



### Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West),  
Mumbai-400058, India  
(Autonomous College Affiliated to University of Mumbai)

#### 1.2.1 Percentage of programmes where syllabus revision was carried out during the last five years

Summary of the courses of each program year wise where the percentage of syllabus revision is 50 % or greater than equal to 50%, mapping of course contents as a proof of it and the syllabus revision report submitted by the chairman and members of syllabus revision committee for such courses

Sr. No.	Program	Page No
1	Applied Sciences and Humanities	
	AY 2022-2023	—
	AY 2021-2022	—
	AY 2020-2021	10-21, 81 - 129
	AY 2019-2020	28-54, 130 - 179
	AY 2018-2019	—
2	Computer Engineering	
	AY 2022-2023	291-301
	AY 2021-2022	302-308
	AY 2020-2021	309-316
	AY 2019-2020	317-325
	AY 2018-2019	326-337
3	Electronics Engineering	
	AY 2022-2023	538-571
	AY 2021-2022	572-589
	AY 2020-2021	590-614
	AY 2019-2020	615-637



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	AY 2018-2019	638-674
4	Electronics and Telecommunication Engineering	
	AY 2022-2023	701-735
	AY 2021-2022	736-753
	AY 2020-2021	754-782
	AY 2019-2020	783-808
	AY 2018-2019	809-843
5	Information Technology	
	AY 2022-2023	
	AY 2021-2022	
	AY 2020-2021	
	AY 2019-2020	
	AY 2018-2019	
6	Master in computer Application	
	AY 2022-2023	954-971
	AY 2021-2022	962-972
	AY 2020-2021	973-987
	AY 2019-2020	988-999
	AY 2018-2019	1002-1024



## SARDAR PATEL INSTITUTE OF TECHNOLOGY

(Autonomous institute affiliated to Mumbai University)  
Munshi Nagar, Andheri (W), Mumbai – 400058.

### Applied Sciences, Mathematics and Humanities

#### Syllabus Revision compiled report of first year courses

Sr. No.	Academic Year	% of New Courses added	Average Syllabus content revision (%)
1	2017-18	33.33 (7/21)	30
2	2019-20	29.16 (7/24)	52
3	2020-21	21.43 (3/14)	49

Rite Das  
Head,

ASMH Department



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### APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2020 – 2021

#### Course Revision Report for All Subjects Taught at First Year B.Tech

Course Name 2019-20	Course Name 2020-21	Overall Percentage Change in Syllabus**
Linear Algebra and Differential Calculus	Engineering Calculus	82
Differential equations and integral calculus	Differential equations and complex analysis	56
Engineering Physics	Engineering Physics	43
Engineering Chemistry	Engineering Chemistry	0
	Engineering Mechanics	100
Engineering Graphics	Engineering Graphics	50
	Biology for Engineers	100
Basic Electrical and Electronics Engineering (for IT & COMPS) Basic Electrical Technology (for ETRX & EXTC)	Basic Electrical Engineering	31
Structured programming approach	Problem solving using imperative programming	0
Digital Circuits	Digital systems and microprocessors	30
Communication Skills	Communication Skills	14
Environmental Studies	-	-
Computational Mathematics Lab I	-	-
Computational Mathematics Lab II	-	-
Engineering Physics lab	-	-
Engineering Chemistry lab	-	-
Engineering Graphics Lab	-	-



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Basic Electrical and Electronics Engineering Lab (for IT & COMPS)	-	-
Basic Electrical Technology Lab (for ETRX & EXTC)	-	-
Structured programming approach Lab	-	-
Digital Circuits Lab	-	-
Python Programming Lab	-	-
	Problem solving using OOPS	100
Workshop-I & II	Skill Shop	30
Constitution of India	-	-
Life Skill Courses	SEVA/SATVA-I	-
Essence of Indian Traditional Knowledge	-	-
Average percentage change in the syllabi of FY B.Tech		49

\*\* Percentage Change in Syllabus = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

Rita Dara  
Head,  
ASMH Department.



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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2019 – 2020

### Course Revision Report for All Subjects Taught at First Year B.Tech

Course Name (Autonomy) 2017-18	Course Name 2019-20	Overall Percentage Change in Syllabus**
Engineering Mathematics-I	Linear Algebra and Differential Calculus	71
Engineering Mathematics-II	Differential equations and integral calculus	0
Applied Physics-I & II	Engineering Physics	65
Applied Chemistry-I & II	Engineering Chemistry	50
Engineering Mechanics	-	-
Engineering Graphics	Engineering Graphics	50
Basic Electrical and Electronics Engineering (for IT & COMPS)	Basic Electrical and Electronics Engineering (for IT & COMPS)	12.8
Basic Electrical Technology (for ETRX & EXTC)	Basic Electrical Technology (for ETRX & EXTC)	12.8
Programming Methodology and Data Structures	Structured programming approach	28
	Digital Circuits	100
Basic Communication Skills	Communication Skills	85
Environmental Studies	Environmental Studies	62
-	Computational Mathematics Lab I	100
-	Computational Mathematics Lab II	100
Applied Science Lab I	Engineering Physics lab	0
Applied Science Lab II	Engineering Chemistry lab	20
Engineering Mechanics Lab	-	-
Engineering Graphics Lab	Engineering Graphics Lab	50



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Basic Electrical Engineering	Basic Electrical and Electronics Engineering Lab (for IT & COMPS)	25
	Basic Electrical Technology Lab (for ETRX & EXTC)	12.5
Programming Methodology and Data Structures Lab	Structured programming approach Lab	38
-	Digital Circuits Lab	100
-	Python Programming Lab	100
Workshop-I	Workshop-I	0
Workshop-II	Workshop-II	0
Constitution of India	Constitution of India	0
-	Life Skill Courses	100
-	Essence of Indian Traditional Knowledge	100
Average percentage change in the syllabi of FY B.Tech		52

\*\*Percentage Change in Syllabus = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

Rita Da.  
Head,  
ASMH Department.



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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Course Revision Report for All Subjects Taught at First Year B.Tech

Course Name (Old) 2016-17	Course Name (New-under autonomy) 2017-18	Overall Percentage Change in Syllabus**
Applied Mathematics-I	Engineering Mathematics-I	12
Applied Mathematics-II	Engineering Mathematics-II	10
Applied Physics-I	Applied Physics-I	21
Applied Physics-II	Applied Physics-II	21
Applied Chemistry-I	Applied Chemistry-I	19
Applied Chemistry-II	Applied Chemistry-II	19
Engineering Mechanics	Engineering Mechanics	0
Engineering Drawing	Engineering Graphics	0
Basic Electrical Engineering	Basic Electrical and Electronics Engineering (for IT & COMPS)	51
	Basic Electrical Technology (for ETRX & EXTC)	19
Structured Programming Approach	Programming Methodology and Data Structures	28
Communication Skills	Basic Communication Skills	38
Business Communication and Ethics*	Advance Communicative English*	73
Environmental Studies	Environmental Studies	38
Applied Physics I, II and Applied Chemistry I, II	Applied Science I Lab	20
	Applied Science II Lab	0
Engineering Mechanics	Engineering Mechanics Lab	25
Engineering Drawing	Engineering Graphics Lab	0



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Course Name (Old) 2016-17	Course Name (New-under autonomy) 2017-18	Overall Percentage Change in Syllabus**
Basic Electrical Engineering	Basic Electrical and Electronics Engineering Lab (for IT & COMPS)	50
	Basic Electrical Technology Lab (for ETRX & EXTC)	25
Structured Programming Approach	Programming Methodology and Data Structures Lab	38
Basic Workshop Practice-I	Workshop-I	71
Basic Workshop Practice-II	Workshop-II	71
	Constitution of India	100
Average percentage change in the syllabi of FY B.Tech		30

\*Will be taught by department faculty in semester VI

\*\*Percentage Change in Syllabus = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

Dr. Dr.

Dr. Rita Desai



## Sardar Patel Institute of Technology

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Syllabus  
 2019

**Academic Year: 2020– 2021**

### **Theory Course Revision Report**

Course Name Old: Linear Algebra and Differential Calculus

Course Code Old (2019-20): BS11

Course Name New: Engineering Calculus

Course Code New (Autonomy 2020-21): MA101

Class and Semester in Old Syllabus: FE ( ALL BRANCHES) SEM I

Class and Semesters in New Syllabus: FE ( ALL BRANCHES) SEM I

### **Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Successive Differentiation and Series (Module 2), Integral Calculus (one variable ) (Module 3), Integral Calculus (multi variable ) (Module 4) –Added 32 lectures	Suggested by Principal sir to make one syllabus on calculus as per requirement of foreign universities.	82.1%
2	Eigen Values and Eigen vectors and its properties, C-H theorem and its applications, Similar matrices, diagonalizable matrices and function of a square matrix, derogatory and non- derogatory matrices, application to find google page rank(Removed 29 lectures)	As these topics are shifted in Linear Algebra syllabus of 2 <sup>nd</sup> Year.	

1. Referred syllabus: <http://www.facweb.iitkgp.ac.in/~rkannan/ac2020/syllabus.pdf>

Committee members Name & Signature:

1. Nida Bakereywala

2. Meghana Naik

Experts Name & Signature:

1. Dr. Ajit Kumar

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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**Academic Year: 2020– 2021**

## Theory Course Revision Report

Course Name Old: Differential Equations and Integral Calculus

Course Code Old (2017-18): BS21

Course Name New: Differential Equations and Complex Analysis

Course Code New (Autonomy 2019-20):MA102

Class and Semester in Old Syllabus: FE ( ALL BRANCHES) SEM II

Class and Semesters in New Syllabus: FE ( ALL BRANCHES) SEM II

### **Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	System of Differential Equations.(02 added) Complex Numbers(12 added)(Module 3) Analytic functions and Complex Integrals(08 added) (Module 4)	Suggested by Principal sir to make one syllabus on Differential equation and complex analysis as per requirement of foreign universities.	56%
2	Integration:1 variable(03 removed) (Module 3) Multiple Integrals and applications(16 removed) (Module 4)	Shifted to Engineering Calculus syllabus in semester I	

Referred syllabus: [https://math.nyu.edu/media/math/filer\\_public/3c/c2/3cc2fbf8-3245-4dbb-92e4-be6b523dfa70/math-ua262-spring2018-syllabus.pdf](https://math.nyu.edu/media/math/filer_public/3c/c2/3cc2fbf8-3245-4dbb-92e4-be6b523dfa70/math-ua262-spring2018-syllabus.pdf)

Committee members Name & Signature:

1. Nida Bakereywala      2. Meghana Naik

Experts Name & Signature:

1. Dr. Ajit Kumar

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Academic Year: 2020– 2021

### Theory Course Revision Report

Course Name: Engineering Physics

Course Code Old (2019-20): BS12/BS22 and BSL12/BSL22

Course Code New (Autonomy 2020-21): AS101

Class and Semester in Old Syllabus: FE-ETRX & EXTC (Sem-II) and FE-COMP & IT (Sem-I)

Class and Semesters in New Syllabus: FE-ETRX & EXTC (Sem-I) and FE-COMP & IT (Sem-II)

#### Change/Addition in the theory portion of syllabus:

Sr. No	Topics Changed/Newly Introduced/Removed	Reason	Overall Percentage Change in syllabus (X)
1	Crystallography (09)	Credits reduced from 4 to 2	(26/52) *100=50% 4-hour theory per week reduced to 2 hour per week so reduction in syllabus
2	Fibre Optics (04)	Credits reduced from 4 to 2	
3	Mechanics and Modern Application (13)	Credits reduced from 4 to 2	

#### Change/Addition in the number of experiments:

Sr. No	Newly Introduced experiments	Reason	Overall Percentage Change in syllabus (X)
1	02	In the new academic scheme the number of experiments to be performed are 10 instead of 8.	(2/10) *100=20%

$$\% \text{ of syllabus revision} = (50 * 0.75 + 20 * 0.25) = 42.5\%$$

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. [https://www.coep.org.in/sites/default/files/FY%20BTech\\_Curriculum\\_E\\_Group.pdf](https://www.coep.org.in/sites/default/files/FY%20BTech_Curriculum_E_Group.pdf)



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2. <http://www.iitb.ac.in/newacadhome/Curriculumfor1styearstudentsof2020batch.pdf>
3. <https://www.iitb.ac.in/mems/en/btech-1st-year-students-curriculum>
4. <https://www.iitk.ac.in › phy › data › physics>

Committee members Name & Signature:

1. Dr. Rita Das (Coordinator)

2. Prof. Gaurish Nerurkar

Experts Name & Signature:

1. Dr. K.G. Suresh, I.I.T., Bombay

\*\*Percentage Change in Syllabus (X) = {No. of hours for newly added topics / Total No. of hours for entire course} x 100



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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2020-21

### Theory Course Revision Report

Course Name	: Engineering Chemistry
Course Code Old (2017-18)	: BS23
Course Code New (Autonomy 2020-21)	: AS102
Class and Semester in Old Syllabus	: Engineering Chemistry, Sem-I (ETRX/EXTC) Engineering Chemistry, Sem II (CE / IT)
Class and Semesters in New Syllabus	: Sem-I (CE & IT) / Sem II (ETRX & EXTC)

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
	NA	NA	0%
Lab course of 1 credit merged into theory, Total Credits = 3			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <https://www.iitm.ac.in/sites/default/files/uploads/b.tech-curriculum.pdf>
2. <https://www.aicte-india.org/sites/default/files>
3. [www.srmuniv.ac.in/content/curriculum-and-syllabus-first-year-btech-all-branches](http://www.srmuniv.ac.in/content/curriculum-and-syllabus-first-year-btech-all-branches)
4. <http://www.coep.org.in/content/fyblechcurriculumstructureanddetailedsyllabi>

Committee members Name & Signature:

1. Dr. Rita Das (Convener)

2. Mrs Ananthalakshmi V

Experts Name & Signature:

Prof Surendra Rathod

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Academic Year: 2020–2021

## Theory Course Revision Report

Course Name: Engineering Mechanics

Course Code Old (2019-20): NIL

Course Code New (Autonomy 2020-21): AS105

Class and Semester in Old Syllabus: NIL

Class and Semesters in New Syllabus: FE-ETRX & EXTC (Sem-II) and FE-COMP & IT (Sem-I)

### Addition in the theory portion of syllabus:

Sr. No.	Topics Introduced	Overall Percentage Change in syllabus
1	Equilibrium of forces	100% change as it is a new course.
2	Friction	
3	Forces in space	
4	Kinematics of Particle	
5	Kinematics of Rigid Bodies	

### Addition in the lab portion of syllabus:

Sr. No.	Topics Introduced	Overall Percentage Change in syllabus
1	Experiments on Equilibrium of forces	100% change as it is a new course.
2	Experiments on Friction	
3	Experiments on Kinematics of Particle	



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Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. [https://www.coep.org.in/sites/default/files/FY%20BTech\\_Curriculum\\_E\\_Group.pdf](https://www.coep.org.in/sites/default/files/FY%20BTech_Curriculum_E_Group.pdf)
2. [https://www.vit.edu/images/NAAC/criteria1/DESH\\_MCIP\\_16\\_17.pdf](https://www.vit.edu/images/NAAC/criteria1/DESH_MCIP_16_17.pdf)
3. <https://www.vit.edu/DESH/images/STRUCTUREandSYLLABUS/FY-Structure-and-Syllabus-of-19-20.pdf>
4. <http://www.iitb.ac.in/newacadhome/Curriculumfor1styearstudentsof2020batch.pdf>
5. <https://www.iitb.ac.in/mems/en/btech-1st-year-students-curriculum>
6. [https://nptel.ac.in/content/syllabus\\_pdf/112105294.pdf](https://nptel.ac.in/content/syllabus_pdf/112105294.pdf)
7. <https://www.vjti.ac.in>

Committee members Name & Signature:

1. Dr. D. M. Patil (Coordinator)
2. H. B. Vasaikar

3. Kaisar Katchi

Experts Name & Signature:

1.

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Academic Year: 2020– 2021

## Theory Course Revision Report

Course Name: Engineering Graphics

Course Code Old (2019-20): ES14 & ESL14/ES24 & ESL24

Course Code New (Autonomy 2020-21): AS104

Class and Semester in Old Syllabus: FE-ETRX & EXTC (Sem-I) and FE-COMP & IT (Sem-II)

Class and Semesters in New Syllabus: FE-ETRX & EXTC (Sem-I) and FE-COMP & IT (Sem-II)

Change/Addition in the theory portion of syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Construction of Engineering Curves	Theory hour reduced	
2	Projections of lines	Theory hour reduced	
3	Projections of solids	Theory hour reduced	
4	Section of solids and Development of lateral surface of solids	Theory hour reduced	(13/26) *100=50% 2-hour theory per week reduced to 1 hour per week so reduction in syllabus

Change/Addition in the lab portion of syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Orthographic Projections	Additional Lab Session introduced	
2	Sectional Orthographic Projections	Additional Lab Session introduced	
3	Isometric View	Additional Lab Session introduced	
4	Section of solids and Development of lateral surface of solids	Additional Lab Session introduced	(13/26) *100=50% 2-hour lab session per week increased to 4-hour lab session per week so addition in syllabus

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- [https://www.coep.org.in/sites/default/files/FY%20BTech\\_Curriculum\\_E\\_Group.pdf](https://www.coep.org.in/sites/default/files/FY%20BTech_Curriculum_E_Group.pdf)
- [https://www.vit.edu/images/NAAC/criteria1/DESH\\_MCIP\\_16\\_17.pdf](https://www.vit.edu/images/NAAC/criteria1/DESH_MCIP_16_17.pdf)
- <https://www.vit.edu/DESH/images/STRUCTUREandSYLLABUS/FY-Structure-and-Syllabus-of-19-20.pdf>



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4. <http://www.iitb.ac.in/newacadhome/Curriculumfor1styearstudentsof2020batch.pdf>
5. <https://www.iitb.ac.in/mems/en/btech-1st-year-students-curriculum>
6. [https://nptel.ac.in/content/syllabus\\_pdf/112105294.pdf](https://nptel.ac.in/content/syllabus_pdf/112105294.pdf)
7. <https://www.vjti.ac.in>

Committee members Name & Signature:

1. Dr. D. M. Patil (Coordinator)

2. H. B. Vasaikar

3. Kaisar Katchi

Experts Name & Signature:

1.

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## APPLIED SCIENCE AND HUMANITY DEPARTMENT

Academic Year: 2020 – 2021

### Theory and Lab Course Revision Report

Course Name: Basic Electrical and Engineering

Course Code Old (2019-20): ES21, ES23, ESL21, ESL23

Course Code New (Autonomy 2020-21): ET101

Class and Semester in Old Syllabus: FE, Sem I & Sem II

Class and Semesters in New Syllabus: FE, Sem I & II

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	DC transient, Converters, Batteries, DC motors	It is used in daily applications hence needs to be known.	
2	(Removed) Electronic devices and its application, OPAMP, IC 555, BLDC motor, permanent magnet DC motor	Electronics devices are covered in physics and generalized dc motors and its applications are included	5/39*100 = 30.95%

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.vjti.ac.in/index.php/academicsyllabus/2-uncategorised/15-academicsyllabus>
2. <https://www.iitk.ac.in/ee/>

Committee members Name & Signature:

1. Dr. R. R. Sawant

2. G. T. Haldankar

3. Payal Shah

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2020-2021

### Theory Course Revision Report

Course Name: Digital Systems & Microprocessor

Course Code Old (2020-21): E512/ESE12

Course Code New (Autonomy 20 - ): EC101

Class and Semester in Old Syllabus: sem I/II, First Year

Class and Semesters in New Syllabus: sem I/II, First Year

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly Introduced 8085 Microprocessor	To introduce concept of Microprocessor in first year itself	Theory (30%) LAB (80%)
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

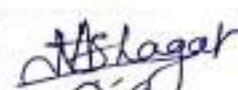
1. [https://www.ee.iitb.ac.in/microprocessor\\_8085](https://www.ee.iitb.ac.in/microprocessor_8085)
2. <https://onlinecourses.nptel.ac.in>
3. <https://mu.ac.in/syllabus>.
- 4.



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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	N. A. Bhagat	ETRX	
2	M. M. PARMAR	EXTC	
3	B. N. CHOUDHARI	Principal	
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

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**Academic Year: 2020– 2021**

## Theory Course Revision Report

**Course Name (New):** Communication skills (Sem-I/Sem-II)

**Course Name (Old):** Communication skills (Sem-I/Sem-II)

**Course Code Old (2019-20):** HSS11

**Course Code New (2020-21):** AS107

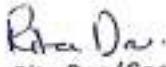
**Class and Semester in Old Syllabus:** FE-ETRX, EXTC, COMP & IT (Sem-I & II)

**Class and Semesters in New Syllabus:** FE-COMP & IT (Sem-I), FE-ETRX & EXTC (Sem-II)

**Change/Addition in the theory portion of syllabus:**

Sr. No	Topics Changed/Newly Introduced/Removed	Reason	Overall Percentage Change in syllabus **(X)
1	Critical Reading: understanding the concept of critical reading and applying to analyze a given text. (1Hr)	To make students read any given text critically and understand the core message of it	(2/14) *100=14%
2	Extempore (1hr)	To enhance impromptu public speaking skills	

**Committee members Name & Signature:**

1. Dr. Rita Das (Coordinator)   
 2. Prof. Firdous Parveen

**Experts Name & Signature:**

1. Dr. Usha Nair

\*\*Percentage Change in Syllabus (X) = {No. of hours for newly added topics / Total No. of hours for entire course} x 100



**Bharatiya Vidya Bhavan's  
Sardar Patel Institute of Technology**  
(Empowered Autonomous Institute Affiliated to the University of Mumbai)  
Applied Sciences, Mathematics & Humanities Department

**Academic Year: 2020-21  
Course Revision Report**

Course Name: Skill Shop (renamed from Workshop I and II)

Course Code Old : ESL16 and ESL26

Course Code New : AS106

Class and Semester in Old Syllabus: First Year, Sem I and II

Class and Semesters in New Syllabus: First Year, Sem I and II

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	2019-20: Carpentry, Electrical board wiring, and sheet metal were all mandatory trades 2020-21: Students may opt for any one trade from carpentry, electrical board wiring, sheet metal.	More weightage given to modern trades, while keeping the mentioned traditional trades as student-interest-based options.	30%
2			
3			
4			

**Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)**

IIT-Bombay:

<https://portal.jitb.ac.in/asc/Courses/crsedetail.jsp?ccd=ME%20113>

<https://portal.iitb.ac.in/asc/Courses/crsedetail.jsp?ccd=ME%20112>

MIT:

<https://d-lab.mit.edu/academics/d-lab-workshop>

**Subject In-Charge Name & Signature:**

Prof. Kaisar Katchi

Mr. Pramod Patil

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

## APPLIED SCIENCES AND HUMANITIES TECHNOLOGY DEPARTMENT

**Academic Year: 2020 – 2021**

### Course Revision Report

Course Name: Problem Solving using Imperative Programming (old- Structured Programming Approach)

Course Code Old (2019-20): ES11/ES21

Course Code New (2020-21): CS101

Class and Semester in Old Syllabus: FE, Sem-I/II

Class and Semesters in New Syllabus: FE, I(COMP/IT/ETRX/EXTC)

#### **Change/Addition in the Syllabus:**

0%

Note: This course was changed from Theory course into Lab course in the current Iteration

#### **Committee members Name & Signature:**

1. Anand Godbole (Co-ordinator)
2. Nikahat Mulla
3. Abhijeet Salunke

**\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100**



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## APPLIED SCIENCES AND HUMANITIES TECHNOLOGY DEPARTMENT

Academic Year: 2020 – 2021

### Theory Course Revision Report

Course Name: Problem Solving using Object Oriented Lab

Course Code New (Autonomy 2020-21): CSL34/ ITL34/ELL34/ETL34

Class and Semester in Old Syllabus: First time introduced.

Class and Semesters in New Syllabus: FE, Sem-II(ETRX/EXTC)/II(COMPS/IT)

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Introduction to OOP and inheritance	To introduce students with the concepts of Object-Oriented programming in early semester	28/28*100 = 100%
2	Abstract class, interface, package		
3	String handling		
4	Exception handling		
5	Multithreading, collection framework		

#### References:

1. Ralph Bravaco,Shai Simoson , “Java Programming From the Group Up” , 1st edition, Tata McGraw-Hill.
2. Herbert Schildt, “Java -The Complete Reference”, 8th edition, Tata McGraw-Hill.
3. Jaime Nino, Frederick A. Hosch, “An introduction to Programming and Object Oriented Design using Java”, 3rd edition, Wiley Student Edition.
4. C Xavier, “Java Programming A Practical Approach”, 1st edition, Tata McGraw-Hill.
5. James Holmes, “Struts: The Complete Reference”, 2nd edition, Tata McGraw-Hill.
6. Jim Keogh, “J2EE: The Complete Reference”, 1st edition, Tata McGraw-Hill.

#### Committee members Name & Signature:

Prof. Swapnali Kurhade

Prof. Abhijeet Salunke

Dr. Pooja Raundale

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



## Sardar Patel Institute of Technology

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### APPLIED SCIENCES AND HUMANITIES TECHNOLOGY DEPARTMENT

Academic Year: 2020 – 2021

#### Theory Course Revision Report

Course Name: Problem Solving using Object Oriented Lab

Course Code New (Autonomy 2020-21): ELL34/ETL34

Class and Semester in Old Syllabus: First time introduced.

Class and Semesters in New Syllabus: FE, Sem-II(ETRX/EXTC)

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Introduction to OOP and inheritance	The course is to be taught in C++ to ETRX and EXTC students	$28/28 * 100 = 100\%$
2	Abstraction		
3	String handling		
4	Exception handling		
5	Polymorphism		

#### Committee members Name & Signature:

Prof. Swapnali Kurhade

Prof. Abhijeet Salunke

Dr. Pooja Raundale

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## APPLIED SCIENCES AND HUMANITIES TECHNOLOGY DEPARTMENT

Academic Year: 2020 – 2021

### Theory Course Revision Report

Course Name: Problem Solving using Object Oriented Lab

Course Code Old (2017-18): IT34

Course Code New (Autonomy 2020-21): CSL34/ ITL34

Class and Semester in Old Syllabus: First time introduced.

Class and Semesters in New Syllabus: FE, Sem-II (COMPS/IT)

#### Change/Addition in the Syllabus:

Sr. No	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	INPUT & OUTPUT	The topic was removed as syllabus was previously of 42 hours. Now it is 28 hours hence topic is removed to accommodate in allocated hours. The course was previously in 3 <sup>rd</sup> semester.	$3/28 * 100 = 12.5\%$

#### References:

1. Ralph Bravaco,Shai Simoson , “Java Programming From the Group Up” , 1st edition, Tata McGraw-Hill.
2. Herbert Schildt, “Java -The Complete Reference”, 8th edition, Tata McGraw-Hill.
3. Jaime Nino, Frederick A. Hosch, “An introduction to Programming and Object Oriented Design using Java”, 3rd edition, Wiley Student Edition.
4. C Xavier, “Java Programming A Practical Approach”, 1st edition, Tata McGraw-Hill.
5. James Holmes, “Struts: The Complete Reference”, 2nd edition, Tata McGraw-Hill.
6. Jim Keogh, “J2EE: The Complete Reference”, 1st edition, Tata McGraw-Hill.

#### Committee members Name & Signature:

Prof. Swapnali Kurhade  
 Prof. Abhijeet Salunke  
 Dr. Pooja Raundale

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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**Academic Year: 2019– 2020**

*Syllabus report*

## Theory Course Revision Report

Course Name Old: Engineering Mathematics-I

Course Code Old (2017-18): BS11

Course Name New: Linear Algebra and Differential Calculus

Course Code New (Autonomy 2019-20):BS11

Class and Semester in Old Syllabus: FE ( ALL BRANCHES) SEM I

Class and Semesters in New Syllabus: FE ( ALL BRANCHES) SEM I

### **Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Eigen Values and eigen vectors and its properties, C-H theorem and its applications, Similar matrices, diagonalizable matrices and function of a square matrix, derogatory and non- derogatory matrices, application to find google page rank(Added 14 lectures)	Suggested by Computer and EXTC departments to put applications of matrices.	70.5%
2	Complex No (Entire module 1) Successive and Partial differentiation (Entire module 2 and 3) Removed 34 Lectures	Course credit is reduced to 3 from 4	

Referred syllabus: 1. Sardar Patel College of Engineering, Andheri,  
 2. V.J.T.I., Matunga

Committee members Name & Signature:

1. C.R. Gajbhiye

2. Nida Bakereywala

3. Meghana Naik

Experts Name & Signature:

1. Dr. Ajit Kumar

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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**Academic Year: 2019– 2020**

## Theory Course Revision Report

Course Name Old: Engineering Mathematics-II

Course Code Old (2017-18): BS21

Course Name New: Differential Equations and Integral Calculus

Course Code New (Autonomy 2019-20):BS21

Class and Semester in Old Syllabus: FE ( ALL BRANCHES) SEM II

Class and Semesters in New Syllabus: FE ( ALL BRANCHES) SEM II

### **Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Linear differential equation, Special types of beta function, DUIS, Mass and volume by triple integration(Removed 13 lectures)	Linear differential equations is already covered in 12 <sup>th</sup> standard Course credit is reduced to 3 from 4.	0% No change in the syllabus (As weightage is reduced as per the credit)

Referred syllabus: 1. Sardar Patel College of Engineering, Andheri,  
 2. V.J.T.I., Matunga

Committee members Name & Signature:

1. C.R. Gajbhiye

2. Nida Bakereywala

3. Meghana Naik

Experts Name & Signature:

1. Dr. Ajit Kumar

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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**Academic Year: 2019– 2020**

### **Theory Course Revision Report**

**Course Name (New): Engineering Physics**

**Course Name (Old): Applied Physics I & Applied Physics II**

**Course Code Old (2017-18): BS12/BS22**

**Course Code New (2019-20): BS12/BS22**

**Class and Semester in Old Syllabus:** FE-ETRX, EXTC, COMP & IT (Sem-I & II)

**Class and Semesters in New Syllabus:** FE-COMP & IT (Sem-I), FE-ETRX & EXTC (Sem-II)

**Change/Addition in the theory portion of syllabus:**

Sr. No	Topics Changed/Newly Introduced/Removed	Reason	Overall Percentage Change in syllabus (X)
1	Crystallography: Ligancy, Critical radius ratio and Point defects (02)	Applied Physics I & II, one module of Engineering Mechanics was combined.	(51/78) *100=65%
2	Quantum Mechanics: Linear harmonic oscillator (01)	One more application of Schrodinger equation.	Two physics courses, one module of Engineering Mechanics was combined in one course, therefore major changes in syllabus.
3	Dielectric and Magnetic materials (07)	Applied Physics I & II, one module of Engineering Mechanics was combined.	
4	Superconductivity (03)	Applied Physics I & II, one module of Engineering Mechanics was combined.	
5	Ultrasonics (03)	Applied Physics I & II, one module of Engineering Mechanics was combined.	
6	Interference and diffraction (13)	Concepts of interference and diffraction were taught through experiments. Applied Physics I & II, one module of Engineering Mechanics was combined.	
7	Electromagnetism (07)	Applied Physics I & II, one module of Engineering Mechanics was combined.	



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8	Nanotechnology (02)	Applied Physics I & II, one module of Engineering Mechanics was combined.	
9	Mechanics and Modern Application (13)	One module of Engineering Mechanics was introduced from applications point of view.	

### Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- [https://www.coep.org.in/sites/default/files/FY%20BTech\\_Curriculum\\_E\\_Group.pdf](https://www.coep.org.in/sites/default/files/FY%20BTech_Curriculum_E_Group.pdf)
- <http://www.iitb.ac.in/newacadhome/Curriculumfor1styearstudentsof2020batch.pdf>
- <https://www.iitb.ac.in/mems/en/btech-1st-year-students-curriculum>
- <https://www.iitk.ac.in › phy › data › physics>

### Committee members Name & Signature:

1. Dr. Rita Das (Coordinator)

2. Prof. Gaurish Nerurkar

### Experts Name & Signature:

- Dr. K.G. Suresh, I.I.T., Bombay

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2019-20.

### Theory Course Revision Report

Course Name	: Engineering Chemistry
Course Code Old (2017-18)	: BS23
Course Code New (Autonomy 2018-19)	: BS13 / BS23
Class and Semester in Old Syllabus	: Applied Chemistry I, Sem-I & Applied Chemistry II, Sem II (CE / IT / ETRX / EXTC)
Class and Semesters in New Syllabus	: Sem-I (ETRX & EXTC) / Sem II (CE & IT)

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Thermodynamics	Importance of heat transfers	26/ 52*100 = 50%
2	Electrochemical sensors	Many students undertake projects using sensors	
3	Non petroleum fuels	Important in the current scenario of reducing harmful emissions	
	Topics Removed : Modules on water, Phase Rule, Lubricants, Polymers : Introduction to polymers, Classification (Monomers, Tacticity, Chemical Structure) Thermoplastic and Thermosetting plastic; Fabrication of plastic by Compression, Injection, Transfer and Extrusion moulding. Preparation, properties and uses of Urea formaldehyde, Kevlar, PMMA, Polymers in medicine & surgery, Polymer blends and alloys, Rubbers : Drawbacks of natural rubber, Vulcanization of rubber, Preparation, properties and uses of Silicone and Polyurethane rubber. Nanomaterials : Synthesis,	Since the credits assigned for the course have been reduced from 4 to 2, only topics relevant for programs in our institution have been retained	



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Corrosion : Methods of coating, factors affecting rate of corrosion, Fuels : proximate and ultimate analysis Alloys : complete module Composites ; Complete Module		
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Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <https://www.iitm.ac.in/sites/default/files/uploads/b.tech-curriculum.pdf>
2. <https://www.aicte-india.org/sites/default/files>
3. [www.smuniv.ac.in/content/curriculum-and-syllabus-first-year-btech-all-branches](http://www.smuniv.ac.in/content/curriculum-and-syllabus-first-year-btech-all-branches)
4. <http://www.coep.org.in/content/fybttechcurriculumstructureanddetailedsyllabi>

Committee members Name & Signature:

1. Dr. Rita Das (Convener)

2. Mrs Ananthalakshmi V

Experts Name & Signature:

Prof Surendra Rathod

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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Academic Year: 2019– 2020

## Theory Course Revision Report

**Course Name:** Engineering Graphics

**Course Code Old (2018-19):** ES15 & ESL15/ES25 & ESL25

**Course Code New (Autonomy 2019-20):** ES14 & ESL14/ES24 & ESL24

**Class and Semester in Old Syllabus:** FE-ETRX & EXTC (Sem-I) and FE-COMP & IT (Sem-II)

**Class and Semesters in New Syllabus:** FE-ETRX & EXTC (Sem-I) and FE-COMP & IT (Sem-II)

### Change/Addition in the theory portion of syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Construction of Engineering Curves	Theory hour reduced	$(26/52) *100=50\%$ 3-hour theory per week reduced to 2 hour per week and 1 hour tutorial removed so reduction in syllabus
2	Projections of lines	Theory hour reduced	
3	Projections of solids	Theory hour reduced	
4	Section of solids and Development of lateral surface of solids	Theory hour reduced	

### Change/Addition in the lab portion of syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Orthographic Projections	Additional Lab Session introduced	$(13/26) *100=50\%$ 2-hour lab session per week increased to 4-hour lab session per week so addition in syllabus
2	Sectional Orthographic Projections	Additional Lab Session introduced	
3	Isometric View	Additional Lab Session introduced	
4	Section of solids and Development of lateral surface of solids	Additional Lab Session introduced	

### Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- [https://www.coep.org.in/sites/default/files/FY%20BTech\\_Curriculum\\_E\\_Group.pdf](https://www.coep.org.in/sites/default/files/FY%20BTech_Curriculum_E_Group.pdf)
- [https://www.vit.edu/images/NAAC/criteria1/DESH\\_MCIP\\_16\\_17.pdf](https://www.vit.edu/images/NAAC/criteria1/DESH_MCIP_16_17.pdf)
- <https://www.vit.edu/DESH/images/STRUCTUREandSYLLABUS/FY-Structure-and-Syllabus-of-19-20.pdf>



## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)



4. <http://www.iitb.ac.in/newacadhome/Curriculumfor1styearstudentsof2020batch.pdf>
5. <https://www.iitb.ac.in/mems/en/btech-1st-year-students-curriculum>
6. [https://nptel.ac.in/content/syllabus\\_pdf/112105294.pdf](https://nptel.ac.in/content/syllabus_pdf/112105294.pdf)
7. <https://www.vjti.ac.in>

Committee members Name & Signature:

1. Dr. D. M. Patil (Coordinator)
2. H. B. Vasaikar
3. Kalsar Katchi

Experts Name & Signature:

- 1.

\*\*Percentage Change in Syllabus (X) = {No. of hours for newly added topics / Total No. of hours for entire course} x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

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## APPLIED SCIENCE AND HUMANITY DEPARTMENT

Academic Year: 2019 – 2020

### Theory Course Revision Report

Course Name: Basic Electrical Technology

Course Code Old (2018-19): ES21

Course Code New (Autonomy 2019-20): ES13

Class and Semester in Old Syllabus: FE, Sem II

Class and Semesters in New Syllabus: FE, Sem I

#### **Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Permanent magnet DC motor, Stepper and BLDC motor	These motors are used in majority applications	
2	(removed) DC machine, equivalent circuit and different starting methods of motor.	Application of more used motors is considered.	5/39*100 = <b>12.8%</b>

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.vjti.ac.in/index.php/academicsyllabus/2-uncategorised/15-academicsyllabus>
2. <https://www.iitk.ac.in/ee/>

Committee members Name & Signature:

1. Dr. R. R. Sawant

2. G. T. Haldankar

3. Payal Shah

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCE AND HUMANITY DEPARTMENT

Academic Year: 2019 – 2020

### Theory Course Revision Report

Course Name: Basic Electrical and Electronics Engineering

Course Code Old (2018-19): ES11

Course Code New (Autonomy 2019-20): ES23

Class and Semester in Old Syllabus: FE, Sem I

Class and Semesters in New Syllabus: FE, Sem II

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Types of different diodes like LED, Schottky diode, photovoltaic solar array, MOSFET and its applications, concepts of ADC and DAC and their types	These diodes, MOSFET based circuits, ADC and DAC are used in day to day applications	5/39*100 = 12.8%
2	(Removed) Oscillators	IT and COMP students don't have any course based on use of oscillators	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.vjti.ac.in/index.php/academicsyllabus/2-uncategorised/15-academicsyllabus>
2. <https://www.iitk.ac.in/ee/>

Committee members Name & Signature:

1. Dr. R. R. Sawant

2. G. T. Haldankar

3. Payal Shah

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES TECHNOLOGY DEPARTMENT

Academic Year: 2019 – 2020

### Theory Course Revision Report

Course Name: Structured Programming Approach (old- Programming Methodology and Data Structures)

Course Code Old (2017-18): ES14/ES24

Course Code New (2019-20): ES11/ES21

Class and Semester in Old Syllabus: FE, Sem-I/II

Class and Semesters in New Syllabus: FE, I(COMP/IT)/ Sem-II(ETRX/EXTC)/

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced/Removed	Reason	Overall Percentage Change in syllabus (X)
1	Introduction to Data Structure: Linear and Non-Linear Stack:Stack as ADT, operations on stack, applications of stack.	These data structures are covered as part of higher semester course in Sem III-Data Structures as per the revised scheme	$11/39 \times 100 = 28.20\%$
2	Queue:Queue as ADT , Operation on Queue,Types of Queue: Circular and Priority Queue, Applications of Queue.		
3	Linked List:Linked List as ADT, Operations on Singly Linked List.		

**Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)**

1. <http://cse.iitkgp.ac.in/~pds/>
2. <https://www.annauniv.edu/dct/documents/cse20012befull.pdf>
3. <http://courses.cs.vt.edu/~cs3online/DataStructures/Lessons/index.html>

**Committee members Name & Signature:**

1. Nikahat Mulla (Co-ordinator)

2. Abhijeet Salunke

3. Prof. Anand Godbole

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2019-20

### Theory Course Revision Report

Course Name: **Digital Circuits (theory)**

Course Code Old (2020-21): **EL303**

Course Code New (Autonomy 20 - ): **ES12**

Class and Semester in Old Syllabus: **sem III ,SE ETRX / EXT C**

Class and Semesters in New Syllabus: **sem I/sem II ,First Year.**

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced in First Year	To expose students to the concept of digital circuits in first year itself	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

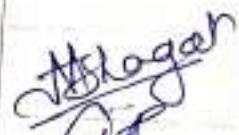
1. <https://www.ee.iitb.ac.in/digitalSystems>
2. <https://onlinecourses.nptel.ac.in>
3. <https://mu.ac.in/Syllabus>
- 4.



## Sardar Patel Institute of Technology

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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	N.A. BHAGAT	ETRX	
2	M.M. PARMAR	EXTC	
3	B. N. CHOUDHARI	Principal	
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Academic Year: 2019– 2020

## Theory Course Revision Report

**Course Name (New):** Communication skills (Sem-I/Sem-II)

**Course Name (Old):** Basic communication skills (Sem-I/Sem-II)

**Course Code Old (2017-18):** HSS11

**Course Code New (2019-20):** HSS11

**Class and Semester in Old Syllabus:** FE-ETRX, EXTC, COMP & IT (Sem-I & II)

**Class and Semesters in New Syllabus:** FE-COMP & IT (Sem-I), FE-ETRX & EXTC (Sem-II)

### Change/Addition in the theory portion of syllabus:

Sr. No	Topics Changed/Newly Introduced/Removed	Reason	Overall Percentage Change in syllabus **(X)
1	1.1 Concept of Word Formation & the Root words from foreign languages and their use in English (1hr) 1.2 Common Errors in Writing, Redundancies, Clichés (3hrs)	To make students understand the formation of words in English thereby helping to reduce common errors in spellings	(22/26) *100=85%
2	2.1 Basic Writing Skills: Sentence Structures, organizing Paragraph in direct or indirect style, creating coherence:7'Cs of Communication (3hrs) 2.2 Writing Practices: 2.2.1. Comprehension passage (2hrs) 2.3 Review Writing: Critical analysis of a book (fiction)/movie using a specific perspective, Writing a paper on the same (3hrs)	More focus on technical writing skills and reviewing content to have more depth understanding of writing style	
3	3.1 Listening Comprehension: Pronunciation, Intonation, Stress and Rhythm (2hrs) 3.2 Speaking Practices: (8hrs) 3.2.1. Common Everyday Situations: Conversations and Dialogues (language lab) 3.2.2. Communication at Workplace: Meeting, notice, agenda, minutes (language lab) 3.2.3. Public Speaking: Formal Speech	To enhance listening and public speaking skills	



## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

Committee members Name & Signature:

- Rita Das  
1. Dr. Rita Das (Coordinator)      2. Prof. Firdous Parveen

Experts Name & Signature:

1. Dr. Usha Nair

\*\*Percentage Change in Syllabus (X) = {No. of hours for newly added topics / Total No. of hours for entire course} x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

**Academic Year: 2019 – 2020**

### Theory Course Revision Report

Course Name	:	Environmental Studies
Course Code Old (2016-17)	:	FEC106
Course Code New (Autonomy 2018-19)	:	MC21
Class and Semester in Old Syllabus	:	FE, Sem-II (All Branches)
Class and Semesters in New Syllabus	:	FE, Sem-I (CE / IT) FE, Sem-II (ETRX/EXTC)

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Activity based learning on Reuse / Recycle approach	Crucial strategies for sustainable development	8/13*100 = 62%
2	Poster Making on environmental issues	Awareness campaigns on key issues are the key to resolving most of them	
3	Plantation activity	To instill social responsibility in students	
	Removal : Lectures on ecosystems, sustainable development, renewable sources of energy	Repetitive as several such courses would have been taken by the students in the past	

- 1. [www.ictmumbai.edu.in](http://www.ictmumbai.edu.in)
- 2. <https://www.aicte-india.org/sites/default/files>
- 3. <http://www.coep.org.in/content/fyblechcurriculumstructureanddetailedsyllabi>

Committee members Name & Signature:

1. Dr. Rita Das (Convener)

2. Mrs Ananthalakshmi V

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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**Academic Year: 2019– 2020**

## **Theory Course Revision Report**

Course Name Old:-

Course Code Old (2017-18):

Course Name New: Computational Mathematics Lab-I

Course Code New (Autonomy 2019-20):BSL11

Class and Semester in Old Syllabus:-

Class and Semesters in New Syllabus: FE ( ALL BRANCHES) SEM 1

### **Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	All	Introduced mathematics lab with the help of SCILAB to understand various numerical methods in semester-I computationally.	100%

Referred syllabus: 1. Sardar Patel College of Engineering, Andheri,  
 2. V.J.T.I., Matunga

Committee members Name & Signature:

1. C.R. Gajbhiye                  2. Nida Bakereywala                  3. Meghana Naik

Experts Name & Signature:

1. Dr. Ajit Kumar

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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**Academic Year: 2019– 2020**

## Theory Course Revision Report

Course Name Old:-

Course Code Old (2017-18):

Course Name New: Computational Mathematics Lab-II

Course Code New (Autonomy 2019-20):BSL21

Class and Semester in Old Syllabus:-

Class and Semesters in New Syllabus: FE ( ALL BRANCHES) SEM II

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	All	Introduced mathematics lab with the help of SCILAB to understand various numerical methods in semester-II computationally.	100%

Referred syllabus: 1. Sardar Patel College of Engineering, Andheri,  
 2. V.J.T.I., Matunga

Committee members Name & Signature:

1. C.R. Gajbhiye

2. Nida Bakereywala

3. Meghana Naik

Experts Name & Signature:

1. Dr. Ajit Kumar

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2019 – 2020

### Lab Course Revision Report

New course name: **Engineering Physics Lab**

Old course name: Applied science lab-I & II

Course Code Old (2017-18): BSL14 and BSL24

Course Code New : BSL12 & BSL22

Class and Semester in Old Syllabus: FE, Sem-I, Sem-II

Class and Semesters in New Syllabus: FE, Sem-I (COMP & IT), Sem-II (ETRX & EXTC)

#### **Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	No Change	Experiments of both the semesters have been combined	0%

Committee members Name & Signature:

Committee members Name & Signature:

1. Dr. Rita Das (Convener) *Rita Das*

2. Mr. Gaurish Nerurkar *Gaurish*

Experts Name & Signature:

1. Dr. K. G. Suresh

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2019-20

### Lab Course Revision Report

Course Name	: Engineering Chemistry Lab
Course Code Old (2017-18)	: BSL 13
Course Code New (Autonomy 2019-20)	: BSL13 / BSL23(Applied Chemistry)
Class and Semester in Old Syllabus	: Applied Chemistry Lab I, Sem I / Applied Chemistry Lab II, Sem II
Class and Semesters in New Syllabus	: Engineering Chemistry Lab, Sem I (ETRX /EXTC) Engineering Chemistry Lab, Sem II (CE /IT)

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	pHmetric and Conductometric Titrations	Correlate with theoretical knowledge of electrochemical sensors.	$2/10 \times 100 = 20\%$
	Removed Experiments : Estimation of Zn and Ni in alloys		

Committee members Name & Signature:

Committee members Name & Signature:

1. Dr. Rita Das (Convener)

2. Mrs Ananthalakshmi V

Experts Name & Signature:

1. Prof Surendra Rathod

\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## APPLIED SCIENCE AND HUMANITY DEPARTMENT

Academic Year: 2019 – 2020

### Lab Course Revision Report

Course Name: Basic Electrical and Electronics Engineering

Course Code Old (2018-19): ESL11

Course Code New (Autonomy 2019-20): ESL23

Class and Semester in Old Syllabus: FE, Sem I

Class and Semesters in New Syllabus: FE, Sem II

#### **Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Experiments on measuring Instruments	As measuring instruments are required for electrical parameter measurement	
2	1 experiment on IC555	Included the topics related to IC 555 in theory	2/8*100 = 25%

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.vjti.ac.in/index.php/academicsyllabus/2-uncategorised/15-academicsyllabus>
2. <https://www.iitk.ac.in/ee/>

Committee members Name & Signature:

1. Dr. R. R. Sawant

2. G. T. Haldankar

3. Payal Shah

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCE AND HUMANITY DEPARTMENT

Academic Year: 2019 – 2020

### Lab Course Revision Report

Course Name: Basic Electrical Technology

Course Code Old (2018-19): ES21

Course Code New (Autonomy 2019-20): ES13

Class and Semester in Old Syllabus: FE, Sem II

Class and Semesters in New Syllabus: FE, Sem I

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	1 experiments on motors is added	As in theory syllabus induction motor is introduced.	$1/8 * 100 = 12.5\%$

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.vjti.ac.in/index.php/academicsyllabus/2-uncategorised/15-academicsyllabus>
2. <https://www.iitk.ac.in/ee/>

Committee members Name & Signature:

1. Dr. R. R. Sawant

2. G. T. Haldankar

3. Payal Shah

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES TECHNOLOGY DEPARTMENT

**Academic Year: 2019-20**

### Lab Course Revision Report

**Course Name:** Structured Programming Approach (old- Programming Methodology and Data Structures Laboratory)

**Course Code Old (2017-18):** ESL14/ESL24

**Course Code New (2019-20):** ESL11/ESL21

**Class and Semester in Old Syllabus:** FE, Sem-I/II

**Class and Semesters in New Syllabus:** FE, Sem-I(ETRX/EXTC)/II(COMPS/IT)

#### **Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced/Removed	Reason	Overall Percentage Change in syllabus (X)
1.	To explore concepts of Stack as linear data structure by developing application	These data structures are covered as part of higher semester course in Sem III	$3/8 * 100 = 37.5\%$
2.	To explore the concepts of Queue as linear data structure by developing application		
3.	To explore the concept of dynamic memory allocation using Linked list as Non-linear data structure.		

#### **Committee members Name & Signature:**

1. Nikahat Mulla (Co-ordinator)
2. Abhijeet Salunke
3. Prof. Anand Godbole

**\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100**



# Sardar Patel Institute of Technology

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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2019-20

### Theory Course Revision Report

Course Name: Digital Circuits LAB

Course Code Old (2020-21): EL303

Course Code New (Autonomy 20 - ): ESL12

Class and Semester in Old Syllabus:

second year semIII

Class and Semesters in New Syllabus:

first year sem I/II

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced LAB course in first year	To introduce students to the concept of Digital Circuits LAB in first year itself	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

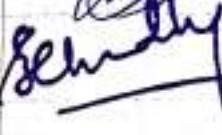
1. <https://onlinecourses.nptel.ac.in>
2. <https://mu.ac.in/syllabus>
3. <https://www.ee.iitb.ac.in/digital-systems>
- 4.



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	N.A. BHAGAT	ETRX	
2	M.M. PARMAR	EXTC	
3	B.N. CHOUDHARI	Principal	
4			

## Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES TECHNOLOGY DEPARTMENT

Academic Year: 2019 – 2020

### Course Revision Report

Course Name: Python Programming Lab

Course Code New (Autonomy 2019-20); ESL25/15

Class and Semester in Old Syllabus: Newly Introduced Lab Course

Class and Semesters in New Syllabus: FE, Sem-I(ETRX/EXTC)/II(COMPS/IT)

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Variable, Expressions and Statements, Functions and modules, Case study: Interface design, Conditionals and recursion	To Solve mathematical problems using Python and able to create a software application using Python.	
2	Fruitful functions and Iterations, Strings, List, Dictionaries and Tuples, Classes and Objects		16/16*100 = 100%
3	Create any software application using Python to interface any Hardware		

\*Students should refer first 150 pages from the reference book [1] Allen Downey "Think Python" Version 2.0.17, Green Tea Press, 2012 and listen the NPTEL videos on "Python Data Structures and Algorithms".

#### Recommended Books:

- [1] Allen Downey "Think Python" Version 2.0.17, Green Tea Press, 2012.
- [2] Martin C. Brown, "The Complete Reference Python" McGraw Hill Education
- [3] NPTEL video lectures on "Python Data Structures and Algorithms"

#### Committee members Name & Signature:

1. Govind T Haldankar

2. Nikahat Mulla

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



**Bharatiya Vidya Bhavan's  
Sardar Patel Institute of Technology**

(Empowered Autonomous Institute Affiliated to the University of Mumbai)  
Applied Sciences, Mathematics & Humanities Department

**Academic Year: 2019-20  
Course Revision Report**

Course Name: Workshop I and II

Course Code Old : ESL13 and ESL23

Course Code New : ESL16 and ESL26

Class and Semester in Old Syllabus: First Year, Sem I and II

Class and Semesters in New Syllabus: First Year, Sem I and II

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	-	-	0%
2	-	-	
3	-	-	
4	-	-	

**Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)**

IIT-Bombay:

<https://portal.iitb.ac.in/asc/Courses/crsedetail.jsp?ccd=ME%20113>

<https://portal.iitb.ac.in/asc/Courses/crsedetail.jsp?ccd=ME%20112>

MIT:

<https://d-lab.mit.edu/academics/d-lab-workshop>

**Subject In-Charge Name & Signature:**

Prof. Kaisar Katchi

Mr. Pramod Patil

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Syllabus  
report

Course Name: Engineering Mathematics-I  
Course Code Old (2016-17): FEC101  
Course Code New (Autonomy 2017-18): BS11  
Class and Semester in Old Syllabus: FE, Sem- I  
Class and Semesters in New Syllabus: FE, Sem- I

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1.	Application of solving system of equations in electrical networks, traffic control and balancing chemical equations	To understand the real time applications of matrices	
2.	Curl and divergence of a vector.	Required for the course of Applied Physics-II in semester II	
3.	De'moivre's Theorem	Required as a prerequisite for complex numbers	
4.	Application of matrices to Decoding	To understand the way to verify an encoded message with the help of matrix	12
5.	(Removed) L- Hospital Rule, problems involving series	Already learnt at HSC level	
6.	(Removed) Solution of Transcendental Equations: Solution by Newton Raphson method and Regula -Falsi Equation	Not relevant for higher courses as per suggestion of BoS	



## Sardar Patel Institute of Technology

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7.	(Removed) Jacobian	
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Committee members Name & Signature:

1. Ms. Meghana N.

2. Ms. Nida B.

3. Mr. C. R. Gajbhiye

Experts Name & Signature:

1. Dr. G. K. Srinivasan

2. Dr. Ajit Kumar

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Engineering Mathematics-II

Course Code Old (2016-17): FEC201

Course Code New (Autonomy 2017-18): BS21

Class and Semester in Old Syllabus: FE, Sem- II

Class and Semesters in New Syllabus: FE, Sem- II

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1.	Formulation of differential equations to solve simple electrical problems	To introduce basic formulation of Differential equations.	
2.	Tracing of curves and solids Tracing of curves and solids	To introduce sketching of curves and solids for better understanding of multiple integrals.	9.62
3.	Application of Numerical Integration to study Motion of a	To enhance application based learning	



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Moving body Application of Numerical Integration to study Motion of a Moving body		
4. Rectification (removed)	Not required much for higher mathematics	

Committee members Name & Signature:

1. Ms. Nida B.

2. Ms. Meghana N.

3. Mr. C. R. Gajbhiye

Experts Name & Signature:

1. Dr. G. K. Srinivasan

2. Dr. Ajit Kumar

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Applied Physics-I

Course Code Old (2016-17): FEC102

Course Code New (Autonomy 2017-18): BS12

Class and Semester in Old Syllabus: FE, Sem- I

Class and Semesters in New Syllabus: FE, Sem- I

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1.	(Introduced) Introduction to X-rays	Use of x-rays to study crystal structures is part of the syllabus, hence introduction to x-rays is introduced.	
2.	(Introduced) Dielectric and magnetic materials	Characterization of various engineering materials are required.	
3.	(Removed) Acoustics	More relevance to civil engineering students	
4.	(Removed) Liquid crystal phases	It was being taught at a very elementary level and out of context in crystallography	20.5
5.	(Removed) FET, SCR., MOSFET	It is being covered in advanced courses	
6.	(Removed) Quantum mechanics	Moved to second semester.	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- [http://academic.vnit.ac.in/images/programs/ug/batch2014/First\\_Year\\_B.Tech\\_Course\\_Book\\_2015.pdf](http://academic.vnit.ac.in/images/programs/ug/batch2014/First_Year_B.Tech_Course_Book_2015.pdf)
- [http://www.coep.org.in/sites/default/files/FY%20BTech\\_Curriculum\\_E\\_Group.pdf](http://www.coep.org.in/sites/default/files/FY%20BTech_Curriculum_E_Group.pdf)

Committee members Name & Signature:

1. Dr. Rita Das

2. Mr. D. M. Patil

3. Mr. Gaurish Nerurkar

Experts Name & Signature:

1. Dr. K. G. Suresh

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Applied Physics-II

Course Code Old (2016-17): FEC202

Course Code New (Autonomy 2017-18): BS22

Class and Semester in Old Syllabus: FE, Sem- II

Class and Semesters in New Syllabus: FE, Sem- II

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1.	(Introduced) Solid state laser – Ruby	First prototype solid state laser.	
2.	(Introduced) Quantum mechanics, Quantum Tunneling	It has been shifted from semester I. Also, quantum tunneling introduced as it is an important concept for understanding various quantum devices.	
3.	(Introduced) Coulomb's law, continuous charge distribution; application of Gauss law for spherical symmetry, Divergence of magnetic induction, Biot-Savart law; Ampere's circuit law; Faraday's law of emf	To understand the development of Maxwell's equations from the known concepts. It is also a pre-requisite for the course on electromagnetic wave theory taught in the higher semesters	
3.	(Removed) Cartesian, Cylindrical and Spherical Coordinate system, Scalar and Vector field, Physical significance of gradient, curl and divergence, design of antenna, wave guide, satellite communication	It is covered under the course of Engineering Mathematics-I	20.5
4.	(Removed) Charge particle in electric and magnetic fields	The topic is extensively covered at HSC level	
5.	(Removed) Introduction to nano-science and nanotechnology, Surface to volume ratio, Bottom up technique and top down technique,	It is covered under the course of Applied Chemistry-I	



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Nano materials: Methods to synthesize  
nanomaterials

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- [http://academic.vnit.ac.in/images/programs/ug/batch2014/First\\_Year\\_B.Tech\\_Course\\_Book\\_2015.pdf](http://academic.vnit.ac.in/images/programs/ug/batch2014/First_Year_B.Tech_Course_Book_2015.pdf)
- [http://www.coep.org.in/sites/default/files/FY%20BTech\\_Curriculum\\_E\\_Group.pdf](http://www.coep.org.in/sites/default/files/FY%20BTech_Curriculum_E_Group.pdf)

Committee members Name & Signature:

1. Dr. Rita Das

2. Mr. D. M. Patil

3. Mr. Gaurish Nerurkar

Experts Name & Signature:

Dr. K. G. Suresh

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Applied Chemistry I

Course Code Old (2016-17): FEC103

Course Code New (Autonomy 2017-18): BS13

Class and Semester in Old Syllabus: FE, Sem-I

Class and Semesters in New Syllabus: FE, Sem-I

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Molecular weights and molecular weight distribution of Polymers, Addition and Condensation Polymers, liquid crystal polymers, polymer blends and Alloys,	Focus on applications of polymers based on their properties like molecular weights and distribution	5/26*100 = 19%
2	Selection of lubricants	lubricants for different applications	
3	Carbon nanomaterials	Advances in materials science is an integral part of engineering sciences	
	Removal : Sewage treatment*, Municipal water treatment, Compounding of polymers**, Cement***	Since the credits assigned for the course have been reduced from 3 to 2, only topics relevant for programs in our institution have been retained	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <https://www.iitm.ac.in/sites/default/files/uploads/b.tech-curriculum.pdf>
2. <https://www.aicte-india.org/sites/default/files>
3. [www.srmuniv.ac.in/content/curriculum-and-syllabus-first-year-btech-all-branches](http://www.srmuniv.ac.in/content/curriculum-and-syllabus-first-year-btech-all-branches)
4. <http://www.coep.org.in/content/fybtechcurriculumstructureanddetailedsyllabi>

Committee members Name & Signature:

1. Dr. Rita Das (Convener)  
3. Dr. Vidya Nikumbh

2. Mrs Ananthalakshmi V

Experts Name & Signature:  
1. Prof B M Bhanage

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Applied Chemistry II

Course Code Old (2016-17): FEC203

Course Code New (Autonomy 2017-18): BS23

Class and Semester in Old Syllabus: FE, Sem-II

Class and Semesters in New Syllabus: FE, Sem-II

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Catalytic Converters	Knowledge of devices to help comply with environmental norms	5/26*100 = 19%
2	Batteries and Battery Technology	Knowledge of different kinds of batteries and utility of fuel cells will be crucial in the current scenario.	
3	Ceramics and Cermets	Advances in materials is an integral part of engineering sciences	
	Removal : Cracking of petroleum, Powder Metallurgy	Since the credits assigned for the course have been reduced from 3 to 2, only topics relevant for programs in our institution have been retained	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <https://www.iitm.ac.in/sites/default/files/uploads/b.tech-curriculum.pdf>
2. <https://www.aicte-india.org/sites/default/files>
3. [www.srmuniv.ac.in/content/curriculum-and-syllabus-first-year-btech-all-branches](http://www.srmuniv.ac.in/content/curriculum-and-syllabus-first-year-btech-all-branches)
4. <http://www.coep.org.in/content/fybttechcurriculumstructureanddetailedsyllabi>

Committee members Name & Signature:

- Rita D.  
 1. Dr. Rita Das (Convener)  
 3. Dr. Vidya Nikumbh

2. Mrs Ananthalakshmi V

Experts Name & Signature:

1. Prof B M Bhanage

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCE AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Engineering Mechanics

Course Code Old (2016-17): FEC104

Course Code New (Autonomy 2017-18): ES12/ES22

Class and Semester in Old Syllabus: FE (COMP, IT, ETRX, EXTC) Semester-I

Class and Semesters in New Syllabus: FE (COMP, IT & ETRX, EXTC) Semester-I & II

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced/	Reason	Overall Percentage Change in syllabus (X)
1	No Change	Fundamental Subject at first year level.	0/39*100 = 0

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.cs.cornell.edu/courses/cs501/2005sp/syllabus.html>
2. [https://www.annauniv.edu/academic\\_courses/PG%20CBCS%20%20\(R-2015\)/WS%2014.08.2015/04.%20I%20&%20C/47.M.Tech%20IT-.pdf](https://www.annauniv.edu/academic_courses/PG%20CBCS%20%20(R-2015)/WS%2014.08.2015/04.%20I%20&%20C/47.M.Tech%20IT-.pdf)
3. <http://cse.iitkgp.ac.in/oldlook/syllabus.html>
4. [https://iitbhu.ac.in/institute-repository/db/2016/ir-2016-025/CSE\\_Syllabus\\_Booklet\\_4\\_Yr\\_BTech\\_Revised\\_060120163.pdf](https://iitbhu.ac.in/institute-repository/db/2016/ir-2016-025/CSE_Syllabus_Booklet_4_Yr_BTech_Revised_060120163.pdf)

Committee members Name & Signature:

1. Dr. Rita Das (Coordinator)
2. Mr. D. M. Patil
3. Mr. H. B. Vasaikar
4. Mr. Kaisar Katchi
5. Mr. Shoaib Shaik

Experts Name & Signature:

1. Dr. S. M. Khot

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## APPLIED SCIENCE AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Engineering Graphics

Course Code Old (2016-17): FEC204

Course Code New (Autonomy 2017-18): ES15/ES25

Class and Semester in Old Syllabus: FE (COMP, IT, ETRX, EXTC) Semester-I

Class and Semesters in New Syllabus: FE (COMP, IT & ETRX, EXTC) Semester-I & II

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced/	Reason	Overall Percentage Change in syllabus (X)**
1	No Change	Fundamental Subject at first year level.	0/39*100 = 0

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <https://www.nitt.edu/home/academics/curriculum/B.Tech-Ist-2013.pdf>
2. [http://unipune.ac.in/Syllabi\\_PDF/revised/engg/FE\\_Syllabus.pdf](http://unipune.ac.in/Syllabi_PDF/revised/engg/FE_Syllabus.pdf)
3. <http://www.nirmauni.ac.in/ITNU/Events/682>
4. <https://www.annauniv.edu/pdf/1stsem.pdf>

Committee members Name & Signature:

1. Dr. Rita Das (Coordinator)
2. Mr. D. M. Patil
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**Sardar Patel Institute of Technology**  
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**APPLIED SCIENCE AND HUMANITY DEPARTMENT**

**Academic Year: 2017 – 2018**

**Theory Course Revision Report**

Course Name: Basic Electrical and Electronics

Course Code Old (2016-17): FEC105

Course Code New (Autonomy 2018-19): ES11

Class and Semester in Old Syllabus: FE, Sem I

Class and Semesters in New Syllabus: FE, Sem I

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Semiconductor devices: Diode, Transistor and their applications	IT and COMP syllabus is not having Electronics in higher semester	
2	(Removed) Motors and Transformer	High voltage machines may not be important for IT and COMP students	20/39*100 = 51.3%

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.vjti.ac.in/index.php/academicsyllabus/2-uncategorised/15-academicsyllabus>
2. <https://www.iitk.ac.in/ee/>

Committee members Name & Signature:

1. Prof. Payal Shah (Coordinator)

*Payal*

2. Dr. S. Rathod

*S. Rathod*

3. Ganpat Parulekar

Experts Name & Signature:

1. G. T. Haldankar

*G.T.Haldankar*

2. Milind Paraye

*Milind Paraye*

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## APPLIED SCIENCE AND HUMINITY DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Basic Electrical Technology

Course Code Old (2016-17): FEC105

Course Code New (Autonomy 2018-19): ES21

Class and Semester in Old Syllabus: FE, Sem I

Class and Semesters in New Syllabus: FE, Sem II

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Magnetic circuit	It is prerequisite for Transformer module.	
2	Induction Motor is added.	Since transformer was in the syllabus Induction motor is also added as an rotating machine.	8/42*100 = 19%

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.vjti.ac.in/index.php/academicsyllabus/2-uncategorised/15-academicsyllabus>
2. <https://www.iitk.ac.in/ee/>

Committee members Name & Signature:

1. Prof. Payal Shah (Coordinator)

2. Dr. S. Rathod

3. Ganpat Parulekar

Experts Name & Signature:

1. G. T. Haldankar

2. Milind Paraye

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



**APPLIED SCIENCES AND HUMANITIES TECHNOLOGY DEPARTMENT**

Academic Year: 2017 – 2018

**Theory Course Revision Report**

Course Name: Programming Methodology and Data Structures(old-Structured Programming Approach)

Course Code Old (2016-17):FEC205

Course Code New (Autonomy 2017-18): ES14/ES24

Class and Semester in Old Syllabus: FE, Sem-II

Class and Semesters in New Syllabus: FE, Sem-I(ETRX/EXTC)/II(COMPS/IT)

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Introduction to Data Structure: Linear and Non-Linear Stack:Stack as ADT, operations on stack, applications of stack.	To understand and apply various basic data structures which could be helpful to solve difficult problems easily	11/39*100 = 28.20%
2	Queue:Queue as ADT , Operation on Queue,Types of Queue: Circular and Priority Queue, Applications of Queue.		
3	Linked List:Linked List as ADT, Operations on Singly Linked List.		

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://cse.iitkgp.ac.in/~pds/>
2. <https://www.annauniv.edu/dct/documents/cse20012befull.pdf>
3. <http://courses.cs.vt.edu/~csonline/DataStructures/Lessons/index.html>

Committee members Name & Signature:

- 1.
- 2.
- 3.

Expert's Name & Signature:

- 1.
- 2.

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for

entire course) x 100



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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Basic Communication Skills

Course Code Old (2016-17):

Course Code New (Autonomy 2017-18): HSS11

Class and Semester in Old Syllabus: FE, Sem - II

Class and Semesters in New Syllabus: FE, Sem - I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	[Modified] Communication Theory	Modified to include only relevant theory	
2	Business Correspondence	Included as a subtopic in new module titled "Speaking and Writing Skills"	
3	[Modified] Grammar and Vocabulary	Included extra topics as per current relevance	
4	Summarization and Comprehension	Included as a subtopic in new module titled "Speaking and Writing Skills"	5/13 * 100 = 38.46%
5	Technical Writing	Covered as classroom discussion in new module titled "Speaking and Writing Skills"	
6	[Removed] Information Communication Technology	Covered in detail in T.E. syllabus	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)  
<http://mu.ac.in/portal/wp-content/uploads/2016/06/4.64-First-Year-Engineering.pdf>

Committee members Name & Signature:

Mr. Udayan Chakraborty

Experts Name & Signature:

Mrs. Usha Nair

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Theory Course Revision Report

Course Name: Environmental Studies

Course Code Old (2016-17): FEC106

Course Code New (Autonomy 2017-18): MC21

Class and Semester in Old Syllabus: FE, Sem-I

Class and Semesters in New Syllabus: FE, Sem-II

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Appropriate technologies & Life Cycle Assessment	Crucial strategies for sustainable development	5/13*100 = 38%
2	Detection Tools for air and water pollution, Kyoto and Montreal Protocol,	Current global strategies to tackle pollution and climate change	
3	Activity based learning	To generate interest and promote self learning practices to keep abreast of latest developments in the field	
	Removal : Depletion of natural resources, global crisis related to Population, water, sanitation and land	Repetitive as several such courses would have been taken by the students in the past	

1. [www.ictmumbai.edu.in](http://www.ictmumbai.edu.in)
2. <https://www.aicte-india.org/sites/default/files>
3. <http://www.coep.org.in/content/fybtechcurriculumstructureanddetailedsyllabi>

Committee members Name & Signature:

1. Dr. Rita Das (Convener)

2. Mrs Ananthalakshmi V

Experts Name & Signature:

1. Prof B M Bhanage

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Lab Course Revision Report

Course Name: Applied Science-I Lab (Applied Physics)

Course Code Old (2016-17): FEC102 (Theory + Lab)

Course Code New (Autonomy 2017-18): BSL14

Class and Semester in Old Syllabus: FE, Sem-I

Class and Semesters in New Syllabus: FE, Sem-I

#### Change/Addition in the Syllabus:

Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
-	-	0

#### Committee members Name & Signature:

1. Dr. Rita Das

2. Mr. D. M. Patil

3. Mr. Gaurish Nerurkar

#### Experts Name & Signature:

1. Dr. K. G. Suresh

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Lab Course Revision Report

Course Name: Applied Science I Lab (Applied Chemistry)

Course Code Old (2016-17): FEC103

Course Code New (Autonomy 2017-18): BSL14(Applied Chemistry)

Class and Semester in Old Syllabus: FE, Sem-I

Class and Semesters in New Syllabus: FE, Sem-I

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Estimation of Total, permanent and temporary hardness in water	Correlate with theoretical knowledge of types of hardness in water	1/5*100=20%

Committee members Name & Signature:

Committee members Name & Signature:

1. Dr. Rita Das (Convener) *Rita Das*

2. Mrs Ananthalakshmi V

3. Dr. Vidya Nikumbh

Experts Name & Signature:

1. Prof B M Bhanage

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Lab Course Revision Report

Course Name: Applied Science-II Lab (Applied Physics)

Course Code Old (2016-17): FEC202 (Theory + Lab)

Course Code New (Autonomy 2017-18): BSL24

Class and Semester in Old Syllabus: FE, Sem-II

Class and Semesters in New Syllabus: FE, Sem-II

#### Change/Addition in the Syllabus:

Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
-	-	0

#### Committee members Name & Signature:

1. Dr. Rita Das

2. Mr. D. M. Patil

3. Mr. Gaurish Nerurkar

#### Experts Name & Signature:

1. Dr. K. G. Suresh

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# Sardar Patel Institute of Technology

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## APPLIED SCIENCES AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Lab Course Revision Report

Course Name: Applied Science II Lab (Applied Chemistry)

Course Code Old (2016-17): FEC203

Course Code New (Autonomy 2017-18): BSL24(Applied Chemistry)

Class and Semester in Old Syllabus: FE, Sem-II

Class and Semesters in New Syllabus: FE, Sem-II

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1			0/5*100=0

#### Committee members Name & Signature:

1. Dr. Rita Das (Convener)

2. Mrs Ananthalakshmi V

3. Dr. Vidya Nikumbh

#### Experts Name & Signature:

1. Prof B M Bhanage

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## APPLIED SCIENCE AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Lab Course Revision Report

Course Name: Engineering Mechanics Lab

Course Code Old (2016-17): FEC104

Course Code New (Autonomy 2017-18): ESL12/ESL22

Class and Semester in Old Syllabus: FE (COMP, IT, ETRX, EXTC) Semester-I

Class and Semesters in New Syllabus: FE (COMP, IT & ETRX, EXTC) Semester-I & II

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Timing Car apparatus	To study impulse based experiments	2/8 * 100 = 25
2	Digital pendulum apparatus	To perform gravity calculations using digital meters	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.cs.cornell.edu/courses/cs501/2005sp/syllabus.html>
2. [https://www.annauniv.edu/academic\\_courses/PG%20CBCS%20%20\(R-2015\)WS%2014.08.2015/04.%20I%20&%20C/47.M.Tech%20IT-.pdf](https://www.annauniv.edu/academic_courses/PG%20CBCS%20%20(R-2015)WS%2014.08.2015/04.%20I%20&%20C/47.M.Tech%20IT-.pdf)
- 3 <http://cse.iitkgp.ac.in/oldlook/syllabus.html>
4. [https://iitbhu.ac.in/institute-repository/db/2016/ir-2016-025/CSE\\_Syllabus\\_Booklet\\_4\\_Yr\\_BTech\\_Revised\\_060120163.pdf](https://iitbhu.ac.in/institute-repository/db/2016/ir-2016-025/CSE_Syllabus_Booklet_4_Yr_BTech_Revised_060120163.pdf)

Committee members Name & Signature:

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4. Mr. Kaisar Katchi
5. Mr. Shoaib Shaik

Experts Name & Signature:

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## APPLIED SCIENCE AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Lab Course Revision Report

Course Name: Engineering Graphics Lab

Course Code Old (2016-17): FEC204

Course Code New (Autonomy 2017-18): ESL15/ESL25

Class and Semester in Old Syllabus: FE (COMP, IT, ETRX, EXTC) Semester-I

Class and Semesters in New Syllabus: FE (COMP, IT & ETRX, EXTC) Semester-I & II

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)**
1	No Change	Fundamental Subject at first year level.	0/39*100 = 0

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <https://www.nitt.edu/home/academics/curriculum/B.Tech-Ist-2013.pdf>
2. [http://unipune.ac.in/Syllabi\\_PDF/revised/engg/FE\\_Syllabus.pdf](http://unipune.ac.in/Syllabi_PDF/revised/engg/FE_Syllabus.pdf)
3. <http://www.nirmauni.ac.in/ITNU/Events/682>
4. <https://www.annauniv.edu/pdf/1stsem.pdf>

Committee members Name & Signature:

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## APPLIED SCIENCE AND HUMANITY DEPARTMENT

Academic Year: 2017 – 2018

### Lab Course Revision Report

Course Name: Basic Electrical and Electronics

Course Code Old (2016-17): FEC105

Course Code New (Autonomy 2018-19): ESL11

Class and Semester in Old Syllabus: FE, Sem I

Class and Semesters in New Syllabus: FE, Sem I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	2 experiments on measuring Instruments	As measuring instruments are required for electrical parameter measurement	
2	2 Experiments using BJT and IC555	Included the topics related to BJT and IC 555 in theory	4/8*100 = 50%

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.vjti.ac.in/index.php/academicsyllabus/2-uncategorised/15-academicsyllabus>
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Committee members Name & Signature:

1. Prof. Payal Shah (Coordinator)

2. Dr. S. S. Rathod

3. Ganpat Parulekar

Experts Name & Signature:

1. G. T. Haldankar

2. Milind Paraye

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## APPLIED SCIENCE AND HUMANITY DEPARTMENT

**Academic Year: 2017 – 2018**

### Lab Course Revision Report

Course Name: Basic Electrical Technology

Course Code Old (2016-17): FEC105

Course Code New (Autonomy 2018-19): ESL21

Class and Semester in Old Syllabus: FE, Sem I

Class and Semesters in New Syllabus: FE, Sem II

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	2 experiments on motors are added	As in theory syllabus induction motor is introduced.	$2/8 * 100 = 25\%$

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. <http://www.vjti.ac.in/index.php/academicsyllabus/2-uncategorised/15-academicsyllabus>
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Committee members Name & Signature:

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1. G. T. Haldankar

2. Milind Paraye

\*\* Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



**APPLIED SCIENCES AND HUMANITIES TECHNOLOGY DEPARTMENT**

**Academic Year: 2017 – 2018**

**Lab Course Revision Report**

Course Name: Programming Methodology and Data Structures Laboratory  
(old-Structured Programming Approach)

Course Code Old (2016-17): FEC205

Course Code New (Autonomy 2017-18): ESL14/ESL24

Class and Semester in Old Syllabus: FE, Sem-II

Class and Semesters in New Syllabus: FE, Sem-I(ETRX/EXTC)/II(COMPS/TT)

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1.	To explore concepts of Stack as linear data structure by developing application	To understand how Stack Data structure can be applied	3/8*100= 37.5%
2.	To explore the concepts of Queue as linear data structure by developing application	To understand the application of Queues to solve problems	
3.	To explore the concept of dynamic memory allocation using Linked list as Non-linear data structure.	To understand dynamic memory allocation through linked lists	

Committee members Name & Signature:

- 1.
- 2.
- 3.



## Sardar Patel Institute of Technology

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Expert's Name & Signature:

1.

2.

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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## APPLIED SCIENCE AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Lab Course Revision Report

Course Name: Workshop I

Course Code Old (2016-17):FEL101

Course Code New (Autonomy 2017-18): ESL13

Class and Semester in Old Syllabus: FE (COMP, IT, ETRX, EXTC) Semester-I

Class and Semesters in New Syllabus: FE (COMP, IT & ETRX, EXTC) Semester-I

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)**
1	Electrical Board Wiring	Change of trades as per the programs offered by the institute	20/28*100 = 71.42%
2	Hardware & Networking	Change of trades as per the programs offered by the institute	
3	Introduction to 3D modeling	For 3D printing in semester 2	

- Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)
1. [http://www.unipune.ac.in/Syllabi\\_PDF/revised-2015/engineering/FE-credit-system-syllabus.pdf](http://www.unipune.ac.in/Syllabi_PDF/revised-2015/engineering/FE-credit-system-syllabus.pdf)
  2. [https://www.nitw.ac.in/media/Scheme&Syllabus- 2014/B.Tech\\_Mech\\_Syllabus.pdf](https://www.nitw.ac.in/media/Scheme&Syllabus- 2014/B.Tech_Mech_Syllabus.pdf)

#### Committee members Name & Signature:

1. Dr. Rita Das (Coordinator)
2. Mr. D. M. Patil
3. Mr. H. B. Vasalkar
4. Mr. Kaisar Katchi
5. Mr. Shoaib Shaik

#### Experts Name & Signature:

1. Dr. S. M. Khot

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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## APPLIED SCIENCE AND HUMANITIES DEPARTMENT

Academic Year: 2017 – 2018

### Lab Course Revision Report

Course Name: Workshop II

Course Code Old (2016-17): FEL201

Course Code New (Autonomy 2017-18): ESL23

Class and Semester in Old Syllabus: FE (COMP, IT, ETRX, EXTC) Semester-II

Class and Semesters in New Syllabus: FE (COMP, IT & ETRX, EXTC) Semester-II

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)**
1	PCB Laboratory Exercises	Change of trades as per the programs offered by the institute	20/28*100 = 71.42%
2	Repairing of Gadgets and Appliances	Change of trades as per the programs offered by the institute	
3	3D printing		

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)  
 1. [http://www.unipune.ac.in/Syllabi\\_PDF/revised-2015/engineering/FE-credit-system-syllabus.pdf](http://www.unipune.ac.in/Syllabi_PDF/revised-2015/engineering/FE-credit-system-syllabus.pdf)  
 2. [https://www.nitw.ac.in/media/Scheme&Syllabus-2014/B.Tech\\_Mech\\_Syllabus.pdf](https://www.nitw.ac.in/media/Scheme&Syllabus-2014/B.Tech_Mech_Syllabus.pdf)

#### Committee members Name & Signature:

1. Dr. Rita Das (Coordinator)
2. Mr. D. M. Patil
3. Mr. H. B. Vasaikar
4. Mr. Kaisar Katchi
5. Mr. Shoaib Shaik

#### Experts Name & Signature:

1. Dr. S. M. Khot

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



**Sardar Patel Institute of Technology**  
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**B.Tech. (Computer Engineering)  
and  
B.Tech. (Information Technology)  
Syllabus  
(Semester I-IV)**

**2020 Iteration (w.e.f. 2020-21)**



# Sardar Patel Institute of Technology

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## Nomenclature of the Courses

<b>BSC</b>	Basic Science Course	<b>PC</b>	Program Core
<b>BSE</b>	Basic Science Elective	<b>PE</b>	Program Elective
<b>ESC</b>	Engineering Science Course	<b>MLC</b>	Mandatory Learning Course
<b>ESE</b>	Engineering Science Elective	<b>SCOPE</b>	Skill Certification for Outcome based Professional Education
<b>SBC</b>	Skill Based Course	<b>OE</b>	Open Elective
<b>ABL</b>	Activity Based Learning	<b>HSSE</b>	Humanities and Social Science Elective
<b>ABL-SEVA</b>	Social Empowerment Through Various Activities	<b>ABL-SATVA</b>	Self- Accomplishment Through Various Activities

## Abbreviations

<b>L</b>	Lecture Hour	<b>O</b>	Other Work (Self Study)
<b>T</b>	Tutorial Hour	<b>E</b>	Total Engagement in Hours
<b>P</b>	Laboratory Hour	<b>C</b>	Credit Assigned

## Engagement and Credit Scheme

Sem I							
No	Type	Code	Course	L	T	P	O
1	BSC	MA101	Engineering Calculus	3	1	0	8
2	BSC	AS102	Engineering Chemistry	2	0	2	3
3	BSC	AS103	Biology for Engineers	2	0	0	3
4	ESC	AS105	Engineering Mechanics	2	0	2	4
5	ESC	CS101	Problem solving using Imperative Programming	2	0	2	4
6	ESC	EC101	Digital Systems and Microprocessors	3	0	2	5
7	SBC	AS107	Communication Skills	1	0	2	2
			<b>TOTAL</b>	<b>15</b>	<b>1</b>	<b>10</b>	<b>29</b>
							<b>55</b>
							<b>21</b>



**Sardar Patel Institute of Technology**  
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**B. Tech. (Electronics Engineering)  
and  
B. Tech. (Electronics &  
Telecommunication Engineering)  
Syllabus  
(Semester I-IV)**

**2020 Iteration (w.e.f. 2020-21)**



# Sardar Patel Institute of Technology

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## 2020 ITERATION: ELECTRONICS DOMAIN

### Nomenclature of the Courses

<b>BSC</b>	Basic Science Course	<b>PC</b>	Program Core
<b>BSE</b>	Basic Science Elective	<b>PE</b>	Program Elective
<b>ESC</b>	Engineering Science Core	<b>MLC</b>	Mandatory Learning Course
<b>ESE</b>			Skill Certification for Outcome based
<b>SBC</b>	Engineering Science Elective Skilled Based Course	<b>SCOPE</b>	Professional Education
<b>ABL-SATVA</b>	Self- Accomplishment Through Various Activities	<b>OE</b>	Open Elective
<b>ABL-SEVA</b>	Social Empowerment Through Various Activities	<b>HSSE</b>	Humanities and Social Science Elective

### Abbreviations

<b>L</b>	Lecture Hour	<b>O</b>	Other Work (Self Study)
<b>T</b>	Tutorial Hour	<b>E</b>	Total Engagement in Hours
<b>P</b>	Laboratory Hour	<b>C</b>	Credit Assigned

No	Type	Code	Course	Semester I						
				L	T	P	O	E	C	
1	BSC	MA101	Engineering Calculus	3	1	0	8	12	4	
2	BSC	AS101	Engineering Physics	2	1	2	5	10	4	
3	ESC	AS104	Engineering Graphics	1	0	4	2	07	3	
4	ESC	ET101	Basic Electrical Engineering	3	0	2	6	11	4	
5	ESC	CS101	Problem Solving using Imperative Programming	2	0	2	3	07	3	
6	SBC	AS106	Skill Shop	0	0	2	0	02	1	
7	ABL	SVXX/ STXX	SEVA-I or SATVA-I	0	0	0	2	02	1	
			<b>TOTAL</b>	<b>11</b>	<b>2</b>	<b>12</b>	<b>26</b>	<b>51</b>	<b>20</b>	

No	Type	Code	Course	Semester II						
				L	T	P	O	E	C	
1	BSC	MA102	Differential Equations and Complex Analysis	3	1	0	8	12	4	
2	BSC	AS102	Engineering Chemistry	2	0	2	3	07	3	
3	BSC	AS103	Biology for Engineers	2	0	0	3	05	2	
4	ESC	AS105	Engineering Mechanics	2	0	2	4	08	3	
5	ESC	CS102	Problem Solving using OOPs	2	0	2	4	08	3	
6	ESC	EC101	Digital Systems and Microprocessors	3	0	2	5	10	4	
7	SBC	AS107	Writing Skills Communication Skills	1	0	2	2	05	2	
			<b>TOTAL</b>	<b>15</b>	<b>1</b>	<b>10</b>	<b>29</b>	<b>55</b>	<b>21</b>	

### FIRST SUMMER

No	Type	Code	Course	L	T	P	O	E	C
1	SBC	AS108	ENGINEERING EXPLORATION (Project to solve social problem)	0	0	0	0	12	2



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Sem II								
No	Type	Code	Course	L	T	P	O	E
1	BSC	MA102	Differential Equations and Complex Analysis	3	1	0	8	12
2	BSC	AS101	Engineering Physics	2	1	2	5	10
3	ESC	AS104	Engineering Graphics	1	0	4	2	07
4	ESC	ET101	Basic Electrical Engineering	3	0	2	6	11
5	ESC	CS102	Problem Solving using OOP	2	0	2	3	07
6	SBC	AS106	Skill Shop	0	0	2	0	02
7	ABL	SV1X/ST1X	SEVA-I or SATVA-I	0	0	0	2	02
			TOTAL	11	2	12	26	51
								20

FIRST SUMMER								
No	Type	Code	Course	L	T	P	O	E
1	SBC	AS108	ENGINEERING EXPLORATION (Project to solve social problem)	0	0	0	100	100



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# Semester-I



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(BSC)  MA101	Engineering Calculus	3	1	0	8	12	3	1	0	4
		Examination Scheme								
		Component		ISE		MSE		ESE		Total
		Theory		100		100		200		400
Laboratory		--		--		--		--		--

Pre-requisite Course Codes, if any.	
Course Objective:	To develop mathematical skills for solving engineering problems.
Course Outcomes (CO):	<i>At the End of the course students will be able to:-</i>
MA101.1	Differentiate a function partially.
MA101.2	Find extreme values of a given function.
MA101.3	Find the nth order derivative of a given function.
MA101.4	Expand a given function as a power series.
MA101.5	Calculate the value of integrals in one variable using different techniques and solve multiple integrals in various coordinate systems.
MA101.6	Calculate Area using double integration.

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MA101.1												
MA101.2												
MA101.3												
MA101.4												
MA101.5												
MA101.6												

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
MA101.1						
MA101.2						
MA101.3						
MA101.4						
MA101.5						
MA101.6						



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BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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## Theory Component

Module No.	Unit No.	Topics	Ref	Hrs.
1	Title	Partial Differentiation	1,2,3	10
	1.1	Partial derivatives of first and higher order. Partial derivatives of composite functions.		4
	1.2	Euler's theorem for homogeneous functions with two and three independent variables, deductions from Euler's theorem.		3
	1.3	Application of partial derivatives: i) Local Maxima and Minima of functions of two variables. ii) Lagrange's Method of undetermined multipliers.		3
2	Title	Successive Differentiation and Series	1,2,3	10
	2.1	Successive Differentiation: Proofs of nth derivatives of standard functions. Use of De Moivre's theorem and partial fractions to calculate nth derivatives of given functions.		3
	2.2	Leibnitz's Theorem on nth derivative of product of two functions		2
	2.3	Infinite series: 1) Maclaurian's series (without proof) and derivation of series of some standard functions using Maclaurin series. Expansion of functions in powers of x by using i) Standard series method ii) Method of differentiation and integration. 2) Taylor's series and applications.		5
3	Title	Integral Calculus (one variable)	1,2,3	8
	3.1	Gamma functions: properties of gamma functions and integrals reducible to gamma functions.		2
	3.2	Beta functions: properties, relation between Beta and Gamma functions, integrals reducible to Beta functions, Duplication formula.		4
	3.3	Differentiation under Integral sign: differentiating integrals with constant limits of integration for one parameter.		2
4	Title	Integral Calculus (multi variable)	1,2,3	14
	4.1	Tracing of curves. Sketching standard solids ( Spheres, Ellipsoids, Cylinders, Cones, Tetrahedrons, planes)		2
	4.2	Double Integration: definition and evaluation. Evaluate by changing the order of integration and by changing to polar form.		7
	4.3	Application of double integral to finding area of given regions.		2
	4.4	Triple integration: definition and evaluation (Cartesian and cylindrical coordinates).		3
	5	Self 1.1 Partial differentiation of implicit functions.	1,2,3	08



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	Study	2.3 Series by method of Substitution 3.2 Proof of Duplication Formula 3.3 Differentiation under Integral sign using two parameters and variable limits 4.1 Finding lengths of curves in Cartesian and polar form		
Total				42*

\*Total of 42 hours does not include self study hours.

### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Higher Engineering Mathematics	Forty Fourth	Dr. B. S. Grewal	Khanna Publications	2020

### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Advanced Engineering Mathematics	Twenty Eighth	H.K Das	S. Chand	2014
2	Advanced Engineering Mathematics	Tenth	Erwin Kreyszig	John Wiley & Sons	2011
3	Advanced Engineering Mathematics	Fourth	Jain and Iyengar	Narosa Publications	2014



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
BS	Engineering Chemistry	2	0	2	3	7	2	0	1	3
Examination Scheme										
AS102		Component	ISE			MSE	ESE		Total	
		Theory	50			50	100		200	
		Laboratory	50			--	50		100	

Pre-requisite Course Codes, if any.	HSC level Chemistry
<b>Course Objective:</b> To provide necessary background of Chemistry suited for relevant areas of engineering	
<b>Course Outcomes (CO):</b> At the End of the course students will be able to	
AS102.1	Relate thermodynamic principles and laws to crucial applications like heat engines (Understanding)
AS102.2	Summarize properties and applications of different materials like polymers, ceramics, alloys , nanomaterials, conductors and insulators (Understanding)
AS102.3	Identify methods for corrosion control based on knowledge of different types of corrosion and factors affecting rate of corrosion (Application)
AS102.4	Compare different sources of energy like conventional fossil fuels, alternative fuels, batteries and fuel cells with respect to availability, working principles, constitution, efficiency of performance and environmental impact (Understanding)
AS102.5	Apply knowledge of electrochemistry and green chemistry in the interest of public health and environment (Application)
AS102.6	Make use of analytical techniques (complexometric and iodometric titrations) and instruments (pHmeter, conductometer and Orsats's Apparatus) for various purposes like hardness parameters of water, composition of alloys etc.
AS102.7	Estimate key properties of lubricants like flash point, viscosity and acid value
AS102.8	Estimate molecular weight of polymer

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
AS102.1												
AS102.2												
AS102.3												
AS102.4												
AS102.5												
AS102.6												
AS102.7												
AS102.8												

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**



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	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
AS102.1						
AS102.2						
AS102.3						
AS102.4						
AS102.5						
AS102.6						
AS102.7						
AS102.8						

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create

## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Thermodynamics		4
	1.1	Introduction, Terminology, Concepts of Internal Energy and Thermodynamic equilibrium, Zeroth and First Law of Thermodynamics, Implications and Limitations of First law	1,3	
	1.2	Concept of Enthalpy, Joule Thomson Effect, Carnot's Cycle, Carnot's theorem and related numericals, Second Law of Thermodynamics	1,3	
	1.3	Applications of thermodynamic principles to the working of refrigerator and air conditioner	1,3	
2	Title	Polymers		3
	2.1	Introduction, Effect of heat on polymers : Glass transition temperature and melting with significance;	1, 2, 3	
	2.2	Conducting polymers, Liquid crystal polymers, Engineering Polymers	1, 2, 3	
3	Title	Corrosion		5
	3.1	Introduction, Dry corrosion (i) Due to oxygen (ii) Due to other gases	1,2	
	3.2	Electrochemical corrosion and mechanism, Galvanic, differential aeration corrosion, Significance of galvanic series for corrosion phenomenon	1,2	
	3.3	Factors affecting rate of corrosion (i)Position in galvanic series, (ii) relative areas of anode and cathode, (iii) conductance of medium	1,2	
	3.4	Methods to decrease the rate of corrosion : Material selection, Proper designing, Cathodic protection- i) Sacrificial	1,2	



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		anodic protection ii) Impressed current method, Metallic coatings, Cathodic and anodic coatings (Galvanisation and Tinning : principle and application only)		
4	Title	<b>Energy Sciences</b>		5
	4.1	Definition and classification of fuels, Calorific value : Definition, Gross or Higher calorific value & Net or lower calorific value, Dulong's formula & numericals for calculations of Gross and Net calorific values.	1,2	
	4.2	Knocking, Octane number, Cetane number, Antiknock agents, unleaded petrol	1,2	
	4.3	Combustion- Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid & gaseous fuels,	1,2	
5	4.4	Disadvantages of fossil fuels, Alternative (Green) Fuels : Power alcohol , Biomass, Biogas, Biodiesel, Natural Gas and CNG (Description, Utility, advantages and disadvantages)	1,2	4
	Title	<b>Batteries and Battery Technology</b>		
	5.1	Introduction, Important terms, Nickel-Hydrogen(metal hydride), Rechargeable Lithium ion batteries	1,2	
	5.2	Reserve Batteries, Fuel cells, characteristics, description, construction and working of Hydrogen-oxygen fuel cells, Types of fuel cells (in.brief)	1,2	
6	5.3	Electrochemical sensors : Working principle, construction and applications	1,2	3
	Title	<b>Green Chemistry</b>		
	6.1	12 principles of green chemistry with examples, numericals on Atom Economy, Green Solvents (Water, Supercritical Fluids),	1,2	
7	Title	<b>Engineering Materials</b>		4
	7.1	Eutectic mixtures and soft solders, Advanced Ceramic materials and cermets : magnetic, electronic and electrical applications Carbon nanomaterials : Fullerenes and Carbon nanotubes, Structure, Properties and applications	1,2,3	
	7.2	Insulators, Semiconductors and Superconductors : Thermal and electrical insulating materials and important engineering applications, Stoichiometric, defect and controlled valency semiconductors.	1,2,3	
	7.3	Superconductors, perovskite structure and 1:2:3 compound YBa <sub>2</sub> Cu <sub>3</sub> O <sub>7-y</sub> , properties and applications	1,2,3	



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8	Self Study	<ol style="list-style-type: none"> <li>1. Supramolecular polymers and their applications</li> <li>2. Anodic Protection as a corrosion control strategy</li> <li>3. Current research and advances in fuel cells</li> <li>4. Commercial applications of superconducting materials</li> <li>5. Tops down vs bottoms up approach to nanotechnology and applications of nanoparticles other than carbon</li> </ol>		4*
Total (* Not Included)				28

### Laboratory Component

Sr. No	Title of the Experiment
1	Determination of total, temporary and permanent hardness of water sample
2	Removal of hardness using ion exchange column
3	Molecular weight determination of polymers by Oswald's Viscometer
4	To determine flash point of a lubricating oil
5	Determination of Viscosity of oil by Redwood Viscometer
6	Estimation of acid value of lubricant
7	Determination of amount of strong acid present in a solution using a conductometer
8	Determination of strength of acid using a pH meter
9	Estimation of Copper in brass by Iodometric Titration
10	Analysis of Flue gas for its composition (by Orsat's Apparatus)
11	Estimation of Iron in plain Carbon steel
12	Determination of COD of wastewater sample

### Text Books

Sr No	Title	Edition	Authors	Publisher	Year
1	Engineering Chemistry	Eleventh	P.C.Jain & M.Jain	Dhanpat Rai & Co. (Pvt) Ltd.	2014
2	A Textbook of Engineering Chemistry	Twelfth	S.S.Dara & S.S.Umare	S. Chand & Co.	2014
3	A Textbook of Engineering Chemistry	Third	S Chawla	Dhanpat Rai & Co. (Pvt) Ltd.	2015

### Reference Books

Sr No	Title	Edition	Authors	Publisher	Year
1	Physical Chemistry	Eleventh	Peter Atkins	Oxford University Press	2017



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		2	0	0	3	5	2	0	0	2
<b>Examination Scheme</b>										
(BSC)	Biology for Engineers	Component	ISE			MSE		ESE	Total	
		Theory	50			50		100	200	
		Laboratory	-			--		-	-	

**Pre-requisite Course Codes, if any.** HSC level Biology

**Course Objective:** To provide engineering perspective towards the biological principles and systems

**Course Outcomes (CO):** At the End of the course students will be able to

AS103.1	understand basic biological principles and organizational structure of living systems at molecular level.
AS103.2	comprehend basic biological principles and organizational structure of living systems at cellular level
AS103.3	know Energy transformation and information processing in biological systems
AS103.4	appreciate biological process with engineering perspective
AS103.5	identify significance of Gene, Blood and Skin in human health system.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
AS103.1												
AS103.2												
AS103.3												
AS103.4												
AS103.5												

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
AS103.1						
AS103.2						
AS103.3						
AS103.4						
AS103.5						



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## BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Bio-molecules and bio-polymers: Structure and Function	1,3	4
	1.1	Organic and inorganic molecules, Unique Properties of water		
	1.2	Carbohydrates, Lipids, Amino Acids and proteins, Nucleic Acids (DNA and RNA)		
2	Title	Levels of organization of life	1,3	4
	2.1	Cell as a basic unit of life, prokaryotic and eukaryotic cells, microbes, plant and animal cells; Cell organelles – structure and function; Cell membrane.		
	2.2	Levels of organization: cells, tissues, organs, systems & organism		
3	Title	Energy transformations	1,3	5
	3.1	Energy transformations in Chloroplast: Photosynthesis (photochemical & biochemical phase) and ATP generation, Aerobic and anaerobic systems		
	3.2	Energy transformations in Mitochondria: Cellular respiration (glycolysis and Krebs cycle) and ATP generation		
4	Title	Transport and Defense mechanisms	1,3	5
	4.1	Transport Phenomena in Biological Systems: Membrane channels and ion channels; Fluid flow and mass transfer (nutrients & ions); In plants: Xylem and Phloem; In animals: Blood and Lymph Transport of gases: Oxygen and Carbon dioxide Heat Transport - Body temperature regulation.		
	4.2	Defense mechanisms: In plants: Herbivory, secondary metabolites In animals: Innate and Adaptive immune systems		
5	Title	Engineering perspectives of biological sciences:	1,3	6
	5.1	Biology and engineering crosstalk – At cell level: Hybridoma technology At tissue level: Plant Tissue Culture, Animal Tissue Culture;		
	5.2	Tissue Engineering: Principles, methods and applications Introduction to Biomimetics and Bio-mimicry, nano-biotechnology		
6	Title	Role of Gene, Blood and Skin in human health system.	2,4	4
	6.1	Introduction to Genetic Engineering, Blood Type, Complete Blood Count Test and Abnormalities.		



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	6.2	Structure of Skin, Functions of Skin, Engineering methods for identification of Skin diseases.		
7	Self Study	Introduction to Biosensors, transducers, amplifiers; Introduction to medical imaging and different medical Imaging modalities; Review of Signals and system; Electro Physiological Signal Analysis.		4*
Total (* Not included)				28

### Text Books

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Molecular Cell Biology	Fourth	Lodish H, Berk A, Zipursky SL	W. H. Freeman	2000
2	Textbook of Anatomy and Physiology for Nurses and allied Health Sciences	First	Indu Khurana & Arushi	CBS Publishers & Distributors Pvt Ltd	2019

### Reference Books

Sr. No.	Title	Edition	Authors	Publisher	Year
3	Lehninger Principles of Biochemistry	Fourth	Nelson, D. L., & Cox, M. M.	Freeman	2004
4	Introduction to Biomedical Engineering.	Third	Joseph D. Bronzino, John Enderle	Academic Press	2012



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(ESC)	Engineering Mechanics	2	0	2	4	8	2	0	1	3
		Examination Scheme								
		Component	ISE		MSE		ESE		Total	
		Theory	50		50		100		200	
AS105		Laboratory	50		--		50		100	

Pre-requisite Course Codes, if any.

Course Objective:

Course Outcomes (CO): At the End of the course students will be able to

AS105.1	Draw free body diagram and determine reactive forces using conditions of equilibrium and Lami's theorem
AS105.2	Determine coefficient of friction for various contact surfaces
AS105.3	Analyze the three-dimensional system of space forces.
AS105.4	Analyze the kinematics of particle and obtain the various parameters of motion.
AS105.5	Determine Instantaneous centre of rotation (ICR).
AS105.6	Design and conduct an experiment to demonstrate principles of statics and dynamics

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
AS105.1												
AS105.2												
AS105.3												
AS105.4												
AS105.5												
AS105.6												

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
AS105.1						
AS105.2						
AS105.3						
AS105.4						
AS105.5						
AS105.6						

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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Mumbai - 400058

## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Unit1	<b>Equilibrium of forces</b>		8
	1.1	Equilibrant force, conditions of equilibrium for concurrent forces, parallel forces and general force system, equilibrium of connected bodies, Lami's theorem.	1,3	
	1.2	Types of supports, types of loads, Beams, Determination of reactions at supports for various types of loads on beams	3	
2	Unit2	<b>Friction</b>		4
	2.1	Introduction to Laws of friction, Cone of friction, Equilibrium of bodies on inclined plane, Application to problems involving wedges, ladders.	1,2	
3	Unit3	<b>Forces in space</b>		5
	3.1	Rectangular Components of Forces in Space, Resultant of Space forces, Moment of a Force about a point, axis and line. Equilibrium of a particle in space.	1	
4	Unit4	<b>Kinematics of Particle</b>		8
	4.1	Motion along straight and curved path, Rectangular component of velocity and acceleration, Tangential & Normal component of acceleration, Motion curves(a-t, v-t, s-t curves), Projectile motion,	2,3	
5	Unit5	<b>Kinematics of Rigid Bodies</b>		3
	5.1	Instantaneous center of rotation for the velocity of bodies in plane motion, (up to 2 linkage mechanism)	3	
6	Self Study	1. Applications of resultant of forces, concept of couple and moments, 2. Centroid and center of gravity, analysis of trusses. 3. Kinetics of rigid body, work energy principle. 4. Principle of Law of Conservation of momentum, Impact and collision.	1,2,3	6*
<b>Total (*Not included)</b>				<b>28</b>

## Laboratory Component

Sr. No	Title of the Experiment
1	Draw the force polygon and determine the equilibrant force for concurrent coplanar force system.
2	Use the conditions of equilibrium for parallel force system and determine the support reactions.
3	Apply the principle of moment for equilibrium of levers.
4	Determine the coefficient of friction for glass slab and a metal plate on an inclined plane.



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5	Determine the axial forces using Lami's theorem for Jib crane apparatus.
6	Use the conditions of equilibrium for non-concurrent non-parallel force system and draw the force polygon.
7	Measure the acceleration due to gravity with the help of simple pendulum apparatus.
8	Determine the range of projectile and the time of flight for the projectile motion.
9	Verify the law of conservation of momentum and determine the coefficient of restitution for collision
10	(Plot the motion of projectile using air-cushion table apparatus.) A small project based on Engineering Mechanics concept.

### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Vector Mechanics for Engineers statics and dynamics	Nineth	Beer and Johnston	McGraw Hill	2010
2	Engineering Mechanics	Fifth	Bhavikatti S and Rajsekharappa	New Age International	2009
3	Engineering Mechanics Statics and Dynamics	Fourteenth	A K Tayal	Umesh Publication, Delhi	2012

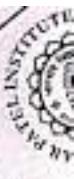
### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Engineering Mechanic: Statics and Dynamics,	Fifth	E.W. Nelson, C.L. Best, W.G. McLean,	McGraw Hill	1998
2	Singer's Engineering Mechanics Statics and Dynamics	Third	Vijaya Kumar Reddy, K. and Suresh Kumar, J	BS Publication	2012



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		2	0	2	4	8	2	0	1	3
<b>Examination Scheme</b>										
(ESC)	Problem Solving using Imperative Programming	Component			ISE		MSE		ESE	Total
		Theory			-		-		-	-
CS101		Laboratory			200		--		100	300

Pre-requisite Course Codes, if any.

Course Objective: To develop problem solving skills using imperative programming

Course Outcomes (CO): At the End of the course students will be able to

- CS101.1 Explain the problem solving aspects using various programming paradigms.
- CS101.2 Solve real world problems using imperative programming approach.
- CS101.3 Solve problems using control structures for real world problems.
- CS101.4 Solve problems using Arrays and Text processing.
- CS101.5 Develop modular code for a given problem.
- CS101.6 Solve real world problems using Structures and Unions

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS101.1												
CS101.2												
CS101.3												
CS101.4												
CS101.5												
CS101.6												

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
CS101.1							
CS101.2							
CS101.3							
CS101.4							
CS101.5							
CS101.6							

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create



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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Introduction to Problem Solving and Programming Paradigms</b>		
	1.1	What is a Problem, Problem Solving Aspect, Top Down Design, Implementation of Algorithms, Characteristics of a good algorithm, what is a computer program, real life examples of programming, Computer based applications of programming, Steps followed in Program Development, Characteristics of good Program	3,4	2
	1.2	Overview of Programming Paradigms - Declarative and Imperative, Problem solving using Algorithm and Flowcharts,	3,4	2
2	Title	<b>Basic Elements of Computer Programming and Control flow</b>		
	2.1	Variables, keywords, Data types, Operators: Arithmetic, Relational and Logical, Assignment, Unary, Conditional, Bitwise, Expression, Statements.	1,2	1
	2.2	Branching Structures: if statement, if-else statement, multi-way decision, switch statement, continue statement, break statement Iterative Structures: while, do-while, for, nested loops.	1,2	3
	2.3	Problem solving using Control Structures for real world problems	1,2,4	2
3	Title	<b>Problem Solving using Array Techniques</b>		
	3.1	Introduction to Arrays: Declaration, Definition, accessing array elements, one-dimensional array, two-dimensional array, array of characters, Strings	1,2	2
	3.2	Classical Problem Solving using Arrays like Array Order Reversal, Array Counting or Histogramming, Finding the maximum number in a set.	1,2,4	2
	3.3	Text Processing problems like finding length, keyword search, finding anagrams	1,2,4	2
4	Title	<b>Problem Solving using Modular Approach</b>		
	4.1	Defining a Function, accessing a Function, Function Prototype, Passing Arguments to a Function, call by value, pointers and call by reference, Recursion	1,2	4
	4.2	Problem solving using Functions and Recursive applications	1,2,4	3
5	Title	<b>Structures and Unions</b>		
	5.1	Structures and Union: Declaration, Initialization, structure within structure, Array of Structure, Operation on structures, Concept of Union, Difference between structure and union,	1,2	3
	5.2	Real world problems using Structures and Unions	1,2,4	2
6	Self Study	File handling: Types of File, File operation- Opening, Closing, Creating, Reading, Processing File, Command line arguments, Dynamic Memory Allocation	1,2,4	4*
<b>Total (* not counted in total hours)</b>				<b>28</b>



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**Laboratory Component (Minimum 10 Laboratory experiments are expected)**  
Note: All problems should be implemented using C language.

Sr. No	Title of the Experiment
1	Use the formatted input/output statements, operators and expressions of C language
2	Apply various control structures to solve given problems.
3	Apply the concept of functions to incorporate modularity.
4	Demonstrate the use of one-dimensional arrays to solve a given problem.
5	Demonstrate the use of two-dimensional arrays to solve a given problem.
6	Apply the concept of recursion to solve a given problem.
7	Implement various text processing problems.
8	Apply the concepts of structures/union to solve a given problem.
9	Demonstrate the use of pointers to solve a given problem.
10	Implement various operations on files to solve a given problem.

### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Programming with C	Fourth	Byron Gottfried	McGraw Hill (Schaum's outline series)	2018
2	The C programming Language	Second	Kernighan , Ritchie	Pearson	2015
3	Foundations of Programming Languages	Second	Kent D. Lee	Springer	2017
4	How to Solve it by Computer	First	R.G. Dromey	Prentice Hall India	1998

### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Let Us C	Sixteenth	Yashavant Kanetkar	BPB	2017
2	Programming Language Concepts	Third	Carlo Ghezzi, Mehdi Jazayeri	John Wiley & Sons	2008
3	Computer Programming in C	Second	V. Rajaraman & Neeharika Adabala	PHI Learning, Eastern Economy Edition,	2014



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Course(Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(ESC)	Digital Systems and Microprocessor	3	0	2	5	10	3	0	1	4
Examination Scheme										
EC101		Component	ISE		MSE		ESE		Total	
		Theory	75		75		150		300	
		Laboratory	50		--		50		100	

Pre-requisite Course Codes, if any.	
Course Objective: To prepare students to perform the analysis and design of various digital electronic circuits and introduce them to the concept of microprocessors	
Course Outcomes (CO): At the End of the course students will be able to	
EC101.1	Explain various logic gates, SOP, POS forms and their minimization with k-map for given combinational circuits.
EC101.2	Construct combinational circuits using given MSI devices.
EC101.3	Apply the knowledge of flip-flops and MSI to design sequential circuits
EC101.4	Compare the logic families based on their characteristics
EC101.5	Comprehend the architectural features of 8085 with basic assembly language programming

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC101.1												
EC101.2												
EC101.3												
EC101.4												
EC101.5												

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
EC101.1						
EC101.2						
EC101.3						
EC101.4						
EC101.5						

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Combinational Circuits		11
	1.1	Logic Gates: Basic gates, Universal gates, Sum of products and products of sum, minimization with Karnaugh Map (up to four variables), Quine Mc'Clusky method and realization.	1,4	
	1.2	Combinational Circuits using basic gates as well as MSI devices: Half adder, Full adder, Half Subtractor, Full Subtractor, Multiplexer, Demultiplexer, Decoder, Comparator	1,4	
2	Title	Sequential Circuits		11
	2.1	Sequential Logic: Latches and Flip-Flops. Conversions of Flip-Flops.	1,4	
	2.2	Counters: Asynchronous Counters, Synchronous Counters, UpDown Counters, Mod Counters, Ring and Twisted Ring Counters , Shift Registers, Universal Shift Register	1,4	
	2.3	MSI counters (IC 7490, IC 74160, IC 74163, IC 74169), MSI Shift registers (IC 74194) and their applications	2,5	
3	Title	Clocked Synchronous Machines		05
	3.1	Mealy and Moore Machines, Clocked synchronous state machine analysis, State reduction techniques.	2,5	
4	Title	Logic Families		05
	4.1	Types of logic families (TTL and CMOS), characteristic parameters (propagation delays, power dissipation, Noise Margin, Fan-out and Fan-in), transfer characteristics of TTL NAND.	1,4	
5	Title	Introduction to Microprocessors		10
	5.1	Evolution of computers and Microprocessors	3	
	5.2	Essential components of a conventional Central Processing Unit (CPU)	3	
	5.3	Architecture of 8-bit microprocessor 8085	3	
	5.4	Basic instruction set with its addressing modes and concepts of Instruction cycle, Machine cycle and T states. Elementary programming in assembly language.	3	
	5.5	Elements of I/O data transfer with the concept of interrupts	3	
6	Self Study	Concepts of PROM, PAL and PLA. Timing Considerations and Meta-stability in Flip-Flops. Clocked synchronous state machine design. Interfacing CMOS to TTL and TTL to CMOS. Concepts of peripherals and memory with its Interfacing with 8085 microprocessor		5*
Total (*Not included)				42

Laboratory Component (Minimum 10 Laboratory experiments are expected)



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Sr. No	Title of the Experiment
1	To implement the combinational logic for given function using basic gates/MSI ICs. <ul style="list-style-type: none"> <li>a. To study and verify the truth table of logic gates</li> <li>b. To study the universal NAND and NOR gate</li> <li>c. To study the working of half adder, full adder, half subtractor, Full subtractor along with truth table</li> </ul>
2	To implement TTL and CMOS logic family <ul style="list-style-type: none"> <li>a. To study TTL NAND gate (BJT implementation).</li> <li>b. To study CMOS NAND gate</li> <li>c. To study interfacing of the TTL /CMOS</li> </ul>
3	To implement 4-bit, 5-bit and 8 bit comparator using given MSI
4	To design implement gate level multiplexers and MSI multiplexers
5	To design and implement gate level and MSI circuits of flip-flops
6	To design counters <ul style="list-style-type: none"> <li>a. To design a MOD4 synchronous up/down counter</li> <li>b. To study IC 7490 – Asynchronous Decade Counter</li> </ul>
7	To synchronous counters, synchronous counters and shift register using given MSI. <ul style="list-style-type: none"> <li>a. To study IC 74160 as Synchronous Decade Counter and Mod 6 counter</li> <li>b. To study IC 74163 as Synchronous MOD 16 Counter and Mod 10 counter</li> <li>c. To verify the truth table of IC 74194 as Universal Shift Register and implement Ring and Twisted Ring Counter.</li> </ul>
8	To perform basic arithmetic operations through assembly language program in 8085
9	To simulate COPY and PASTE operation through 8085 assembly program
10	To write a program to add N elements stored in an array of 8 bit numbers (8085)

### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Modern Digital Electronics	Fourth	R. P. Jain	Tata McGraw Hill	2009
2	Digital Design Principles And Practices	Third	John F. Wakerly	Pearson Education	2001
3	Microprocessor Architecture, Programming, and Applications with the 8085	Sixth	Ramesh S. Gaonkar	Penram International	2013

### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Digital Design	Forth	Morris Mano	Pearson Education	2008
2	Fundamentals of digital logic design with VHDL	Second	Stephen Brown and ZvonkoVranesic	McGraw Hill	2006



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(SBC)		1	0	2	2	5	1	0	1	2
Examination Scheme										
AS107	Communication Skills	Component			ISE		MSE		ESE	Total
		Theory			--		50**		--	50
		Laboratory			150*		--		--	150

\*\* MSE will be evaluated on the basis of written test based on module 1 and 2.

\*\* ISE will be evaluated on the basis of marks scored in practicals, out of 150.

Pre-requisite Course Codes, if any.	
Course Objective:	
Course Outcomes (CO): At the end of the course students will be able to	
AS107.1	Apply the principles of business writing for professional documents.
AS107.2	Develop advance vocabulary and grammar for spoken and written communication.
AS107.3	Design the draft a formal speech.
AS107.4	Analyze received information by using active listening and reading skills.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
AS107.1												
AS107.2												
AS107.3												
AS107.4												

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
AS107.1						
AS107.2						
AS107.3						
AS107.4						

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create

### Theory Component



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Module No.	Unit No.	Topics	Ref.	L Hrs.	P Hrs
1	Title	Vocabulary Building & Grammar			
	1.1	Concept of word formation, the root words from foreign languages and their use in English	7,1	2	4
	1.2	Common errors in writing, confused pair of words, redundancies, clichés	6, 2		
2	Title	Writing Skills		7	14
	2.1	Principles of Business Writing: 7Cs of communication, sentence structures, Organizing paragraph in direct and indirect style; Summarization	4		
	2.2	Practices in Writing: E-mail Etiquettes, e-mail for business purposes	3		
	2.3	Critical Reading: understanding the concept of critical reading and applying to analyze a given text.	5		
3	Title	Oral Skills		5	10
	3.1	Listening Comprehension(audio): Pronunciation, intonation, Stress and Rhythm	5		
	3.2	Speaking Practices: 1. Common everyday situation: Conversation and dialogues (group activity, ice-breaking session) 2. Public Speaking: Extempore, formal speech	3		
4	Self Study	1. Basic Rules Of Grammar 2. GRE Vocabulary 3. Reading a book(fiction/non-fiction) and preparing a review on it		6*	
Total (*Not included)					42 hrs

### List of activities (Graded, Non-graded)

Sr. No	Title of the assignments	Marks
1	Skit based on a given situation	-
2	ISE 1 – Summary Writing	10
3	ISE 2 – Extempore	10
4	ISE 3 – Grammar	20
5	ISE 4 – Vocabulary	20
6	Reviewing a book (fiction/ non-fiction)	10
7	ISE 5 – Email Writing (Inquiry)	20
8	ISE 6 – Email Writing (Complaint)	20
9	ISE 6 – Speech	20
10	ISE 7 – Critical Reading	20
	Total	150



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### Text Books:

Sr. No	Title	Edition	Authors	Publisher	Year
1	Communication Skills	2013	Shirley Mathews	Technical Publication, Pune	2013
2	English Vocabulary in Use	1999	Michael McCarthy , Felicity O'Dell	Cambridge University Press, India	1999

### Reference Books:

Sr. No	Title	Edition	Authors	Publisher	Year
1	Oxford Practice Grammar	1999	John Eastwood	Oxford, India	1999
2	Communication Skills	2011	Meenakshi Raman, Sangeeta Sharma	Oxford, India	2011
3	Communication Skills	2010	Dr. Meera Bharwani	Synergy Knowledgeware, India	2010
4	English Grammar for Today	2005	Geoffrey Leech	Palgrave, UK	2005
5	Word Power Made Easy	1978	Norman Lewis	Anchor Books, New York	1978



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# Semester-II



## Sardar Patel Institute of Technology

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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		3	1	0	8	12	3	1	0	4
Examination Scheme										
(BSC)	Differential Equations and Complex Analysis	Component	ISE			MSE	ESE		Total	
		Theory	75			75	150		400	
		Laboratory	--			--	--		--	

Pre-requisite Course Codes, if any. MA101

Course Objective: To develop mathematical skills for solving engineering problems.

Course Outcomes (CO): At the End of the course students will be able to:-

- MA102.1 Solve differential equations of first order.
- MA102.2 Solve differential equations of higher order using operators.
- MA102.3 Solve differential equations in electrical engineering problems.
- MA102.4 Find powers, roots & logarithm of a complex number and to separate the function of a complex number into real and imaginary.
- MA102.5 Check whether a given function is analytic and construct analytic functions.
- MA102.6 Compute integrals of complex valued functions.

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MA102.1												
MA102.2												
MA102.3												
MA102.4												
MA102.5												
MA102.6												

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
MA102.1							
MA102.2							
MA102.3							
MA102.4							
MA102.5							
MA102.6							



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## BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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### Theory Component

Module No.	Unit No.	Topics	Ref	Hrs.
1	Title	Linear Differential Equations of first order	1,2,3	11
	1.1	Exact Differential Equations, Integrating Factors, equations reducible to exact form.		3
	1.2	Linear differential equations (Definition), equations reducible to linear form, Bernoulli's equation		2
	1.3	Simple application of differential equation of first and second order to electrical engineering problems.		2
	1.4	Numerical solution of ordinary differential equations of first order and first degree using (a) Taylor's series method (b) Euler's method (c) Modified Euler method (d) Runge-Kutta fourth order formula.		4
2	Title	Linear Differential Equations of higher order	1,2,3	11
	2.1	Linear Differential Equation with constant coefficient-complementary function, particular integrals of differential equation of the type $f(D)y = X$ where $X$ is $e^{-ax}$ , $\sin(ax+b)$ , $\cos(ax+b)$ , $x^m$ , $e^{ax}V$ , $xV$ , where $V$ is a function of $x$ .		7
	2.2	Cauchy's homogeneous linear differential equation and Method of variation of parameters for second order.		2
	2.3	System of Differential Equations.		2
3	Title	Complex Numbers	1,2,3	12
	3.1	Revision: Complex Numbers as ordered pairs, Argand's diagram, Cartesian, Polar and Exponential form of Complex Numbers.		1
	3.2	De Moivre's Theorem and its application to determine powers of complex numbers. Roots of complex numbers by De Moivre's Theorem.		3
	3.3	Expansion of $\sin n\theta$ and $\cos n\theta$ in terms of powers of $\sin \theta$ and $\cos \theta$ . Expansion of $\sin^n \theta$ and $\cos^n \theta$ in terms of sines and cosines of multiples of $\theta$ .		2
	3.4	Hyperbolic Functions: relation between circular and hyperbolic functions, Inverse hyperbolic functions. Separation into real and imaginary parts of complex functions.		4
4	3.5	Logarithm of a complex number.		2
	Title	Analytic functions and Complex Integrals	1,2,3	8



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	4.1	Analytic functions, Cauchy Riemann equations in cartesian and polar form, construction of analytic functions using Milne-Thompson's method, Harmonic functions, poles of $f(z)$ .		4
	4.2	Line Integral, Cauchy's Integral theorem for simply connected regions, Cauchy's Integral formula (for poles lying inside or outside the curve).		4
5	Self Study	1.3 To form D.E. for given L-C-E-R circuit 1.4 Picard's method 2.1 Method of undetermined coefficients to solve differential equations. 2.2 Legendre's differential equation, Method of variation of parameters for third order differential equations. 3.2 Complex examples using De Moivre's Theorem. 4.1 Construction of analytic function $f(z) = u+iv$ when $u+v$ or $u-v$ is given. Orthogonal trajectories		08
			Total	42*

\*Total of 42 hours does not include self study hours.

### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1.	Higher Engineering Mathematics	Forty Fourth	Dr.B.S. Grewal	Khanna Publications	2020

### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1.	Advanced Engineering Mathematics	Twenty Eighth	H.K Das	S.Chand	2014
2.	Advanced Engineering Mathematics	Tenth	Erwin Kreyszig	John Wiley & Sons	2011
3.	Advanced Engineering Mathematic	Fourth	Jain and Iyengar	Narosa Publications	2014



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
BSC		2	1	2	5	10	2	1	1	4
Engineering Physics										
AS101		Component		ISE		MSE		ESE		Total
		Theory		75		75		150		300
		Laboratory		50		--		50		100

Pre-requisite Course Codes, if any. HSC level physics

Course Objective: To provide the knowledge and methodology necessary for solving problems in the field of engineering

Course Outcomes (CO): At the End of the course students will be able to

- AS101.1 Illustrate the knowledge of basic concepts of semiconductor physics, lasers and quantum mechanics.
- AS101.2 Solve the problems by applying the basics concepts of physics.
- AS101.3 Use the Schrodinger equation to realize the concept of discreteness and quantum tunneling.
- AS101.4 Explain the working of various LASERs and its practical applications.
- AS101.5 To develop experimental skills and the practical abilities.
- AS101.6 To develop an ability of understanding of concepts and principles of physics.
- AS101.7 To comprehend importance of precision, accuracy of the experimental data.

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
AS101.1												
AS101.2												
AS101.3												
AS101.4												
AS101.5												
AS101.6												
AS101.7												

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
AS101.1						
AS101.2						
AS101.3						
AS101.4						
AS101.5						
AS101.6						
AS101.7						



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BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Quantum Mechanics</b>		
	1.1	de-Broglie hypothesis; experimental verification of de Broglie hypothesis; wave packet, group velocity and phase velocity; Wave function, Physical interpretation of wave function; Heisenberg's uncertainty principle; Electron diffraction experiment; Applications of uncertainty principle	1,2,3	09
	1.2	Schrodinger's time dependent wave equation, time independent wave equation; Application of time-independent Schrodinger equation - Particle trapped in one dimensional box and Potential barrier (Tunnelling), Harmonic oscillator (qualitative)	1,2,3	
2	Title	<b>Physics of Semiconductors and Semiconductor devices</b>		
	2.1	Conduction in metals and semiconductors; Fermi-Dirac distribution function and Fermi level in a conductor, insulator and semiconductor	5	
	2.2	Intrinsic and extrinsic semiconductors; intrinsic conductivity and extrinsic conductivity; Law of mass action, charge neutrality condition; intrinsic carrier concentration, electron and hole concentration; Extrinsic carrier concentration as a function of temperature; Effect of impurity concentration and temperature on the Fermi Level; Hall Effect and its applications. Drift and Diffusion current density	5	13
	2.3	Formation of a P-N junction, depletion region and barrier potential; Energy band structure of P-N Junction (unbiased, forward-bias, reverse-bias); concept of carrier current densities in p-n junction in equilibrium, forward bias and reverse bias; Breakdown mechanism - Zener effect and avalanche	5,6	
	2.4	P-N junction devices: LED, Zener diode, photoconductors, photovoltaic solar cells and Bipolar Junction Transistors	5,6	
3	Title	<b>LASERS</b>		06



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	<b>3.1</b>	Processes - Absorption of light, spontaneous emission, stimulated emission; Einstein's equations, Population inversion; metastable states; pumping and pumping schemes; optical resonance cavity	3,4	
	<b>3.2</b>	Ruby and Helium Neon laser, semiconductor laser; Applications of laser in industry, medicine and holography. (construction & reconstruction of holograms)	3,4	
<b>4</b>	<b>Self Study</b>	Interference of light in thin films having uniform thickness, Newton's rings, Applications of interference in anti-reflecting and highly reflecting thin films. Diffraction of light, Diffraction due to single slit, double slit and diffraction grating.		<b>05*</b>
<b>Total (*Not included)</b>				<b>28</b>

### Laboratory Component

Sr. No	Title of the Experiment*
1	Determination of energy band gap of a semiconductor
2	Study of I-V characteristics of a Zener diode
3	Determination of the type of semiconductor sample, concentration of charge carriers and its mobility using Hall Effect
4	Determination of Planck's constant using photo vacuum tube
5	Measurement of ultrasonic velocity in liquid medium using ultrasonic interferometer
6	Determination of radius of curvature using Newton's Rings
7	Determination of thickness of a thin foil or wire using the interference pattern of a wedge-shaped film
8	Determination of wavelengths of a mercury source and resolving power of a plane diffraction grating
9	Study of single slit diffraction
10	Determination of grating element of a diffraction grating using a laser source
11	Determination of the numerical aperture of an optical fibre
12	Uses of a Cathode-Ray Oscilloscope

\*Students will perform any 10 of the above experiments



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### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	A Textbook of Engineering Physics	Eleventh	Dr. M.N. Avadhanulu & Dr. P. G. Kshirsagar	S. Chand	2018
2	Engineering Physics	First	D. K. Bhattacharya & Poonam Tandon	Oxford University Press	2015

### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Concepts of Modern Physics	Sixth	Arthur Beiser	McGraw Hill Education	2009
2	Modern Physics	Third	Serway, Moses and Moyer	Thomson Learning	2005
3	Fundamentals of Physics	Tenth	Halliday and Resnick	Wiley	2013
4	Solid State Physics	Eighth	S. O. Pillai	New Age International Publishers	2018
5	Solid State Electronic Devices	Seventh	Ben G. Streetman and Sanjay Kumar Banerjee	Pearson Education	2016
6	Lasers: Fundamentals and Applications	Second	Ghatak and Thyagarajan	Springer	2011



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(ESC)	Engineering Graphics	1	0	4	2	7	1	0	2	3
Examination Scheme										
AS104		Component	ISE		MSE		ESE		Total	
		Theory	25		25		50		100	
		Laboratory	150		--		50		200	

Pre-requisite Course Codes, if any.
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### Course Objective:

**Course Outcomes (CO):** At the End of the course students will be able to

AS104.1	Construct basic engineering curves.
AS104.2	Read the 3 dimensional view and draw the orthographic projections.
AS104.3	Draw projection of points and lines.
AS104.4	Draw projection of regular solids inclined to both the reference planes.
AS104.5	Read the orthographic projection and draw isometric views.
AS104.6	Draw the development of lateral surfaces of solids.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
AS104.1												
AS104.2												
AS104.3												
AS104.4												
AS104.5												
AS104.6												

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
AS104.1						
AS104.2						
AS104.3						
AS104.4						
AS104.5						
AS104.6						

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Unit1	Introduction to Engineering Drawing	1,2	3
	1.1	Types of Lines, Dimensioning Systems as per IS conventions. First angle method of projection only		
	1.2	Basic construction of Cycloid and Involutes.		
2	Unit2	Orthographic Projection	1	2
	2.1	Orthographic views of a simple machine part as per the first angle method of projection recommended by I.S.		
	2.2	Full Sectional views of the Simple Machine parts.		
3	Unit3	Projection of Points and Lines:-	1,2	4
	3.1	Projection of points in all four quadrants		
	3.2	Projection of lines parallel to one principal reference plane.		
	3.3	Lines inclined to both the Reference Planes (Excluding Traces of lines).		
4	Unit4	Projection of solid (Regular solids like Prism, Pyramid, Cylinder, Tetrahedron, Hexahedron and Cone only)	1,2	5
	4.1	Projection of solid resting on plane (Single step projection)		
	4.2	Projection of solid such that base inclined to one reference plane (Two step projection)		
	4.3	Projection of solid such that base inclined to both reference planes (Three step projection/problem) (Exclude Spheres, Composite, Hollow solids and frustum of solids)		
5	Unit5	Isometric visualization and DLS	2	Lab session (2)
	5.1	Isometric view (Natural scale only)		
	5.2	Development of lateral surface. (Exclude DLS of a solid with section or a hole in it and Reverse Development)		
6	Self Study	1.2 Construction of Engineering curves like ellipse, parabola, hyperbola, helix, other types of cycloid etc. by using different method of construction. 2.1 Solve more practice examples of orthographic views. Draw different views of a machine part/any object using third angle method of projection. (Axonometric view, oblique view, perspective etc.) 2.2 Half sectional orthographic views. 3.1 Projection of lines with traces, application based problems on Projection of lines	1,2,3	6*



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		4.1 Projection of section of solid with cutting planes. 5.1 Development of surfaces of frustum of solid, and retaining part of the solid after cutting plane, reverse development of solid.		
Total (*Not included)				14

Laboratory Component (Minimum 10 Laboratory experiments are expected)

Sr. No	Engineering AutoCAD Laboratory
1	Introduction to AutoCAD:-Basic Drawing and Editing Commands. Knowledge of setting up layers, Dimensioning, Hatching, plotting and Printing. AutoCad Practice sheets (Min. Two)
2	Orthographic views (Two Problems)
3	Sectional Orthographic views(Two Problems)
4	Draw cycloid and involute(one each)
5	Draw Projection of lines(parallel and inclined to one plane)
6	Draw Projection of lines (Inclined to both the reference plane)
7	Projection of solid (Single step and two step)
8	Projection of solid (Three step )
9	Draw development of lateral surfaces with simple sections.
10	Isometric Views:- Isometric View/Drawing of blocks of plain and cylindrical surfaces using plain/natural scale only. (Exclude Spherical surfaces).

Text Books:

Sr. No	Title	Edition	Authors	Publisher	Year
1	Engineering Drawing	53 <sup>rd</sup>	N D Bhatt	Charotar	2016
2	Engineering Drawing	3 <sup>rd</sup>	Dhananjay A Jolhe	Tata McGraw Hill	2011

Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	AutoCAD 2017	--	Sham Tickoo	DreamTech Press, Delhi	2017
2	Engineering Drawing and Graphics	Fifth	K Venugopal	New Age International	2011



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(ESC)  ET101	Basic Electrical Engineering	3	0	2	6	11	3	0	1	4
		Examination Scheme					Total			
		Component	ISE		MSE		ESE		Total	
		Theory	75		75		150		300	
Pre-requisite Course Codes, if any.		Basic concepts of electric charge, current, voltage and power								

**Course Objective:** Course Objective: To impart a basic knowledge of electrical quantities, Circuits and components.

**Course Outcomes (CO):** At the End of the course students will be able to

ET101.1	Compute various electrical quantities of given dc circuit using circuit simplification techniques and various network theorems.
ET101.2	To expose the students to different terms and concepts in AC Circuits at fundamental frequency and to expose them to basics of effects of harmonics in the waveforms
ET101.3	To study the working principles of electrical machines and their applications
ET101.4	To expose the students the fundamental concepts in Controllable Switch and Modulation based Power Conversion
ET101.5	To study Electrical Parameters of the Batteries and their selection and design criteria for a specific application

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ET101.1												
ET101.2												
ET101.3												
ET101.4												
ET101.5												

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
ET101.1						
ET101.2						
ET101.3						
ET101.4						
ET101.5						



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BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs
1	Title	DC Circuits	1,2	10
	1.1	Electrical circuit elements (R, L and C), Voltage and current sources, Equivalent resistance of circuits, Simplification using delta-star and star-delta transformation.		
	1.2	Kirchoff's current and voltage laws, Analysis of simple circuits with dc excitation, Mesh analysis, Superposition, Thevenin, Norton and Maximum Power Transfer Theorems		
	1.3	Time-domain analysis of first-order DC Transients in RL and RC circuits.		
2	Title	AC Circuits	1,2	12
	2.1	Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Harmonics, Total Harmonic Distortion, Power supplied by Harmonic voltages and currents, Power factor in case of non-sinusoidal waveforms.		
	2.2	AC Analysis of series and parallel RLC Circuits with Resonance, Concept of Bandwidth and Q-factor,		
	2.3.	Three-phase balanced circuits, voltage and current relations in star and delta connections.		
3	Title	Electromagnetic and Electro-Mechanical Energy Converters	1,2	10
	3.1	Magnetically Coupled Coils, Self and Mutual Inductance and Dot Convention		
	3.1	Single Phase Transformer: Principle of Operation, Equivalent Circuits		
	3.2	Single Phase Transformer: Efficiency and Regulation		
	3.3	Introduction to Three-phase Transformers and Applications		
	3.4	Fundamental Principles of Rotating Machines, Characteristics of Induction motor and DC motor		
4	Title	Electric Power Converters	1,2	05
	4.1	Fundamental Principles of Buck, Boost and buck-boost DC-DC converters and their Transfer Characteristics, Duty Ratio Control		
	4.2	Single-phase voltage source inverters and PWM		
5	Title	Batteries: Electrical Characteristics and Applications		05



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	5.1	Introduction to type of Batteries, Generalized Battery parameters such as SoC, DoD, Energy and Power Densities, Battery C-rating, etc. Comparison of Batteries, Charging and Discharging Characteristic		
	5.2	Selection and Sizing of Battery Packs for Specific Applications		
6	Self Study	Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption and power factor improvement.		6*
Total (*Not Included)				42

### Laboratory Component (Minimum 10 Laboratory experiments are expected)

Sr. No	Title of the Experiment
01	Introduction to Electrical Measuring instruments, Lamp Loads, Inductor Loads and Capacitor Bank
02	Verification of Star-Delta and Delta-star Transformation with Kirchhoff's Laws
03	Verification of Thevenin's Norton's and Maximum Power Transfer Theorem
04	Verification of DC Transient equations in RL and RC Circuits
05	Experimental study of single-phase AC circuit with R-L and R-C Load with Measurement of Power and Power factor
06	Experimental study of R-L-C series Resonance. To plot resonance curve, To compute Bandwidth and Q-factor
07	Experiment on Magnetic Circuit Fundamentals
08	Loading of a transformer: measurement of primary and secondary voltages and currents, and power. To compute efficiency and regulation.
09	Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
10	Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super-synchronous speed.
11	Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform.
12	Demonstration of V/F control of Induction motor
13	Experimental study of charge and Discharge characteristics of a Lead-acid Battery
14	Introduction to L.T. Switch gear



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### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Basic Electrical Engineering	Third	D.P. Kothari and I. J.	Tata McGraw Hill	2010
2	Electrical Technology	Twenty Third	B.L.Theraja	S. Chand Publications	2003

### Reference Books

Sr. No	Title	Edition	Author	Publisher	Year
1	Basic Electrical Engineering	Second	D.C. Kulshreshtha	McGraw Hill	2019
2	Fundamentals of Electrical Engineering	Second	L.S. Bobrow	Oxford University Press	2011
3	Electrical and Electronics Technology	Third	E. Hughes	Pearson	2010
4	Electrical Engineering Fundamentals	Second	V.D. Toro	Prentice Hall India	1989
5	Elements of Power Electronics	Second	P. T. Krein	Oxford University Press	2015
6	Power Electronics: Converters, Application and Design	Second	Ned Mohan, T.M Undelands and W P Robbins	John Wiley and Sons. Inc.	1995
7	Electric Machinery	Sixth	A. E. Fitzgerald, C. Kingsley and S. D. Umans	McGraw-Hill	2003



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		2	0	2	3	7	2	0	1	3
Examination Scheme										
(ESC)	Problem Solving using OOP	Component		ISE		MSE		ESE		Total
		Theory		--		--		--		--
		Laboratory		200		--		100		300

Pre-requisite Course Codes, if any.	Problem Solving using Imperative Programming
<b>Course Objective:</b> To learn problem solving using Object-Oriented programming paradigm	
<b>Course Outcomes (CO):</b> At the End of the course students will be able to	
CS102.1	Apply concepts of object oriented programming using classes and objects
CS102.2	Apply Inheritance for a given scenario
CS102.3	Apply polymorphism for solving a given problem
CS102.4	Apply abstraction and exception handling to create efficient program.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS102.1												
CS102.2												
CS102.3												
CS102.4												

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
CS102.1							
CS102.2							
CS102.3							
CS102.4							

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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**Theory (This course content delivery will be in C++/Java. Course Contents to be taken care accordingly)**

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Introduction and Encapsulation</b>	1,2	8
	1.1	Introduction to Object Oriented Programming, Procedural verses Object Oriented Programming, Principles, Benefits and applications of Object Oriented Programming.		
	1.2	Encapsulation: Problem solving with Objects and Classes		
	1.3	static data member and methods, constructors and their types. Types of functions and keywords, Strings, Arrays		
2		<b>Inheritance</b>	1,2	6
	2.1	Concept of Inheritance, parent class, derived class, base class and derived class constructor		
	2.2	Types of inheritance: single, multiple, multilevel, hierarchical, hybrid		
	2.3	Aggregation and Composition		
3		<b>Polymorphism</b>	1,2	6
	3.1	Static Polymorphism: Method overloading and Constructor overloading		
	3.2	Dynamic Polymorphism: Method overriding		
	3.3	Data conversion		
4		<b>Abstraction</b>	1,2	2
	4.1	Abstraction: abstract class		
5		<b>Exception Handling</b>	1,2	6
	5.1	try, throw, and catch exceptions		
	5.2	Function exception declaration		
6	<b>Self Study</b>	File Handling, \$ STL, \$pointers, \$virtual functions @Multithreading, @Packages, @interface	1,2	5*
<b>Total</b>				28+ 5*

\$ only for C++

@ only for Java

\*\* Language used: C++ for Etrx and Extc Branch

\*\* Language used: C++/Java for IT and CE Branch

### Laboratory Component



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Sr. No	Title of the Experiment
1	Program on Encapsulation: Write a program to demonstrate classes and objects
2	Program on Encapsulation: Write a program to demonstrate constructor
3	Program on Polymorphism: Implement a Program to demonstrate method overloading,
4	Program on Polymorphism: Implement a Program to demonstrate constructor overloading
5	Program on Polymorphism: Implement a Program to demonstrate method overriding
6	Program on Inheritance: Implement a Program to demonstrate single, multilevel Inheritance
7	Program on Inheritance: Implement a Program to demonstrate multiple Inheritance
8	Program on Abstraction: Implement a Program to demonstrate Abstraction using abstract class
9	Program on Abstraction: Implement a Program to demonstrate multithreading/ STL
10	Program to demonstrate File Handling

### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Object Oriented Programming with C++	Sixth	E Balagurusamy	Tata McGraw Hill	2017
2	Oriented Programming in Turbo C++	Fourth	Robert Lafore	Galgotia	2001
3	Java -The Complete Reference	Tenth	Herbert Schildt	Tata McGraw-Hill	2017
4	Java Programming From the Ground Up	First	Ralph Bravaco,Shai Simoson	Tata McGraw-Hill	2009

### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	The Compete Reference C++	Fourth	Herbert Schildt	Tata McGraw Hill	2017
2	An introduction to Programming and Object Oriented Design using Java	Third	Jaime Nino, Frederick A. Hosch	Wiley Student Edition	2010



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(SBC)		0	0	2	0	02	0	0	1	1
Examination Scheme										
AS106	Skill Shop	Component	ISE		MSE		ESE		Total	
		Theory	--		--		--		--	
		Laboratory	50		--		50		100	

### Pre-requisite Course Codes, if any.

**Course Objective:** To equip the students with the fundamental skills involved in the creation of simulated and physical design.

**Course Outcomes (CO):** At the End of the course students will be able to

- AS106.1 Operate basic electronic equipment and instruments.
- AS106.2 Make PCB designs in simulations.
- AS106.3 Assemble, disassemble and troubleshoot computer hardware and network peripherals.
- AS106.4 Fabricate basic jobs in traditional trades.
- AS106.5 Design a 3D model and translate it to a 3D printed component.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
AS106.1												
AS106.2												
AS106.3												
AS106.4												
AS106.5												

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
AS106.1						
AS106.2						
AS106.3						
AS106.4						
AS106.5						

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create



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### Lab Component

Trade No.	Unit No.	Topics	Ref.	Hrs.
1	Unit 1	<b>Electronic Components</b>  1.1 Introduction to Electronic Components Exposure to usual electronic equipment/instruments such as Multi-meter, Oscilloscope, Function generator, IC tester and Power supply, Information about their front panels, Demonstrations on their working, Hands-on for measurement of component values and DC voltage using multi-meter, AC mains voltage/1 KHz Square wave/any small signal from function generator on Oscilloscope, Testing of sample digital ICs using IC tester.  OR Repairing of gadgets and appliances: Elementary skills of repairing juicer, mixer, grinder, etc.	5	4
2	Unit 2	PCB Laboratory Exercises  2.1 Layout drawing, Positive and negative film making, PCB etching and drilling, Tinning and soldering technique.	6	4
3	Unit 3	<b>Hardware and Networking</b>  3.1 Dismantling of a Personal Computer (PC), Identification of Components of a PC such as power supply, motherboard, processor, hard disk, memory (RAM, ROM), CMOS battery, CD drive, monitor, keyboard, mouse, printer, scanner, pen drives, disk drives etc.  3.2 Assembling of PC, Installation of Operating System and Device drivers, Boot-up sequence. Installation of application software (at least one).  3.3 Basic troubleshooting and maintenance.  3.4 Identification of network components: LAN card, wireless card, switch, hub, router, different types of network cables (straight cables, crossover cables, rollover cables) Basic networking and crimping.	7, 8	4
4	Unit 4	<b>Traditional Trades*</b>  Carpentry Use and setting of hard tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood turning and modern wood turning methods. One carpentry job involving a joint and report on demonstration of a job involving wood turning required for successful completion of module.  OR Electrical board wiring	1, 2	4



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		House wiring, staircase wiring, and wiring diagram for fluorescent tube light, Godown wiring and three phase wiring for electrical motors.  OR <b>Sheet Metal Practice</b> Introduction to primary technology processes involving bending, punching and drawing various sheet metal joints, development of joints. Utility job in sheet metal required for successful completion of module.		
5	Unit 5	<b>3D Modeling and Printing</b>	3, 4	4
	5.1	Modeling approaches for ideation and creation. Developing a CAD file (.iges/.step/.dwg) of a 3D model and export it as an .stl file for the purpose of 3D printing. Importing the 3D .stl file to generate a .gcode file for 3D printing through slicing, using open source software.		
	5.2	Introduction to 3D printing: methodologies, best practices, material and model variation. Live printing sessions of generated .gcode files in real time with optimal parameters and troubleshooting.		
Total				20

\* Students can opt for any one of the three trades from Unit 4.

**Text Books:**

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Workshop Manual	Sixth	Venkat Reddy	BS Publication	2008
2	Wiring Simplified: Based on 2017 National Electrical Code	Forty Fifth	Frederic P Hartwell, Herbert P. Richter, W.C. Schwan	Park Publishing	2017

**Reference Books:**

Sr. No.	Title	Edition	Authors	Publisher	Year
3	Autocad 2017	First	ShyamTikoo	Dreamtech Press	2016
4	Ultimaker 2+ reference manual	-	-	Ultimaker	2017
5	Encyclopedia of Electronic Components	First	Charles Platt	O Reilly	2012
6	Printed Circuit Boards	First	Khandpur R.S.	Tata McGraw Hill	2005
7	Troubleshooting Your PC For Dummies	Second	Gookin Dan	For Dummies	2005
8	Networking For Dummies	Eighth	Lowe Doug	For Dummies	2007

Bharatiya Vidya Bhavan's  
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Revision: SPIT-1-19



**Bachelor of Technology (B.Tech)**  
 All Branches

**First Year Engineering**  
 (Sem. I and Sem. II)  
Effective from Academic Year 2019 -20

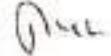
Board of Studies Approval: Respective Department Boards

Academic Council Approval: 16/01/2019 & 14/05/2019

Rita Ds  
 Dr. Rita Ds  
 Head, ASH department

  
 Dr. Surendra Rathod  
 Dean Academics  
 Bharatiya Vidya Bhavan's  
 Sardar Patel Institute of Technology



  
 Dr. Prachi Gharpure  
 Principal  
 Bharatiya Vidya Bhavan's  
 Sardar Patel Institute of Technology



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## Scheme for First Year B.Tech (2019-20)

### Group 1: Computer Engineering and Information Technology

Course Code	Course Name	Group	SEM I (Group 1)			Credits
			L	T	P	
BS11	Linear Algebra & Differential Calculus	BS	3	--	--	3
BS12	Engineering Physics	BS	4	1	--	5
ES11	Structured Programming Approach	ES	3	--	--	3
ES12	Digital Circuits	PC	3	--	--	3
BSL11	Computational Mathematics Lab-I	BS	--	--	2	1
BSL12	Engineering Physics Lab	BS	--	--	2	1
ESL11	Structured Programming Approach Lab	ES	--	--	4(2+2)	2
ESL12	Digital Circuits Lab	PC	--	--	2	1
ESL16	Workshop I	ES	--	--	2	1
HSS11	Communication Skills	HSS	2	--	2	3
MC21	Environmental Studies (Non-Credit)	MC	1	--	--	--
ABL-A	Essence of Indian Traditional Knowledge (Non-Credit)	MC	1	--	--	--
Total			17	1	14	23

Course Code	Course Name	Group	SEM II (Group 1)			Credits
			L	T	P	
BS21	Differential Equations & Integral Calculus	BS	3	--	--	3
BS23	Engineering Chemistry	BS	2	--	--	2
ES23	Basic Electrical and Electronics Engineering	ES	3	--	--	3
ES24	Engineering Graphics	ES	2	--	--	2
BSL21	Computational Mathematics Lab-II	BS	--	--	2	1
BSL23	Engineering Chemistry Lab	BS	--	--	2	1
ESL23	Basic Electrical and Electronics Engineering Lab	ES	--	--	2	1
ESL24	Engineering Graphics Lab	ES	--	--	4(2+2)	2
ESL25	Python Programming Lab	ES	--	--	2	1
ESL26	Workshop II	ES	--	--	2	1
MC22	Constitution of India (Non-Credit)	MC	1	--	--	--
LSC	Life Skill Courses (Non-Credit)	LA	1	--	--	--
Total			12	--	14	17



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**Scheme for First Year B.Tech (2019-20)**

**Group 2: Electronics and Electronics & Telecommunication**

Course Code	Course Name	Group	SEM I (Group 2)			Credits	
			Teaching Scheme (Hrs/week)				
			L	T	P		
BS11	Linear Algebra & Differential Calculus	BS	3	--	--	3	
BS13	Engineering Chemistry	BS	2	--	--	2	
ES13	Basic Electrical Technology	ES	3	--	--	3	
ES14	Engineering Graphics	ES	2	--	--	2	
BSL11	Computational Mathematics Lab-I	BS	--	--	2	1	
BSL13	Engineering Chemistry Lab	BS	--	--	2	1	
ESL13	Basic Electrical Technology Lab	ES	--	--	2	1	
ESL14	Engineering Graphics Lab	ES	--	--	4(2+2)	2	
ESL15	Python Programming Lab	ES	--	--	2	1	
ESL16	Workshop I	ES	--	--	2	1	
HSS11	Communication Skills	HSS	2	--	2	3	
MC22	Constitution of India (Non-Credit)	MC	1	--	--	--	
ABL-A	Essence of Indian Traditional Knowledge (Non-Credit)	MC	1	--	--	--	
Total			14	--	16	20	

Course Code	Course Name	Group	SEM II (Group 2)			Credits	
			Teaching Scheme (Hrs/week)				
			L	T	P		
BS21	Differential Equations & Integral Calculus	BS	3	--	--	3	
BS22	Engineering Physics	BS	4	1	--	5	
ES21	Structured Programming Approach	ES	3	--	--	3	
ES22	Digital Circuits	PC	3	--	--	3	
BSL21	Computational Mathematics Lab-II	BS	--	--	2	1	
BSL22	Engineering Physics Lab	BS	--	--	2	1	
ESL21	Structured Programming Approach Lab	ES	--	--	4(2+2)	2	
ESL22	Digital Circuits Lab	PC	--	--	2	1	
ESL26	Workshop II	ES	--	--	2	1	
MC21	Environmental Studies (Non-Credit)	MC	1	--	--	--	
LSC	Life Skill Courses (Non-Credit)	LA	1	--	--	--	
Total			15	1	12	20	



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## Evaluation Scheme for First Year B.Tech (2019-20)

### Group 1: Computer Engineering and Information Technology

Course Code	Course Name	Group	Marks			
			ISE	MSE	ESE	Total
BS11	Linear Algebra & Differential Calculus	BS	20	20	60	100
BS12	Engineering Physics	BS	20	20	60	100
ES11	Structured Programming Approach	ES	20	20	60	100
ES12	Digital Circuits	PC	20	20	60	100
BSL11	Computational Mathematics Lab-I	BS	40	--	--	40
BSL12	Engineering Physics Lab	BS	40	--	--	40
ESL11	Structured Programming Approach Lab	ES	80	--	20	100
ESL12	Digital Circuits Lab	PC	40	--	--	40
ESL16	Workshop I	ES	50	--	--	50
HSS11	Communication Skills	HSS	80	20	--	100
MC21	Environmental Studies (Non-Credit)	MC	--	--	--	--
ABL-A	Essence of Indian Traditional Knowledge (Non-Credit)	MC	--	--	--	--
	Total		410	100	260	770

Course Code	Course Name	Group	Marks			
			ISE	MSE	ESE	Total
BS21	Differential Equations & Integral Calculus	BS	20	20	60	100
BS23	Engineering Chemistry	BS	15	15	30	60
ES23	Basic Electrical and Electronics Engineering	ES	20	20	60	100
ES24	Engineering Graphics	ES	15	15	30	60
BSL21	Computational Mathematics Lab-II	BS	40	--	--	40
BSL23	Engineering Chemistry Lab	BS	40	--	--	40
ESL23	Basic Electrical and Electronics Engineering Lab	ES	40	--	--	40
ESL24	Engineering Graphics Lab	ES	80	--	20	100
ESL25	Python Programming Lab	ES	40	--	--	40
ESL26	Workshop II	ES	50	--	--	50
MC22	Constitution of India (Non-Credit)	MC	--	--	--	--
LSC	Life Skill Courses (Non-Credit)	LA	---	--	--	--
	Total		360	70	200	630



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**Evaluation Scheme for First Year B.Tech (2019-20)**

**Group 2: Electronics and Electronics & Telecommunication**

Course Code	Course Name	Group	Marks			
			ISE	MSE	ESE	Total
BS11	Linear Algebra & Differential Calculus	BS	20	20	60	100
BS13	Engineering Chemistry	BS	15	15	30	60
ES13	Basic Electrical Technology	ES	20	20	60	100
ES14	Engineering Graphics	ES	15	15	30	60
BSL11	Computational Mathematics Lab-I	BS	40	--	--	40
BSL13	Engineering Chemistry Lab	BS	40	--	--	40
ESL13	Basic Electrical Technology Lab	ES	40	--	--	40
ESL14	Engineering Graphics Lab	ES	80	--	20	100
ESL15	Python Programming Lab	ES	40	--	--	40
ESL16	Workshop I	ES	50	--	--	50
HSS11	Communication Skills	HSS	80	20	--	100
MC22	Constitution of India (Non-Credit)	MC	--	--	--	--
ABL-A	Essence of Indian Traditional Knowledge (Non-Credit)	MC	--	--	--	--
	Total		440	90	200	730

Course Code	Course Name	Group	Marks			
			ISE	MSE	ESE	Total
BS21	Differential Equations & Integral Calculus	BS	20	20	60	100
BS22	Engineering Physics	BS	20	20	60	100
ES21	Structured Programming Approach	ES	20	20	60	100
ES22	Digital Circuits	PC	20	20	60	100
BSL21	Computational Mathematics Lab-II	BS	40	--	--	40
BSL22	Engineering Physics Lab	BS	40	--	--	40
ESL21	Structured Programming Approach Lab	ES	80	--	20	100
ESL22	Digital Circuits Lab	PC	40	--	--	40
ESL26	Workshop II	ES	50	--	--	50
MC21	Environmental Studies (Non-Credit)	MC	--	--	--	--
LSC	Life Skill Courses (Non-Credit)	LA	--	--	--	--
	Total		330	80	260	670



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		3	-	-	3	-	-	3
BS11	Linear Algebra & Differential Calculus	Examination Scheme				TOTAL		
		ISE	MSE	ESE		TOTAL		
		20	20		60	100		

**Course Objectives:** To develop mathematical skills for solving engineering problems.

**Course Outcomes:**

Pre-requisite	HSC level Mathematics		
Course Outcomes	Learners will be able		Cognitive Level
	CO1 To differentiate a function partially.		Knowledge
	CO2 To apply partial derivatives to find extreme values of 2 & more than 2 variables function.		Application
	CO3 To find rank of a matrix.		Comprehension
	CO4 To solve system of linear equations by Numerical Methods and to encode and decode messages.		Application
	CO5 To check if matrix is diagonalizable.		Comprehension
	CO6 To calculate functions of a square matrix and to find google page ranking.		Application

Module No	Unit No.	Topics	Ref	Hrs.
1	Module name : Differential Calculus(Partial Differentiation)			
	1.1	Partial derivatives of first and higher order. Partial derivatives of composite and implicit functions.	1,2,3,5	04
	1.2	Euler's theorem on homogeneous functions with two and three independent variables, deduction from Euler's theorem		03
	1.3	Application of partial derivatives: i) Local Maxima and Minima of functions of two variables. ii) Lagrange's Method of undetermined multipliers.		03
2	Module name : Linear Algebra(Matrices)			
	2.1	Revision: Revision of basic matrices.	1,2,3,4,5	01
		Rank of Matrix, Normal form, and Echelon form.		03



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2.2	Consistency and solution of simultaneous linear homogeneous and Non-homogeneous equations.			03
2.3	Application of solving system of equations in electrical networks, traffic control and balancing chemical equations.			02
2.4	Linear dependence and independence of vectors.			01
2.5	Solution of system of linear algebraic equations, by (1) Gauss Elimination Method, (2)Gauss Jordan method (3) Gauss Jacobi Iteration method      (4) Gauss Seidel Method.			03
2.6	Application of matrices to Coding and De-coding	7		02
2.7	Eigen values and Eigen vectors and its properties.(Theorems without proof)			04
2.8	Cayley-Hamilton theorem and its applications.			02
2.9	Similar matrices, diagonalizable matrices and functions of square matrix.	1,2,3,4,5		05
3.0	Derogatory and non-derogatory matrices.			01
3.1	Application to findgoogle page rank.			02
			Total	39hrs

### Reference Books:

- [1] Kreyszig, "Advanced Engineering Mathematics", 9<sup>th</sup> edition, John Wiley
- [2] H.K.Dass, "Advanced Engineering Mathematics", 28<sup>th</sup> edition, S.Chand, 2010
- [3] Grewal B.S., "Higher Engineering Mathematics", 38<sup>th</sup> edition, Khanna Publication
- [4] H Anton and C.Rorres, "Elementary Linear Algebra Application Version", 6th edition, John Wiley & Sons, 2010
- [5] Jain and Iyengar, "Advanced Engineering Mathematics", 4<sup>th</sup> edition, Narosa Publishing House, Pvt. Ltd, 2014
- [6] S.S. Sastry, "Introductory Methods of Numerical Analysis", 4<sup>th</sup> edition, Prentice-Hall of India Pvt.Ltd.
- [7] M. Eisenberg, "Hill Cipher and Modular Linear Algebra", 3 Nov 1999



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BSL11	Computational Mathematics Lab-I	-	-	02	-	-	01	01
<b>Examination Scheme</b>								
ISE			MSE		ESE		Total	
40			--		--		40	

**Course Objectives:** To develop logical and problem solving skills.

	After successful completion of the course, student will be able to	
Course Outcomes	CO1	Use Scilab as a tool to solve linear equations by various methods specified.
	CO2	Develop an understanding of logic of given methods.

Experiment No.	Experiment Details	Marks
1	To solve linear equations using Gauss Elimination method.	08
2	To solve linear equations using Gauss Jordan method.	08
3	To solve linear equations using Gauss-Jacobi method.	08
4	To solve linear equations using Gauss-Seidel method.	08
5	To find Eigen values and Eigen vectors.	08
Total Marks		40

\*Note: Students have to solve 2 problems using SCILAB in practical session which will be evaluated. In alternate week, tutorials and ISE will be conducted.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		4	1	-	4	1	-	5
BS12/BS22	Engineering Physics	Examination Scheme						
		ISE	MSE	ESE	Total			
		20	20	60	100			

**COURSE OBJECTIVE:**

To provide the knowledge and methodology necessary for solving problems in the field of engineering

Pre-requisite Course Codes	HSC level physics		
Course Outcomes	Learners will be able to		Cognitive level
	CO1	Illustrate the knowledge of basic concepts of solid state physics, quantum mechanics and fibre optics	Understanding
	CO2	Visualize and sketch various lattice planes and directions using Miller Indices	Applying
	CO3	Solve the problems by applying the basics of semiconductors	Applying
	CO4	Use the Schrodinger equation to realize the concept of discreteness and quantum tunneling	Applying
	CO5	Explain the working of various LASERs and its practical applications	Understanding
	CO6	Determine the reactions for equilibrium of rigid bodies.	Understanding
	CO7	Demonstrate the understanding of applications of engineering mechanics to MEMS.	Understanding



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Module No.	Module Name	Unit no.	Topics	Ref.	Hrs.
1	Crystallography	1.1	Space lattice, Unit Cell and its characteristics, Bravais lattices, Cubic crystal system; HCP structure, Special cubic crystal structures:- Diamond structure, ZnS structure, NaCl structure	1	04
		1.2	Miller indices of crystallographic planes & directions; interplanar distance; introduction to X-rays, X-ray diffraction and Bragg's law; Determination of crystal structure		05
2	Semiconductors	2.1	Conduction in metals and semiconductors; Fermi-Dirac distribution function and Fermi level in a conductor, insulator and semiconductor	1	02
		2.2	Intrinsic and extrinsic semiconductors; intrinsic conductivity and extrinsic conductivity; Law of mass action, charge neutrality condition; intrinsic carrier concentration, electron and hole concentration; Extrinsic carrier concentration as a function of temperature; Effect of impurity concentration and temperature on the Fermi Level; Hall Effect and its applications. Drift and Diffusion current density		04
		2.3	Formation of a P-N junction, depletion region and barrier potential; Energy band structure of P-N Junction (unbiased, forward-bias, reverse-bias); concept of carrier current densities in p-n junction in equilibrium, forward bias and reverse bias; Breakdown mechanism - zener effect and avalanche	1	03
		2.4	P-N junction devices: LED, zener diode, photoconductors, photovoltaic solar cells and Bipolar Junction Transistors		03



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3	Quantum Mechanics	3.1	de-Broglie hypothesis; experimental verification of de Broglie hypothesis; wave packet, group velocity and phase velocity; Wave function, Physical interpretation of wave function; Heisenberg's uncertainty principle; Electron diffraction experiment; Applications of uncertainty principle	2,3,6	04
		3.2	Schrodinger's time dependent wave equation, time independent wave equation; Application of time-independent Schrodinger equation - Particle trapped in one dimensional box and Potential barrier (Tunneling), Harmonic oscillator (qualitative)		04
4	LASER & Fibre Optics	4.1	Processes - Absorption of light, spontaneous emission, stimulated emission; Einstein's equations Population inversion; metastable states; pumping and pumping schemes; optical resonance cavity	2,4	03
		4.2	Ruby and Helium Neon laser, semiconductor laser; Applications of laser in industry, medicine and holography. (construction & reconstruction of holograms)		03
		4.3	Propagation of light through optical fibre and its types; Numerical aperture, V-number	2,5	02
		4.4	Losses in optical fibre - attenuation and dispersion; Applications - optical fibre communication link, optical fibre sensors, medical applications		02
5	Mechanics and Modern Applications	5.1	Condition of equilibrium for concurrent forces, parallel forces and Non-concurrent Non-Parallel or general force system and Couples. Equilibrium of connected bodies.	7	06
		5.2	Types of supports, loads, Beams, Determination of reactions at supports for various types of loads on beams.	7	04
		5.3	Mechanics of MEMS: Basics of MEM sensors and actuators, Stiffness, Microcantilevers, Microhinges, Microbridges and Microsuspensions.	8	03
				Total	52



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## Recommended Books:

1. Bhattacharya D K and Tandon, "Engineering Physics", 1<sup>st</sup>ed, New Delhi, Oxford Press, 2015.
2. Halliday and Resnick, "Fundamentals of Physics", 10<sup>th</sup>ed, Wiley, 2013.
3. Beiser Arthur, "Concepts of Modern Physics", 6<sup>th</sup>ed, McGraw Hill Education, 2009.
4. Ghatak and Thyagarajan, "Lasers: Fundamentals and Applications", Springer, 2011.
5. Gerd Keiser, "Optical Fiber Communications", McGraw Hill.
6. Robert Eisberg& Robert Resnick, "Quantum Physics of Atoms, Molecules and Solids", Wiley Publications.
7. F.P. Beer, E.R. Johnston Jr., *Vector Mechanics for Engineers – Statics and Dynamics*, 9<sup>th</sup> ed., NY, USA, McGraw-Hill, 2010.
8. Nicolae Lobontiu and Ephraim Garcia, *Mechanics of Microelectromechanical Systems*, Kluwer Academic Publishers, 2005



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
		-	-	02	-	-	01	01	
<b>Engineering Physics Lab</b>									
<b>Examination Scheme</b>					<b>Total</b>				
ISE			MSE		ESE		Total		
40			--		--		40		

### Pre-requisite Course Codes-

Course Outcomes	CO1	To develop experimental skills for the use of laboratory instruments and tools
	CO2	To develop an ability of understanding of concepts and principles of physics
	CO3	To develop practical abilities (observation, recording data and analyzing results)
	CO4	To comprehend importance of precision, accuracy of the experimental data

Experiment No.	Experiment Details	Marks*
1	Determination of energy band gap of a semiconductor	5
2	Hall effect	5
3	Determination of Planck's constant using photo vacuum tube	5
4	Measurement of ultrasonic velocity in liquid medium using ultrasonic interferometer	5
5	Determination of radius of curvature using Newton's Rings	5
6	Determination of the wavelengths of a mercury source and resolving power of a plane diffraction grating	5
7	Study of single-slit diffraction	5
8	Determination of grating element of a diffraction grating using a laser source	5
9	Determination of the numerical aperture of an optical fibre	5
10	Uses of a Cathode-Ray Oscilloscope	5
Total Marks		40

\*Any 8 experiments

### Recommended Books:

- [1] Harnam Singh, Hemne P.S, "B.Sc Practical Physics", S Chand Publication.
- [2] Halliday and Resnick, "Fundamentals of Physics", 10<sup>th</sup> ed, Wiley, 2013.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ES11/ES21	Structured Programming Approach	03	-	--	03	-	--	03	
Examination Scheme									
		ISE		MSE		ESE		Total	
		20		20		60		100	

Pre-requisite Course Codes		--
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Demonstrate the fundamentals of computer programming.
	CO2	Make use of structured and modular programming approach to implement algorithms.
	CO3	Apply four primary constructs - sequential, iterative, branching and recursion to solve problems.
	CO4	Make use of primitive, derived and user-defined data types to solve problems.
	CO5	Utilise pointers to access arrays, strings, functions and files.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	<b>Introduction to Algorithms, flowcharts:</b> Algorithm definition, Properties of a good algorithm, Symbols of flowcharts, Writing algorithms and drawing flowcharts for a given problem	1,2,3,4	06
	1.2	<b>Standard Libraries, Data Types, Pointers:</b> Character set, standard Data types, Introduction to Pointers <b>Operators:</b> Arithmetic, Relational and Logical, Assignment, Unary, Conditional, Bitwise, Comma, Other Operators, Expression, Statements		
2	2.1	<b>Control structures:</b> <b>Branching Structures:</b> If statement, If-else Statement, multi-way decision, Switch statement, Continue statement , Break statement <b>Iterative Structures:</b> while , do-while , for , Nested Control Structures	1,2,3,4	06
3	3.1	<b>Functions:</b> Defining a Function, Accessing a Function, Function Prototype, Passing Arguments to a Function (Pointers revisited), Recursion	1,2,3,4	10



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	3.2	Arrays: Declaration, Definition, Accessing array element, One-dimensional array, Two-Dimensional array, Array Pointers revisited	1,2,3,4	
4	4.1	Strings: Array of characters, String functions, String Pointers	1,2,3,4	12
	4.2	Structures & Union: Declaration, Initialization, structure within structure, Array of Structure, Operation on structures, Concept of Union, Difference between structure and union, Structure to pointer, Pointer to Structure	1,2,3,4	
5	5.1	File Handling: Types of File, File operation- Opening, Closing, Creating, Reading, Processing File	1,2,3,4	05
<b>Total</b>				<b>39</b>

**Proposed pedagogy:** Selected classic algorithmic problems will be used to teach course concepts and language.

### References:

- [1] Kernighan , Ritchie, "*The C programming Language*", Prentice Hall of India.
- [2] Byron Gottfried, "*Programing with C*", McGraw Hill ( Schaum's outline series)
- [3] Carlo Ghezi, Mehdi Jazayeri, "*Programing Language Concepts*", John Wiley & Sons.
- [4] V. Rajaraman & Neelika Adabala, "*Computer Programming in C*", PHI Learning, Eastern Economy Edition, 2014



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
		--	--	2+2	--	--	2	2	
Examination Scheme									
		ISE		MSE		ESE		Total	
		80		--		20		100	

Pre-requisite Course Codes		--
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Make use of structured programming approach to solve problems.
	CO2	Apply various programming language constructs for problem solving.
	CO3	Develop modular code for an application.
	CO4	Develop applications using primitive, derived and user-defined data types to solve problems.
	CO5	Build application programs using pointers and files.

Exp. No.	Experiment Details	Ref.	Marks
1	To apply various control structures to solve given problem.	1,2,3,4	5
2	To develop an application to demonstrate functionality of Arrays.	1,2,3,4	5
3	To apply concept of functions to incorporate modularity.	1,2,3,4	5
4	To develop recursive functions in a program.	1,2,3,4	5
5	To apply various operations on strings.	1,2,3,4	5
6	To develop an application by applying concepts of structures/union.	1,2,3,4	5
7	To use pointers for an application.	1,2,3,4	5
8	To explore operations on files.	1,2,3,4	5
Total Marks			40

**Proposed pedagogy:** Selected classic algorithmic problems will be used to teach course concepts and language.

**Note:** C++ compiler will be used in the lab for executing programs

**References:**

- [1] Kernighan, Ritchie, "The C programming Language", Prentice Hall of India.
- [2] Byron Gottfried, "Programming with C", McGraw Hill ( Schaum's outline series).
- [3] Carlo Ghezi, Mehdi Jazayeri, "Programming Language Concepts", John Wiley & Sons.
- [4] V. Rajaraman & Neelamika Adabala, "Computer Programming in C", PHI Learning, Eastern Economy Edition, 2014.
- [5] John Hubbard, "Schaum's Outlines Series: Programming With C++", McGraw Hill.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ES12/22	Digital Circuits	3	--	--	3	--	--	3
		Examination Scheme						
		ISE		MSE		ESE		Total
		20		20		60		100

Pre-requisite Course Codes	--
After successful completion of the course, student will be able to	
Course Outcomes	CO1 Explain various logic gates, SOP, POS forms and their minimization with k-map for given combinational circuits.
	CO2 Construct combinational circuits using given MSI devices.
	CO3 Discuss different types of programmable logic devices like PROM, PAL and PLA
	CO4 Apply the knowledge of flip-flops and MSI to design sequential circuits
	CO5 Design state machines for given state diagrams after state reduction
	CO6 Compare the logic families based on their characteristics

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Logic Gates: Basic gates, Universal gates, Sum of products and products of sum, minimization with Karnaugh Map (upto four variables), Quine Mc'Clusky method and realization.	1,2,3	18
	1.2	Combinational Circuits using basic gates as well as MSI devices: Half adder, Full adder, Half Subtractor, Full Subtractor, Multiplexer, Demultiplexer, Decoder, Comparator (Multiplexer and Demultiplexer gate level upto 4:1).	1,2,3	
	1.3	Concepts of PROM, PAL and PLA.	4,5	
2	2.1	Sequential Logic: Latches and Flip-Flops. Conversions of Flip-Flops, Timing Considerations and Metastability.	1,2,3	12
	2.2	Counters: Asynchronous, Synchronous Counters, Up Down Counters, Mod Counters, Ring Counters Shift Registers, Universal Shift Register	1,2,3	
	2.3	MSI counters (IC 7490, IC 74160, IC 74163, IC 74169), MSI Shift registers (IC 74194) and their applications	4,5	
3	3.1	Mealy and Moore Machines, Clocked synchronous state machine analysis, State reduction techniques and state assignment, Clocked synchronous state machine design.	4,5	04



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4	4.1	Logic Families: Types of logic families (TTL and CMOS), characteristic parameters (propagation delays, power dissipation, Noise Margin, Fan-out and Fan-in), transfer characteristics of TTL NAND, Interfacing CMOS to TTL and TTL to CMOS.	2,3	5
				Total 39

## References:

- [1] William I. Fletcher, 'An Engineering Approach to Digital Design', PHI., First Edition
- [2] R. P. Jain, "Modern Digital Electronics", Tata McGraw Hill, Forth Edition
- [3] Morris Mano, "Digital Design", Pearson Education, Forth Edition
- [4] John F. Wakerly, "Digital Design Principles And Practices, third Edition Updated, Pearson Education, Third Edition
- [5] Stephen Brown and Zvonko Vranesic, "Fundamentals of digital logic design with VHDL", McGraw Hill, Second Edition.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ESL12/22	Digital Circuits Lab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE		MSE		ESE	Total	
		40		--		--	40	

Pre-requisite Course Codes | EL33 (Digital Circuits)

After successful completion of the course, student will be able to

Course Outcomes	CO1	Construct logic circuits using gate to realize given function
	CO2	Construct logic circuits using MSI ICs to realize given function
	CO3	Validate the design of combinational and sequential logic circuits by hardware implementation
	CO4	Test and troubleshoot given logic circuits
	CO5	Create an application using concepts of digital circuits

Exp. No.	Suggested List of Experiments	Ref.	Marks
1	Experiment based on combinational logic at gate level	1,2	5
2	Experiment based on combinational logic using MSI circuits	1,2	5
3	Experiment based on TTL and CMOS logic families	1,2	5
4	Experiment based on sequential circuits	1,2	5
5	Experiment based on Moore and Mealy machine	1,2	5
6	Mini-Project: Design and implement an application using digital circuit concepts.	1,2	15
Total Marks			40

### References:

- [1] Datasheets and application notes of LSI and MSI circuits.
- [2] R. P. Jain and M. M. S. Anand "Digital Electronics Practice Using Integrated Circuits," TataMc Graw Hill Education



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS13/ BS23	Engineering Chemistry	2	-	-	2	-	-	2
<b>Examination Scheme</b>								
ISE			MSE		ESE		<b>TOTAL</b>	
15			15		30		60	

### Course Education Objective:

To provide necessary background of applied chemistry suited for relevant areas of engineering.

Pre-requisite Course Codes		HSC Level Chemistry
After successful completion of the course, learner will be able to		
Course Outcomes	CO1	Relate thermodynamic principles and laws to crucial applications like heat engines (Understanding)
	CO2	Summarize properties and applications of different materials like polymers, ceramics, alloys , nanomaterials, conductors and insulators (Understanding)
	CO3	Identify methods for corrosion control based on knowledge of different types of corrosion and factors affecting rate of corrosion (Application)
	CO4	Compare different sources of energy like conventional fossil fuels, alternative fuels, batteries, fuel cells with respect to availability, working principles, constitution, efficiency of performance and environmental impact (Understanding)
	CO5	Apply knowledge of electrochemistry and green chemistry in the interest of public health and environment (Application)



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Module No	Module Name	Unit No.	Topics	Ref.	Hrs.
1	Thermodynamics	1.1	Introduction, Terminology, Concepts of Internal Energy and Thermodynamic equilibrium, Zeroth and First Law of Thermodynamics, Implications and Limitations of First law	1, 2,	1
		1.2	Concept of Enthalpy, Joule Thomson Effect, Carnot's Cycle, Carnot's theorem and related numericals, Second Law of thermodynamics	1, 2	2
		1.3	Overview of applications of thermodynamics	1,2	1
2	Polymers	2.1	Introduction to polymers, Effect of heat on polymers : Glass transition temperature and melting with significance;	2, 3,4	1
		2.2	Latest Applications: Conducting polymers, Liquid crystal polymers, Engineering Polymers,	2, 3,4,5	2
3	Corrosion	3.1	Introduction, Dry corrosion (i) Due to oxygen (ii) Due to other gases	2,3	1
		3.2	Mechanism of Electrochemical corrosion, Galvanic, differential aeration corrosion, Significance of galvanic series for corrosion phenomenon,	2,3	2
		3.3	Factors affecting rate of corrosion (i)Position in galvanic series, (ii) relative areas of anode and cathode, (iii) conductance of medium  Methods to decrease the rate of corrosion : Material selection, Proper designing, Cathodic protection- i) Sacrificial anodic protection ii) Impressed current method, Metallic coatings, Cathodic and anodic coatings (Galvanisation and Tinning : principle and application only)	2,3	2



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Module No	Module Name	Unit No.	Topics	Ref.	Hrs.
4	Energy Sciences	4.1	Definition and classification of fuels, Calorific value : Definition, Gross or Higher calorific value & Net or lower calorific value, Dulong's formula & numericals for calculations of Gross and Net calorific values.	2,3	2
		4.2	Knocking, Octane number, Cetane number, Antiknock agents, unleaded petrol	2,3	1
		4.3	Combustion- Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid & gaseous fuels.	2,3	1
		4.4	Disadvantages of fossil fuels, Alternative (Green) Fuels : Power alcohol , Biomass, Biogas, Biodiesel, Natural Gas and CNG (Description, Utility, advantages and disadvantages)	2,3	1
5	Batteries and Battery Technology	5.1	Introduction, Important terms, Nickel-Hydrogen(metal hydride), Rechargeable Lithium ion batteries	2,3	1
		5.2	Reserve Batteries, Fuel cells, characteristics, description, construction and working of Hydrogen-oxygen fuel cells, Types of fuel cells (in brief)	2,3	1
		5.3	Electrochemical sensors : Working principle, construction and applications	2,3,4	1
6	Green Chemistry	6.1	12 principles of green chemistry with examples, Numericals on Atom Economy, Green Solvents (Water, Supercritical Fluids),	2,3	2



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7	<b>Engineering materials</b>	7.1	Eutectic mixtures and soft solders Advanced Ceramic materials and cermets : magnetic, electronic and electrical applications Carbon nanomaterials : Fullerenes and Carbon nanotubes, Structure, Properties and applications	2,3,4	2
		7.2	Insulators, Semiconductors and Superconductors : Thermal and electrical insulating materials and important engineering applications, Stoichiometric, defect and controlled valency semi conductors.	2,3,4	1
		7.3	Superconductors, perovskite structure and 1:2:3 compound $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ , properties and applications	2,3,4	1
		<b>Total</b>		<b>26</b>	

**References:**

- [1] Peter Atkins, Physical Chemistry, XIth ed, Oxford, United Kingdom, Oxford University Press, 2017
- [2] P. C. Jain & M. Jain, Engineering Chemistry, XVIth ed , New Delhi, India:Dhanpat Rai Publishing Co. (P) Ltd., 2014
- [3] S. S. Dara & S. S. Umare, A Textbook of Engineering Chemistry, XIIth ed., New Delhi, India: S. Chand & Co. Ltd., 2013
- [4] S. Chawla, A Textbook of Engineering Chemistry, IIIrd ed., Delhi, India:Dhanpat Rai & Co. (Pvt.) Ltd., 2015
- [5] S. Agarwal, Engineering Chemistry Fundamentals and Applications, 1st ed, Delhi, India: Cambridge Univ. Press., 2015



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS13/ BS23	Engineering Chemistry Lab	-	-	2	-	-	1	1
		Examination Scheme				TOTAL		
		ISE	MSE	ESE	TOTAL		40	
		40	--	--	40		40	

Course Outcomes	Learner will be able to				
	CO1	Make use of analytical techniques like complexometric and iodometric titrations for varied purposes like estimation of hardness of water and composition of alloys			
	CO2	Use analytical instruments like conductometer, pHmeter and Orsat Apparatus			
	CO3	Estimate the molecular weight of polymer.			
	CO4	Estimate key properties of lubricants such as temperature dependence of viscosity, acid value and flash point.			
	CO5	Analyse a sample of coal for its moisture content			

Exp. No.	Experiment Details	Ref.	Marks
1	Determination of total, temporary and permanent hardness of water sample	1, 2	5
2	Removal of hardness using ion exchange column	1, 2	5
3	Molecular weight determination of polymers by Oswald's Viscometer	2	5
4	To determine flash point of a lubricating oil	2	5
5	Determination of Viscosity of oil by Redwood Viscometer	1, 2	5
6	Determination of amount of strong acid present in a solution using a conductometer	2	5
7	Determination of strength of acid using a pH meter		
8	Estimate percentage of Copper in brass by Iodometric Titration	1, 2	5
9	Estimate moisture content in coal.	1, 2	5
10	Analyse Flue gas for its composition (by Orsat's Apparatus).	1, 2	5
<b>Total Marks</b>			<b>40</b>

\* Any eight from the above list of experiments will be performed.

#### References:

- [1] P. C. Jain & M. Jain, *Engineering Chemistry*, XVth ed reprint, New Delhi, India, Dhanpat Rai Publishing Co. (P) Ltd., 2010.
- [2] S. S. Dara, *A Text Book on Experiments and Calculations in Engineering Chemistry*, IXth ed, New Delhi, India, S. Chand & Company Ltd., 2003.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS21	Differential Equations and Integral Calculus	3	-	-	3	-	-	3
		Examination Scheme						
		ISE		MSE		ESE		TOTAL
		20		20		60		100

**Course Objectives:** To develop mathematical skills for solving engineering problems.

**Course Outcomes:**

Pre-requisite	HSC level Mathematics		
Course Outcomes	Learners will be able		Cognitive level
	CO1 To solve differential equations of first order.		Comprehension
	CO2 To solve differential equations of higher order using operators.		Comprehension
	CO3 To apply techniques of solving Differential Equations to electrical engineering problems.		Application
	CO4 To evaluate improper integrals and multiple integrals in various co-ordinate system.		Comprehension
	CO5 To calculate Area using double integration.		Application

Module No	Module name	Unit No.	Topics	Ref	Hrs.
1	Linear Differential Equations (First order)	1.1	Exact differential Equations, Equations reducible to exact form by using integrating factors.	1,2,3,6,7	03
		1.2	Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation.		02
		1.3	Simple application of differential equation of first and second order to electrical Engineering problems.		02
		1.4	Numerical solution of ordinary differential equations of first order and first degree using (a) Taylor's series method (b) Euler's method (c) Modified Euler method (d) Runge-Kutta fourth order formula.	1,2,3,4,6, 7	04



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2	Linear Differential Equations (Higher order)	2.1	Linear Differential Equation with constant coefficient- complementary function, particular integrals of differential equation of the type $f(D)y = X$ where $X$ is $e^{ax}$ , $\sin(ax+b)$ , $\cos(ax+b)$ , $x^m e^{ax} V$ , $xV$ , where $V$ is a function of $x$	1,2,3,6,7	07
		2.2	Cauchy's homogeneous linear differential equation and Legendre's differential equation, Method of variation of parameters.		02
3	Integration (One variable)	3.1	Gamma function, Beta functions $\int_0^1 x^{m-1} (1-x)^{n-1} dx$ , $\int_0^{\pi/2} \sin^p \theta \cos^q \theta d\theta$	1,2,3,6	03
4	Multiple Integrals & Applications	4.1	Tracing of curves and standard solids.	1,2,3,5,6	02
		4.2	Double integration-definition, Evaluation of Double Integrals.		03
		4.3	Change the order of integration, Evaluation of double integrals by changing the order of integration and changing to polar form.		05
		4.4	Triple integration definition and evaluation (Cartesian, cylindrical and spherical polar coordinates).		04
		4.5	Application of double integrals to compute Area.		02
					Total 39

## References Books:

- [1] Kreyszig, "Advanced Engineering Mathematics", 9<sup>th</sup> edition, John Wiley
- [2] H.K.Dass, " Advanced Engineering Mathematics", 28<sup>th</sup> edition, S.Chand, 2010
- [3] Grewal B.S., "Higher Engineering Mathematics", 38<sup>th</sup> edition, Khanna Publication
- [4] S.C. Chapra and R.P. Canale, "Numerical Methods for Engineers with Programming and Software Applications", McGrawHill, Newyork 1998
- [6] Thomas & Finney, "Calculus & Analytic Geometry", 9<sup>th</sup> edition, Addison Wesley.
- [7] Jain and Iyengar, "Advanced Engineering Mathematics"
- [8] Dennis G. Zill, " A First Course in Differential Equations with Modelling Applications,
- [9] Cengage Learning



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BSL21	Computational Mathematics Lab-II	-	-	02	-	-	01	01
<b>Examination Scheme</b>								
ISE		MSE		ESE		<b>Total</b>		
40		--		--		40		

**Course Objectives:** To develop logical and problem solving skills.

**Course Outcomes:**

	Learners will be able
CO1	To use Scilab to solve differential equations of first order.
CO2	To Trace Curves and visualize Surfaces using Scilab.

Experiment No.	Experiment Details	Marks
1	Ordinary differential equation of first order.	08
2	Euler's and Euler modified method	08
3	Runge-Kutta method	08
4	Tracing of curves (Cartesian and Polar)	08
5	Tracing of surfaces	08
Total Marks		40

\*Note: Students have to solve 2 problems using SCILAB in practical session which will be evaluated. In alternate week, tutorials and ISE will be conducted.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		3	-	-	3	-	-	3
ES11	Basic Electrical and Electronics Engineering	Examination Scheme						
		ISE		MSE		ESE	Total	
		20		20		60	100	

## Pre-requisite Course Codes

Course Outcomes	CO1	Compute various electrical quantities of given dc circuit using circuit simplification techniques and various network theorems.
	CO2	Describe the concept of ac circuit and its resonance phenomena for a given RL, RC and RLC circuit.
	CO3	Compare Diode, BJT, FET on the basis of their operation and applications.
	CO4	Implement applications using OPAMP and timer circuit.

Module No.	Unit No.	Topics	Ref.	Hrs.
Prerequisite	A	Concept of e.m.f, potential difference, current, ohm's law, resistance, resistivity, series and parallel connections, power dissipation in resistance, effect of temperature on resistance		02
	B	Capacitors, with uniform and composite medium, energy stored in capacitor, R-C time constant.		
	C	Magnetic field, Faraday's laws of Electromagnetic induction, Hysteresis and eddy current losses, energy stored in an inductor, time constant in R-L circuit		
1		DC circuit		
	1.1	Kirchhoff's laws, Ideal and practical voltage and current source, Source transformation, Star-delta transformation	1,2	03
	1.2	Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem	1,2	03
2		AC circuit		
	2.1	Generation of alternating voltage and currents, RMS and Average value, form factor, crest factor, AC through resistance, inductance and capacitance	2,3	03
	2.2	R-L, R-C and R-L-C series and parallel circuits, power and power factor	2,3	04
	2.3	Series and parallel resonance, Q-factor and bandwidth	2,3	03



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<b>3</b>	<b>Semiconductor Devices</b>			
	<b>3.1</b>	P-N Junction Diode, Zener Diode, Light Emitting Diode, Schottky Diode: Common I-V characteristics	<b>4</b>	<b>02</b>
	<b>3.2</b>	Bipolar Junction Transistor : PNP and NPN types, I-V characteristics in CE, CB and CC configuration, Mode of BJT operation : cut off, active and saturation	<b>4</b>	<b>02</b>
	<b>3.3</b>	FET, JFET and MOSFET, common characteristics, different mode of operation in Enhancement mode and Depletion type MOSFETs.	<b>4</b>	<b>02</b>
<b>4</b>	<b>Application of semiconductor devices</b>			
	<b>4.1</b>	Diode rectifier circuits, Clipper and clamper circuits, zener diode as a voltage regulator, photovoltaic solar array	<b>4</b>	<b>02</b>
	<b>4.2</b>	BJT in single stage CE amplifier, BJT as a switch	<b>4</b>	<b>02</b>
	<b>4.3</b>	Applications of MOSFET as a switch and as an amplifier	<b>4</b>	<b>02</b>
<b>5</b>	<b>Operational amplifier and Integrated Circuits</b>			
	<b>5.1</b>	Ideal characteristics of operational amplifier (OP-AMP), concept of virtual ground, OP-AMP as inverting and non inverting amplifier, adder and subtractor, integrator and differentiator, precision rectifier, OP-AMP as a comparator with different applications.	<b>5</b>	<b>03</b>
	<b>5.2</b>	Introduction to IC555 as a timer circuit, internal block diagram of IC555, Astable, Monostable and Bistable Multivibrator using IC 555	<b>5</b>	<b>03</b>
	<b>5.3</b>	Introductory concepts of Analog to digital and Digital to Analog Conversion, R-2R Ladder, DAC and Successive Approximation ADC.	<b>5</b>	<b>02</b>
<b>Total</b>			<b>39</b>	

### Recommended Books:

- [1] B.L.Theraja "Electrical Technology" Vol-I and II, S. Chand Publications, 23<sup>rd</sup> ed. 2003.
- [2] Joseph A Edminister, "Schaum's outline of theory and problems of electric circuits" Tata McGraw Hill, 2<sup>nd</sup> edition
- [3] S.Sivanagaraju, G. Kishor, C. Srinivasa Rao, " Electrical Circuit Analysis" CENGAGE Learning
- [4] David Bell, " Electronic Devices and Circuits" Fifth Edition, Oxford University Press
- [5] Ramakant A. Gayakwad, "OPAMP and Linear ICs", 4th Edition, Prentice Hall / Pearson Education, 2001.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		--	-	2	---		1	1
ESL11	Basic Electrical and Electronics Lab	Examination Scheme						
		ISE	MSE		ESE	Total		
		40	---		20	60		

#### Pre-requisite Course Codes:

Course Outcomes	CO1	Identify instruments to measure electrical parameters.
	CO2	Compute electrical parameters for the given circuit using network theorem.
	CO3	Verify the resonance phenomenon for a given RLC circuit.
	CO4	Create an application using BJT and IC555
	CO5	Compare astable, monostable and bistable multivibrator circuit using given IC

Exp. No.	Experiment Details	Ref.	Marks
1	Various measurement using following instruments: 1. DSO: voltage, time, frequency, FFT, wave form storage in different format 2. Function Generator: Observe different waveforms by adjusting its voltage, frequency, dc bias, symmetry. 3. Digital Multimeter: Voltage, Current, Resistance, Capacitor 4. RLC meter: Measurement of Inductor and capacitor, Q factor 5. Power and Energy meter	1,2	10
2	Verification of superposition theorem. Compare the result after implementing the circuit on breadboard with simulation software.	1,2	05
3	Verification of Thevenin and Nortons theorem with an application to maximum power transfer theorem.	1,2	05
4	Measurement of active, reactive and apparent power in RLC series circuit.	1,2	05
5	Realization of resonance phenomenon in series RLC circuit.	2	05
6	BJT and its applications.	3	05
7	Create an application using IC555 on general purpose board. *	4	05
Total Marks			40

- Teachers are instructed to allot application of IC555 based on three modes in a group of students and evaluate the performance on general purpose board.



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### Recommended Books:

- [1] B.L.Theraja "Electrical Technology" Vol-I and II, S. Chand Publications, 23<sup>rd</sup> ed, 2003.
- [2] M. B. Patil, V. Ramanarayanan, V. T. Ranganathan, "Simulation of Power Electronics Circuits", Narosa publication
- [3] Ramakant A. Gayakwad, "OPAMP and Linear ICs", 4th Edition, Prentice Hall / Pearson Education, 2001.



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Course Code	Course Name	Teaching Scheme (Hrs./week)			Credits Assigned			
		L	T	P	L	T	P	Total
ES21	Basic Electrical Technology	3	-	--	3	-	-	3
<b>Examination Scheme</b>								
			ISE	MSE		ESE	Total	
			20	20		60	100	

Pre-requisite Course Codes		
Course Outcomes	CO1	Compute various electrical quantities of given dc circuit using circuit simplification techniques and various network theorems.
	CO2	Describe the concept of ac circuit and its resonance phenomena for a given RL, RC and RLC circuit.
	C03	Analyze the series and parallel magnetic circuit.
	CO4	Describe characteristics of single phase, three phase ac circuits and transformer equivalent circuit theoretically and graphically
	CO5	Describe the constructional details and working principle of given AC and DC machines

Module No.	Unit No.	Topics	Ref.	Hrs.
Prerequisite	A	Concept of e.m.f, potential difference, current, ohm's law, resistance, resistivity, series and parallel connections, power dissipation in resistance, effect of temperature on resistance		02
	B	Capacitors, with uniform and composite medium, energy stored in capacitor, R-C time constant.		
	C	Magnetic field, Faraday's laws of Electromagnetic induction, Hysteresis and eddy current losses, energy stored in an inductor, time constant in R-L circuit		
1	1.1	Kirchhoff's laws, Ideal and practical voltage and current source, Source transformation, Star-delta transformation	1,2	03
	1.2	Mesh and Nodal analysis, super node and super mesh	1,2	02
	1.3	Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem	1,2	05
2	2.1	Basic definitions to understand concepts in magnetic circuit, ohm's law in a magnetic circuit, parallel magnetic circuit, coefficient of coupling, dot convention,	3	03
	2.2	Electrically joined coupled coils: Series adding, Series opposing, parallel adding, parallel opposing, comparison between magnetic and electrical circuit	3	02
3	3.1	Generation of alternating voltage and currents, RMS and Average value, form factor, crest factor, AC through resistance, inductance and capacitance	1,2	03



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	<b>3.2</b>	R-L , R-C and R-L-C series and parallel circuits, power and power factor	1,2	03
	<b>3.3</b>	Series and parallel resonance, Q-factor and bandwidth	1,2	03
<b>4</b>	<b>4.1</b>	Three phase voltage and current generation, Star and delta connections, relationship between phase and line currents and voltages	1	01
	<b>4.2</b>	Power in three phase circuit, two wattmeter method	1	02
<b>5</b>	<b>5.1</b>	Single phase transformer :Construction, working principle, EMF equation, Phasor diagram with resistive, inductive and capacitive load	1,4	03
	<b>5.2</b>	Three phase and single phase induction motor, Fundamental and working principles, speed Torque characteristics	1,4	02
	<b>5.3</b>	Permanent magnet DC motor: Fundamental and working principle of operation, speed torque characteristics, emf equation and typical applications	1,4	02
	<b>5.4</b>	Stepper and BLDC motor: Working principle of stepper motor, basic types of stepper motor, common applications. BLDC motor: Working principle and construction of BLDC motor, Electronic commutation of BLDC motor and common applications	1,4	03
			<b>Total</b>	<b>39</b>

### References:

- [1] B.L.Theraja "Electrical Technology" Vol-I and II, S. Chand Publications, 23<sup>rd</sup> ed. 2003.
- [2] Joseph A Edminster, "Schaum's outline of theory and problems of electric circuits" Tata McGraw Hill, 2<sup>nd</sup> edition
- [3] S.Sivanagaraju, G. Kishor, C. Srinivasa Rao, " Electrical Circuit Analysis" CENGAGE Learning
- [4] D P Kothari and I J Nagrath "Electrical Machines", McGraw Hill, Fourth edition



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Course Code	Course Name	Teaching Scheme (Hrs./week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ESL21	Basic Electrical Technology Lab	--	--	2	--	--	1	1	
		Examination Scheme							
		ISE	MSE	ESE	Total				
		40	--	20	60				

Pre-requisite Course Codes	
Course Outcomes	CO1 Compute electrical parameters for the given circuit using network theorem.
	CO2 Verify the resonance phenomenon for a given RLC circuit.
	CO3 Compare single phase and three phase circuit for various terminology.
	CO4 Identify different parts of given ac and dc machines and implement circuit to control speed of motors in clockwise and anticlockwise direction.
	CO5 Implement any application using electronic components.

Exp. No.	Experiment Details	Ref.	Marks
1	Verification of Kirchoff's law	1,2,3	5
2	Verification of superposition theorem	1,2,3	5
3	Verification of maximum power transfer theorem.	1,2,3	5
4	Obtain bandwidth of the given RLC circuit.	1,2,3	5
5	Verify the relationship between line voltage/ phase voltage and line current/ phase circuit in three phase circuit	2	5
6	Obtain equivalent circuit of transformer using OC and SC test	1,4	5
7	List different parts from cut section of DC motor and three phase induction motor and control the speed of both in clockwise and anticlockwise direction.	4	5
8	Implement +15V/1A power supply.	5, 6	5
Total Marks			40

### References:

- [1] M. B. Patil, V. Ramanarayanan, V. T. Ranganathan, "Simulation of Power Electronics Circuits", Narosa publication
- [2] B.L.Theraja "Electrical Technology" Vol-I and II, S. Chand Publications, 23<sup>rd</sup> ed. 2003,
- [3] Shaum series
- [4] Sailendra Nath Bhadra, "Electric Machinery Experiment laboratory practices and simulation study", Narosa
- [5] David Bell, "Electronic Devices and Circuits", Oxford University Press
- [6] OSCAD by IITB



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ES14/ES24	Engineering Graphics	2	--	--	2	--	--	2
Examination Scheme								
		ISE	MSE	ESE	Total			
		15	15	30	60			

### Course Outcomes:

ES15/ES25 Engineering Graphics	Learners will be able to...
CO1	Construct basic engineering curves
CO2	Draw projection of points and lines
CO3	Draw projection of regular solids inclined to both the reference planes
CO4	Draw the development of lateral surfaces of solids with sections

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	<b>Introduction to Engineering Drawing:-</b> Types of Lines, Dimensioning Systems as per IS conventions. First angle method of projection only. <b>Engineering Curves:-</b> Basic construction of Cycloid and Involutes.	1,3	4
2	2.1	<b>Projection of Points and Lines:-</b> Lines inclined to both the Reference Planes (Excluding Traces of lines) and simple application based problems on Projection of lines.	1,3	6
3	3.1	<b>Projection of Solids :-</b> ( Prism, Pyramid, Cylinder, Tetrahedron and Cone) Solid projection with the axis inclined to HP and VP. (Exclude Spheres, Composite, Hollow solids and frustum of solids). Use change of position or Auxiliary plane method	1,3	12
4	4.1	<b>Introduction to Section of Solids and Development of Lateral Surfaces Using AutoCAD</b>	1,3	4
<b>Total</b>				<b>26</b>



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**NOTE:**

1. ISE component will be evaluated on the A3 size sketch-book for the following topics as an assignment i.e. for the modules 1 to 3:

Sr. No.	Topics
1	Engineering Curves
2	Projection of Lines
3	Projection of Solids

2. ISE will be conducted for the module 4 on AutoCAD 2017
3. MSE and ESE will be conducted for the module 1 to 3 (i.e. Manual Drawing)

**Recommended Books:**

1. N.D. Bhatt, *Engineering Drawing (Plane and solid geometry)*, Charotar Publishing House Pvt. Ltd.
2. N.D. Bhatt & V.M. Panchal, *Machine Drawing*, Charotar Publishing House Pvt. Ltd.
3. Dhananjay A Jolhe, *Engineering Drawing*, Tata McGraw Hill.
4. Prof. Sham Tickoo (Purdue University) & Gaurav Verma, "( CAD Soft Technologies) : Auto CAD 2017 (For engineers and Designers)", Dreamtech Press New Delhi.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ESL14/ESL24	Engineering Graphics Lab	--	--	2+2	--	--	2	2
				Examination Scheme				
		ISE		MSE		ESE		Total
		80		--		20		100

### Course Outcomes:

Learners will be able to...			Cognitive level
CO1	Use CAD tool to draw and modify basic 2-dimensional objects with dimensions, line-types & layers as per IS conventions		Application
CO2	Develop the sectional view of the regular solids on the basis of the given cutting planes.		Application
CO3	Develop the lateral surface of the sectioned solids.		Application
CO4	Read the 3-dimensional view and draw orthographic projections using CAD tool		Application
CO5	Read the orthographic projections and draw the isometric view using CAD tool		Application

Module No.	Unit No.	Topics	Ref.
1	1.1	<b>Introduction to AutoCAD:</b> - Basic Drawing and Editing Commands. Knowledge of setting up layers, Dimensioning, Hatching, plotting and Printing.	
2	2.1	<b>Section of Solids:</b> - Section of Prism, Pyramid, Cylinder, Tetrahedron & Cone cut by plane perpendicular to at least one reference plane. (Exclude Curved Section Plane). Use change of position or Auxiliary plane method	1,3,4
	2.2	<b>Development of Lateral Surfaces of Sectioned Solids:</b> - Lateral surface development of Prism, Pyramid, Tetrahedron, Cylinder, and Cone with section plane inclined to HP or VP only. (Exclude DLS of a solid with a hole in it and Reverse Development).	1,3,4
3	3.1	<b>Orthographic and Sectional Orthographic Projections:</b> - Different views of a simple machine part as per the first angle projection method recommended by I.S. • Full or Half Sectional views of the Simple Machine parts.	2,4
4	4.1	<b>Isometric Views:</b> - Isometric View/Drawing of blocks of plain and cylindrical surfaces using plain/natural scale only. (Exclude Spherical surfaces).	2,4
5	5.1	<b>Introduction to 3D-AutoCAD:</b> - Commands for isometric snap, 3D modeling: Working in 3-dimensions, Viewing 3D Objects, Basic wireframe models, Extruding, simple revolved objects, Boolean operations.	4



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Session No.	AutoCAD Session Details	Marks
1	All the draw & modify commands	
2	Layer properties manager, page setup, plotting, etc.	
3	Section of Solids (1 problem)	10
4	Development of Lateral Surfaces (1 problem)	10
5	Orthographic Projections (3 problem)	20
6	Sectional Orthographic Projections (4 problem)	20
7	Isometric view (3 problems)	20
	Total Marks	80 Marks

### References:

1. N.D. Bhatt, Engineering Drawing (Plane and solid geometry), Charotar Publishing House Pvt. Ltd.
2. N.D. Bhatt & V.M. Panchal, Machine Drawing, Charotar Publishing House Pvt. Ltd.
3. Dhananjay A Jolhe, Engineering Drawing, Tata McGraw Hill.
4. Prof. Sham Tickoo (Purdue University) & Gaurav Verma, "( CAD Soft Technologies) : Auto CAD 2017 (For engineers and Designers)", Dreamtech Press New Delhi.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ESL25/15	Python Programming	--	-	2	---	1	1	1
				Examination Scheme				
		ISE		MSE		ESE		Total
		40		---		20		60

### Pre-requisite Course Codes

Course Outcomes	CO1	Solve mathematical problems using Python
	CO2	Write programs utilizing the standard library distributed with Python.
	CO3	Use different modules in Python.
	CO4	Create a software application using Python.

### Laboratory Plan

Sr. No.	Topics	References	Marks
1	Variable, Expressions and Statements	1,3	05
2	Functions and modules	1,3	05
3	Case study: Interface design	1,2	05
4	Conditionals and recursion	1,2	05
5	Fruitful functions and Iterations	1,2	05
6	Strings, List, Dictionaries and Tuples	1,2	05
7	Classes and Objects	1,2	05
8	Create any software application using Python to interface any Hardware	1,2	05

\*Students should refer first 150 pages from the reference book [1] Allen Downey "Think Python" Version 2.0.17, Green Tea Press, 2012 and listen the NPTEL videos on "Python Data Structures and Algorithms".

### Recommended Books:

- [1] Allen Downey "Think Python" Version 2.0.17, Green Tea Press, 2012.
- [2] Martin C. Brown, "The Complete Reference Python" McGraw Hill Education
- [3] NPTEL video lectures on "Python Data Structures and Algorithms"



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ESL16	Workshop I	--	--	2	--	--	1	1	
		Examination Scheme							
		ISE		ESE				Total	
		50		-				50	

### Course Objective:

The objective is to develop technical life skill sets. This exercise also aims in inculcating respect for physical work and hard labor in addition to some amount of value addition by getting exposed to interdisciplinary engineering domains.

### Course Outcomes: Learners will be to...

1. Acquire skills in basic engineering practice.
2. Identify the hand tools and various instruments.
3. Read a drawing for the manufacturing of wooden job.
4. Demonstrate an understanding of the basic domestic wiring.
5. Demonstrate an understanding of assembling of personal computer troubleshooting and networking.
6. Model a basic 3D object and generate a .iges or .step file.

Trade No.	Topics	Ref.	Hrs.
1	<b>Carpentry</b> <ul style="list-style-type: none"> <li>• Use and setting of hard tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood turning and modern wood turning methods.</li> <li>• Term work to include one carpentry job involving a joint and report on demonstration of a job involving wood turning.</li> </ul>	1	8
2	<b>Electrical board wiring</b> <ul style="list-style-type: none"> <li>• House wiring, staircase wiring, and wiring diagram for fluorescent tube light, Godown wiring and three phase wiring for electrical motors.</li> </ul>	6,7	8
3	<b>Hardware and Networking:</b> <ul style="list-style-type: none"> <li>• Dismantling of a Personal Computer (PC), Identification of Components of a PC such as power supply, motherboard, processor, hard disk, memory (RAM, ROM), CMOS battery, CD drive, monitor, keyboard, mouse, printer, scanner, pen drives, disk drives etc.</li> <li>• Assembling of PC, Installation of Operating System (Any one) and Device drivers, Boot-up sequence. Installation of</li> </ul>	4,5	8



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	<ul style="list-style-type: none"> <li>application software (at least one)</li> <li>Basic troubleshooting and maintenance</li> <li>Identification of network components: LAN card, wireless card, switch, hub, router, different types of network cables (straight cables, crossover cables, rollover cables) Basic networking and crimping.</li> </ul>		
4	<b>Introduction to 3D Modelling</b> <ul style="list-style-type: none"> <li>Developing a CAD file .iges or .step of 3D model to export it as a .stl file for the purpose of 3D printing.</li> </ul>	3	4

### Recommended Books:

- P. Kannaiah; K. L. Narayana, *Workshop Manual*, Scitech Publishers
- Venkat Reddy, *Workshop Manual*, BS Publication
- Sham Tickoo, *AutoCAD 2017*, Dreamtech Press
- Gookin Dan, *Troubleshooting your PC For Dummies*, 2<sup>nd</sup> edition
- Lowe Doug, *Networking for Dummies*
- Frederic P Hartwell, Herbert P. Richter, W.C. Schwan, *Wiring simplified: Based on 2017 National Electrical Code*"
- OSCAD, an open source tool for circuit design, simulation, analysis and PCB design" SPD publication.

ISE Distribution	Marks
Carpentry	10
Hardware & Networking	10
Electrical Board Wiring	10
3D modeling	10
Journal / Quiz	10



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
--	--	2	--	--	1	1		
<b>Examination Scheme</b>								
ESL26	Workshop II	ISE			ESE			Total
		50			-			

### Course Objective:

The objective is to develop technical life skill sets. This exercise also aims in inculcating respect for physical work and hard labor in addition to some amount of value addition by getting exposed to interdisciplinary engineering domains.

### Course Outcomes: Learners will be to...

1. Acquire skills in basic engineering practice.
2. Identify the hand tools and various instruments.
3. Read a drawing for the manufacturing of sheet-metal job.
4. Demonstrate an understanding of the PCB etching, drilling and soldering technique.
5. Demonstrate an understanding of repairing of household appliances like mixer, fan, etc.
6. Print a basic 3D object from the .stl file.

Trade No.	Topics	Ref.	Hrs.
1	<b>Sheet Metal Practice</b> <ul style="list-style-type: none"> <li>• Introduction to primary technology processes involving bending, punching and drawing various sheet metal joints, development of joints.</li> <li>• Term work to include a utility job in sheet metal.</li> </ul>	1	8
2	<b>PCB Laboratory Exercises</b> <ul style="list-style-type: none"> <li>• Layout drawing, Positive and negative film making, PCB etching and drilling, Tinning and soldering technique.</li> </ul>	5	8
3	<b>Introduction to Electronic Components</b> <ul style="list-style-type: none"> <li>• Exposure to usual electronic equipment/instruments such as Multi-meter, Oscilloscope, Function generator, IC tester and Power supply, Information about their front panels, Demonstrations on their working, Hands-on for measurement of component values and DC voltage using multi-meter, AC mains voltage/ 1 KHz Square wave/any small signal from function generator on Oscilloscope, Testing of sample digital ICs using IC tester.</li> </ul> <p style="text-align: center;"><b>OR</b></p> <b>Repairing of gadgets and appliances:</b> <ul style="list-style-type: none"> <li>• Elementary skills of repairing juicer, mixer, grinder, etc.</li> </ul>	5	8



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4	<b>3D Printing</b>		
4	<ul style="list-style-type: none"> <li>Importing the .stl file to generate a .gcode for 3D printing through the use of open source softwares like <i>Cura</i>, etc.</li> </ul>	4	4

### Recommended Books:

1. P. Kannaiah; K. L. Narayana, *Workshop Manual*, Scitech Publishers
2. Venkat Reddy, *Workshop Manual*, BS Publication
3. Sham Tickoo, *AutoCAD 2017*, Dreamtech Press
4. Think3D reference manual
5. Khandpur R.S., *Printed Circuit Boards*, Tata McGraw Hill, 2005.
6. Simon Monk, *Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards* McGrawHill publication.
7. Charles Platt, *Encyclopedia of Electronic Components* O'Reilly; 1 edition.

ISE Distribution	Marks
Sheet Metal Job	10
PCB Laboratory Exercises	10
Introduction to Electronic Components	
OR	10
Repairing of appliances	
3D printing	10
Journal / Quiz	10



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
		02	-	02	02	-	01	03	
Examination Scheme									
		ISE**	MSE*		ESE	Total			
		80	20		--	100			

\* MSE will be evaluated on the basis of written test based on module 1 and 2.

\*\* ISE will be evaluated on the basis of marks scored in practical's, out of 80.

**Pre-requisite Course Codes:** The learners will be able to

Course Outcomes	CO1	Apply the principles of communication for professional communication.
	CO2	Demonstrate the use of advanced vocabulary and grammar in spoken and written communication.
	CO3	Assimilate and respond to received information using active listening and reading skills.
	CO4	Prepare and confidently deliver a formal speech using right voice modulation.
	CO5	Produce precise and concise business documents in the required format.

Module No.	Unit No.	Topics	Ref.	Hrs.
1. Vocabulary Building and Grammar	1.1	Concept of Word Formation & the Root words from foreign languages and their use in English	9, 1	1
	1.2	Common Errors in Writing, Redundancies, Clichés	7, 2	3
2. Writing Skills	2.1	Basic Writing Skills: Sentence Structures, organizing Paragraph in direct or indirect style, creating coherence: 7'Cs of Communication	4	3
	2.2	Writing Practices: 2.2.1. Comprehension passage 2.2.2. Summary Writing 2.2.3. Business Letter Writing (Inquiry, Complaint)	3	6
	2.3	Review Writing: Critical analysis of a book (fiction)/movie using a specific perspective, Writing a paper on the same	6	3
3. Oral Skills	3.1	Listening Comprehension: Pronunciation, Intonation, Stress and Rhythm	6	2
	3.2	Speaking Practices: 3.2.1. Common Everyday Situations: Conversations and Dialogues (language lab) 3.2.2. Communication at Workplace: Meeting, notice, agenda, minutes (language lab) 3.2.3. Public Speaking: Formal Speech	3	8
<b>TOTAL</b>				<b>26</b>



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Activity No.	Activity Details	Ref.	Marks
1	Grammar	7, 2	10
2	Vocabulary	9, 1	10
3	Summary	3	05
4	Business letters	4	20
5	Skit based on an everyday situation	8	-
6	Meetings & Minutes	5	10
7	Critical reading	6	10
8	Speech	3	15
<b>Total</b>			<b>80</b>

### Reference Books:

1. Michael McCarthy and Felicity O'Dell. *English Vocabulary in Use*. India: Cambridge University Press, 1999.
2. John Eastwood. *Oxford Practice Grammar*. India: Oxford, 1999.
3. Meenakshi Raman and Sangeeta Sharma. *Communication Skills*. India: Oxford India, 2011.
4. Shirley Mathew, *Communication Skills*. Pune, India: Technical Publications, 2013.
5. Rhoda A Doctor and Aspi H Doctor. *Communication Skills*. Mumbai, India: Sheth Publishers, 2009.
6. MeeraBharwani. *Communication Skills*. Mumbai, India: Synergy Knowledgeware, 2010.
7. Geoffrey Leech, Et al. *English Grammar for Today*. UK: Palgrave, 2005.
8. George Bernard Shaw. *Pygmalion*. London, UK: Penguin, 1914.
9. Lewis, Norman. *Word Power Made Easy*. New York: Anchor Books, 1978.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MC21	Environmental Studies	01	-	--	Non credit			
		Examination Scheme						
		ISE1	ISE2		Attendance	Total		
		20	20		10	50		

### Course Education Objective:

To create awareness about environmental issues and inculcate the habit of practising ecofriendly strategies.

Pre-requisite Course Codes		HSC Level awareness of Environmental Studies		
After successful completion of the course, learner will be able to				
Course Outcomes	CO1	Make use of methods of reuse / recycling at home and workplace (Application)		
	CO2	Plan awareness campaigns for various environmental issues like waste segregation, cleanliness, energy conservation and water conservation (Application)		
	CO3	Experiment with basic Appropriate Technologies (Application)		
	CO4	Relate to environmental concerns through field visit (Understanding)		
	CO5	Illustrate role of technology and legislation in overcoming environmental problems (Understanding)		



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S. N.	Activity	Activity No	Actual Activity	No of hours
1	Reuse / Recycle	1.1	Introduction to concept of life cycle thinking Best out of waste activity	2
		1.2	Survey on marketing of recycled products with actual data on current scenario and suggestions for improvement	2
		1.3	Drive for segregation of waste	2
2	Slogan / Poster making	2.1	Make slogans / posters on water management, avoiding wastage of electricity, prevention of littering etc to be put up at strategic points across the campus	1
3	Plantation	3.1	Adopt a tree / Gift a tree	1
4	Cleanliness drive	4.1	Ensure cleanliness of surrounding environment	Ongoing
5	Reduction in energy consumption	5.1	Shutting down fans and ACs of the campus for an hour	1
		5.2	Suggestions for improvement in power consumption at institute	1
		5.3	Appropriate technology and its features Working model of a pot in pot refrigerator	1
6	Lecture	6.1	Role of legislation in environment, Clearance, control and authorisation mechanism	1
		6.2	Role of technology in environment protection : Green Buildings, Indoor air pollution, concept of carbon credits	1
7	Field visit		Total	4
				17*

\* 12 hours will be engaged in activities and lectures



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### ABL-A: Essence of Traditional Indian Knowledge

This course is path-breaking in the following respects:

1. It makes students aware of ideology of trust of national eminence Bharatiya Vidya Bhavan.
2. It explores India's intellectual, literary, artistic, scientific and technological knowledge traditions, offering a perspective on Indian civilization.
3. It provides enough time for teacher-student interaction and in the process create sense of belongingness to institute and country.
4. It makes students aware of our great leaders like Dr. K. M. Munshi, Sardar Patel and Mahatma Gandhi who made impact on human lives.
5. It teaches students about morals and values and their significance in human life
6. It teaches students about 'Unity in Diversity' and significance of working in multi-cultural environment.

**A. Ideology of Bharatiya Vidya Bhavan:** It is important to create sense of belongingness. For this purpose information of founding members and their messages must be shared with students. Bhavan's faith and belief. 'Vasudhaiva Kutumbakam', "Let noble thoughts come to us from every side."

**B. Value education:** Value education is rooted in Indian philosophy and culture and ingrained in every tradition of Indian culture. Educational institutions play a significant role in the promotion of value. The Vedas and Upanishads form the source of inspiration for value education. In the Vedic period, In Ashram education, the Guru insists his sishya to follow certain values throughout his life. Students should be taught about Morals, Values and Ethics, Code of Ethics, Respect for Diversity, conflict resolution, justice, respect, responsibility and self-esteem.

**C. Indian Culture:** India is one of the ancient civilizations of the world which has stood the test of time. In fact what makes Indian culture unique among other ancient civilizations is its ability to accommodate and assimilate external influences and weave them into its own cultural fabric. This composite influence has not only enriched the cultural milieu of India, it has also made it stronger. Indian art, architecture, music, language, philosophy and religion reflect this diversity of influence that has occurred through centuries. This is the beauty of Indian Culture and Heritage. As Indian citizens not only do we need to be proud of this pluralistic and rich cultural heritage but also to study it objectively and assess it.



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**D. Indian Tradition in Science and Technology:** Indian Mathematicians and other scientists. Introduction to Ayurveda, Introduction to Vaastushastra, Introduction to wide range of India's ancient technologies, like Harappan technologies, town planning, civil engineering, construction techniques, water structures, ceramic, metallurgy, glass, acoustics, textiles, metrology, as well as historical testimonies on such technologies. As a result, Indian civilization emerges as a dynamic, creative one which was able to adapt to very different needs and situations in the course of its long history.

**Methodology of Course Conduction:**

1. Guest lectures by experts shall be arranged on various topics mentioned above.
2. Videos on biographies of Indian leaders, Indian civilization etc. can be shown.
3. Case studies and group activities based on the contents of the course can be conducted.
4. Educational visits shall be arranged to historical places and museums. Some of the places recommended are:
  1. Nehru Planetarium Worli
  2. Chhatrapati Shivaji Maharaj Vastu Sangrahalaya (Formerly Prince of Wales Museum) Mumbai
  3. Places and museums related to Indian Leaders, Bharat Ratna Awardee etc.
  4. Places demonstrating Indian scientific marvels like Jaipur observatory Jantar Mantar
  5. Astronomical Observatories

**Assessment:**

Assessment shall be based on performance in following:

- I. 25 Marks: Quiz (Compulsory for all)
- II. 40 Marks: Any one of the following
  1. Prepare short video
  2. Power Point Presentation
  3. Skit Performance
- III. 25 Marks: Report on Educational visit
- IV. 10 Marks: Attendance

**Passing marks:** Minimum 40

In case of defaulter or failure in this activity students will have to repeat the activity with financial penalty and grade card will not be issued till student passes the course.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		1	-	-	Non-Credits			
MC22	Constitution of India	Examination Scheme				Attendance		Total
		ISE1		ISE2		Attendance		Total
		20		20		10		50

Student will be evaluated after six sessions for 20 Marks (ISE1) and at the end of last session for 20 Marks (ISE2). Grade equivalent to 'D' (50%-59.99% Marks) or above is considered as 'Satisfactory'. If any of the tasks given is not completed/submitted/shown/evaluated then the corresponding lower grade will be given. Although the grades are given they will not mentioned in final grade card but they are necessary to declare the successful completion of the Non-Credit course.

Pre-requisite Course Codes ---		
Course Outcomes	CO1	Student will be able to understand constitution principles
	CO2	Student will be able to co-relate with political system
	CO3	Student will be able to pursue the values of civic life
	CO4	Student will be able to exercise their rights and duties

Day No.	Topics	Hrs.
1	Historical background of constitution	1
2	Philosophy of constitution	1
3	Fundamental Rights – Duties	1
4	Directive principles – with respect to issues	1
5	Separation of powers	1
6	Law making procedure	1
7	Party system – Electoral dynamics	1
8	Challenges to constitutional democracy	1
9	Judicial Administration	1
10	Working of quasi – judicial bodies	1
11	Amendment process and language	1
12	Local self government	1
13	Core issues (Uniform civil code, Article 370, Reservation)	1
14	Landmark cases – Nanavati case, Shah Bano, Keshvanand BhartiVishakha Case etc	1

### References:

- [1] D.C. Gupta – Indian Government and Politics
- [2] D.D. Basu – Introduction to the Constitution of India
- [3] P. M. Bakshi - The Constitution of India
- [4] M. V. Pylee - Constitutional History of India

Bharatiya Vidya Bhavan's  
**Sardar Patel Institute of Technology**  
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**Bachelor of Technology (B.Tech)**

**First Year Engineering**  
**(Sem. I and Sem. II)**

**Effective from Academic Year 2017 -18**

*[Signature]*  
Principal  
Sardar Patel Institute of Technology  
Bhavans Andheri Campus  
Munshi Nagar, Andheri (West),  
Mumbai - 400 058.



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### Preamble:



Concept of academic autonomy is based on the argument that Institutions can undertake the work expected of them by all stakeholders such as Students, Parents, University, Industry, Society in general, only if they have freedom of choice and action. We at S.P.I.T. would like to believe that this freedom of choice and action as far as academics is concerned will make us more Proactive in our offerings.

An academic autonomy is as good as its Curricula and execution of it is as well as its faculty. S.P.I.T. is confident of succeeding on both the fronts.

In the first offering we have tried to pro-actively bridge the ever discussed "Industry-academic gap" by way of our SCOPE program. The issue about sensitizing students to social needs is being addressed by special activity based courses. Liberal arts courses have been introduced to enhance functionality of both sides of brain. In all this the professional core has not been overlooked. Thus the curricula are designed to achieve multi dimensional outcomes.

The evaluation mechanism is tuned for assessing the attainment of the designed outcomes and is designed as a fair mechanism.

As our learning cycle begins from July 2017, I wish to place on record that entire S.P.I.T. staff and faculty will work with singular focus and commitment towards the success of this endeavour.

**Dr. Prachi Gharpure**  
**Principal, S.P.I.T.**



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### From the Desk of Dean Academics



Greetings and congratulations to all the students, teaching and supporting staff of Sardar Patel Institute of Technology for getting autonomous status to the institute from the year 2017-18. We look towards autonomy as a great opportunity to design and implement curriculum sensitive to needs of Indian Society and Industries.

In the proposed curriculum we have made an attempt to provide opportunity for students to develop themselves as competent engineering graduates with knowledge, skill and ethical behavior required for global career. Curriculum is designed to provide multiple learning opportunities for students to acquire and demonstrate competencies for rewarding careers. The curriculum model is outcome based that focuses on learning by doing. This is achieved through activity based learning, minor projects, problem solving and innovative styles of pedagogy. Various steps are taken to transform teaching-learning process to make learning a joyful experience for students. Special laboratory based courses are introduced to give more practical exposure to the students.

To create socially responsible citizen curriculum offers courses like Constitution of India, Environmental Studies and Human Health Systems Approach. Also various activity based learning modules like 'Building Automation, Fire Safety and Electronic Security', 'Occupational Safety & Legal Studies for Engineers', 'Technical Presentation Skills', 'Technical Paper and Patent Drafting', 'Engineering Solution for Environmental Problems' and 'Financial Planning, Taxation Policies and Investment' are introduced. For overall development of the learner, various elective courses like Yoga Vidya, Music Appreciation, Dramatics, Industrial and Organizational Psychology, Law for Engineers, French Language, German Language etc. are introduced. To encourage interdisciplinary studies institute level Open Elective courses are offered.

One of the special feature of this curriculum is Skill development programme called SCOPE (Skill Certification for Outcome-Based Professional Education) planned to enhance employability, innovation and research culture in the institute. Every department is offering six domain specific tracks, each track containing six courses. Student will have an opportunity to enroll for more than 140 courses in any of the department of his choice. Some of the courses under SCOPE will be delivered in co-ordination with industries.

We believe that this curriculum will raise the bar of academic standards with the active involvement and cooperation from students, academic and administrative units. Faculty of S.P.I.T. deserves a special appreciation for their relentless efforts in designing curriculum and assessment instruments which will bring transformation in the quality and transparency in assessment of learners.

Looking forward for your active cooperation and constructive feedback to create vibrant and joyful learning environment at Sardar Patel Institute of Technology.

**Dr. Surendra Singh Rathod**  
 Professor and Dean Academics



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### Message from Head of the Department



The curriculum of an institution is a living entity. It evolves with time; it reflects the ever changing needs of the society and keeps pace with the growing talent of the students and the faculty.

The aim of S.P.I.T. is to develop professionals having competencies, intellectual skills, knowledge and equipping them to contribute to the society.

The curriculum of the first year B.Tech has been framed according to the guidelines set by the AICTE and UGC, which recommends appropriate importance for basic sciences, basic engineering, branch specific core and humanities subjects.

The Applied Sciences and Humanities department equips the first year students with fundamentals in applied sciences, basic engineering courses and subjects in the domain of humanities. First year courses have been designed to develop logical thinking and analytical skills.

**Dr. Rita Das**  
**Head of Applied Sciences and Humanities**



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### Scheme for First Year B.Tech.

#### Group 1: Computer Engineering and Information Technology

Course Code	Course Name	Group	Teaching Scheme (Hrs/week)			Credits
			L	T	P	
BS11	Engineering Mathematics I	BS	4	1	--	5
BS12	Applied Physics I	BS	3	--	--	3
BS13	Applied Chemistry I	BS	2	--	--	2
ES11	Basic Electrical and Electronics Engineering	ES	3	--	--	3
ES12	Engineering Mechanics	ES	3	1	--	4
ESL11	Basic Electrical and Electronics Engineering Lab	ES	--	--	2	1
ESL12	Engineering Mechanics Lab	ES	--	--	2	1
BSL14	Applied Science I Lab	BS	--	--	2	1
ESL13	Workshop I	ES	--	--	2	1
HSS11	Basic Communication Skills	HSS	1	2	--	2
Total			16	4	8	23
SEM II (Group 1)						
Course Code	Course Name	Group	Teaching Scheme (Hrs/week)			Credits
			L	T	P	
BS 21	Engineering Mathematics II	BS	4	1	--	5
BS22	Applied Physics II	BS	3	--	--	3
BS23	Applied Chemistry II	BS	2	--	--	2
ES24	Programming Methodology and Data Structures	ES	3	--	--	3
ES25	Engineering Graphics	ES	3	1	--	4
ESL24	Programming Methodology and Data Structures Lab	ES	--	--	2	1
ESL25	Engineering Graphics Lab	ES	--	--	2	1
BSL24	Applied Science II lab	BS	--	--	2	1
ESL23	WorkshopII	ES	--	--	2	1
MC21	Environmental Studies	MC	1	--	--	1
MC22	Constitution of India	MC	1	--	--	1
Total			17	2	8	23



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## Group 2: Electronics and Electronics & Telecommunication

Course Code	Course Name	Group	SEM I (Group 2)			Credits
			L	T	P	
BS11	Engineering Mathematics I	BS	4	1	--	5
BS12	Applied Physics I	BS	3	--	--	3
BS13	Applied Chemistry I	BS	2	--	--	2
ES14	Programming Methodology and Data Structures	ES	3	--	--	3
ES15	Engineering Graphics	ES	3	1	--	4
ESL14	Programming Methodology and Data Structures Lab	ES	--	--	2	1
ESL15	Engineering Graphics Lab	ES	--	--	2	1
BSL14	Applied Science I Lab	BS	--	--	2	1
ES13	Workshop I	ES	--	--	2	1
HSS11	Basic Communication Skills	HSS	1	2	--	2
Total			16	4	8	23

## SEM II (Group 2)

Course Code	Course Name	Group	Teaching Scheme (Hrs/week)			Credits
			L	T	P	
BS21	Engineering Mathematics II	BS	4	1	--	5
BS22	Applied Physics II	BS	3	--	--	3
BS23	Applied Chemistry II	BS	2	--	--	2
ES21	Basic Electrical Technology	ES	3	--	--	3
ES22	Engineering Mechanics	ES	3	1	--	4
ESL21	Basic Electrical Technology Lab	ES	--	--	2	1
ESL22	Engineering Mechanics Lab	ES	--	--	2	1
BSL24	Applied Science II lab	BS	--	--	2	1
ESL23	Workshop II	ES	--	--	2	1
MC21	Environmental Studies	MC	1	--	--	1
MC22	Constitution of India	MC	1	--	--	1
Total			17	2	8	23



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS11	Engineering Mathematics-I	4	1	--	4	1	--	5
		Examination Scheme						
		ISE	MSE		ESE			
		10	30		100 (60% Weightage)			

**Course Objectives:** To develop mathematical skills for solving engineering problems.

Pre-requisite Course Codes		HSC level Mathematics
After successful completion of the course, student will be able to		
Course Outcomes	CO1	To find powers, roots and logarithm of a complex number and separate function of a complex number into real and imaginary parts
	CO2	To find nth order derivative of a function and product of functions
	CO3	To expand the given function as power series
	CO4	To differentiate a function partially and apply it to extremise functions
	CO5	To find rank of a matrix and solve system of linear equations and its applications
	CO6	To solve system of linear equations by Numerical Methods and to encode and decode messages

Module No	Module name	Unit No.	Topics	Ref	Hrs.
1	Complex Numbers		Revision: Complex Numbers as ordered pairs, Argand's diagram, Cartesian, Polar and Exponential form of Complex Numbers.		01
		1.1	De'moivre's Theorem and its application to determine powers of complex numbers. Roots of complex numbers by De'moivre's Theorem		03
		1.2	Expansion of $\sin n\theta$ and $\cos n\theta$ in terms of powers of $\sin \theta$ and $\cos \theta$ . Expansion of $\sin^n \theta$ and $\cos^n \theta$ in terms of sines and cosines	1,2,3, 5	02
		1.3	Hyperbolic Function: Circular function and relation between circular and hyperbolic function, Inverse hyperbolic functions. Separation into real and imaginary parts of complex functions.		05
		1.4	Logarithm of complex numbers,	1,2,3, 5	02
2	Differential Calculus	2.1	Successive Differentiation: nth derivative of standard functions	1,2,3, 5	02



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		2.2	Leibnitz's Theorem on nth derivative of product of two functions.	02
		2.3	Infinite series: Maclaurin's series(without proof). Expansion of standard functions, Expansion of function in power series using i) Maclaurin's series ii) Standard series method iii) Method of differentiation and integration iv) Method of substitution.	05
		2.4	Taylor's Series (Without Proof).i) Expansion of function $f(x + h)$ in powers of $x$ and $h$ ii) $f(x)$ in powers of $(x - a)$	01
3	Partial Differentiation	3.1	Partial derivatives of first and higher order, total differential coefficient and total derivative. Partial derivatives of Composite and Implicit functions.	04
		3.2	Euler's theorem on homogeneous functions with two and three independent variables, deduction from Euler's theorem	03
		3.3	Application of partial derivatives: i) Local Maxima and Minima of functions of two variables. ii) Lagrange's Method of undetermined multipliers.	04
4	Matrix and Vectors		Revision: Revision of basic matrix and vectors.	01
		4.1	Rank of Matrix, Normal form, and Echelon form.	03
		4.2	Consistency and solution of simultaneous linear homogeneous and Non-homogeneous equations.	04
		4.3	Application of solving system of equations in electrical networks, traffic control and balancing chemical equations.	02
		4.3	Linear dependence and independence of vectors.	02
		4.4	Curl and divergence of a vector.	01
		4.5	Solution of system of linear algebraic equations, by (1) Gauss Elimination Method, (2) Gauss Jacobi Iteration Method, (3) Gauss Seidel Method.	03
		4.6	Application of matrices to Coding and De-coding	02
				Total 52



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### References:

- [1] Kreyszig, "Advanced Engineering Mathematics", 9<sup>th</sup> edition, John Wiley
- [2] H.K.Dass, "Advanced Engineering Mathematics", 28<sup>th</sup> edition, S.Chand, 2010
- [3] Grewal B.S., "Higher Engineering Mathematics", 38<sup>th</sup> edition, Khanna Publication
- [4] H Anton and C.Rorres, "Elementary Linear Algebra Application Version", 6<sup>th</sup> edition, John Wiley & Sons, 2010
- [5] Jain and Iyengar, "Advanced Engineering Mathematics", 4<sup>th</sup> edition, Narosa Publishing House, Pvt. Ltd, 2014
- [6] S.S. Sastry, "Introductory Methods of Numerical Analysis", 4<sup>th</sup> edition, Prentice-Hall of India Pvt.Ltd.
- [7] M. Eisenberg, "Hill Cipher and Modular Linear Algebra", 3 Nov 1999



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS12	Applied Physics I	3	-	-	3	-	-	3
		Examination Scheme						
		ISE			MSE		ESE	
		10			30		100 (60% weightage)	

## COURSE OBJECTIVE:

To provide the knowledge and methodology necessary for solving problems in the field of engineering

Pre-requisite Course Codes		HSC level physics
After successful completion of the course, student will be able to		
Course Outcomes	C01	Illustrate the knowledge of crystallography and identify crystal structure using X-ray diffraction
	C02	Comprehend the Physics of semiconductors and apply the same to electronic devices
	C03	Identify various engineering materials based on their electrical and magnetic properties
	C04	Apply the knowledge of superconductivity for various potential applications
	C05	Describe the working of transducer to produce ultrasonic waves and its various applications

Module No.	Module Name	Unit no.	Topics	Ref.	Hrs.
1	Crystallography	1.1	Space lattice, Unit Cell and its characteristics, Bravais lattices, Cubic crystal system; HCP structure, Special cubic crystal structures:- Diamond structure, ZnS structure, NaCl structure, BaTiO <sub>3</sub> structure	1,2, 4	06
		1.2	Miller indices of crystallographic planes & directions; interplanar distance; introduction to X-rays, X-ray diffraction and Bragg's law; Determination of crystal structure	1,2, 4	05
		1.3	Ligancy and Critical radius ratio; Point defects	1,2, 4	02
2	Semiconductors	2.1	Band formation in solids and classification of solids on band theory; drift, mobility and	1,2, 4	03



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			conductivity in conductors; Fermi-Dirac distribution function and Fermi level in a conductor, insulator		
		2.2	intrinsic and extrinsic semiconductors; intrinsic conductivity and extrinsic conductivity; Law of mass action, charge neutrality condition; intrinsic carrier concentration, electron and hole concentration; Extrinsic carrier concentration as a function of temperature; Effect of impurity concentration and temperature on the Fermi Level; Hall Effect and its applications. Drift and Diffusion current density	1,2, 4	04
		2.3	Formation of a P-N junction, depletion region and barrier potential; Energy band structure of P-N Junction (unbiased, forward-bias, reverse-bias); concept of carrier current densities in p-n junction in equilibrium, forward bias and reverse bias; Breakdown mechanism - zener effect and avalanche	1,2, 4	03
		2.4	P-N junction devices: LED, zener diode, photoconductors, photovoltaic solar cells and Bipolar Junction Transistors	1,2, 4	03
3	<b>Dielectric and Magnetic materials</b>	3.1	Dielectric constant, polarization, relative permittivity, dielectric susceptibility, Relation between three electric vectors D, E and P, Effect of dielectric on capacitance; Polarizability; Clausius-Mossotti equation, Types of polarization; Ferroelectric materials, Applications of dielectric materials - Requirement of good insulating material, some important insulating material	2,3, 4	04
		3.2	Origin of magnetization using Atomic Theory; classification of magnetic materials; Origin of ferromagnetism, domain theory and Hysteresis loss; Soft & hard magnetic materials and their applications	1,2, 3,4	03
4	Superconductivity	4.0	Introduction, Meissner Effect; Type I and Type II superconductors; BCS Theory (concept of Cooper pair), Josephson junction; Applications of superconductors- SQUID, MAGLEV	4	03
5	Ultrasonics	5.0	Ultrasonic Waves; Methods of production of ultrasonic waves - Piezoelectric Oscillator & Magnetostriction Oscillator; low and high frequency applications	4	03
					Total 39

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## References:

- [1] Kittel Charles and Paul McEuen, "Introduction To Solid State Physics", New Delhi, 8<sup>th</sup> ed, John Wiley & Sons, 2015.
- [2] Pillai S, "Solid State Physics", 7<sup>th</sup> ed, New age international, 2015.
- [3] Dekker A J, "Electric Engineering Materials", PHI, 1970.
- [4] Bhattacharya D K and Tandon, "Engineering Physics", 1<sup>st</sup> ed, New Delhi, Oxford Press, 2015.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned					
		L	T	P	L	T	P	Total		
BS13	Applied Chemistry - I	2	0	0	2	0	0	2		
		Examination Scheme								
		ISE	MSE	ESE						
		10	30	100 (60% Weightage)						

### Course Education Objective:

- To provide necessary background of applied chemistry suited for relevant areas of engineering.

Pre-requisite Course Codes	HSC Level Chemistry
After successful completion of the course, student will be able to	
Course Outcomes	CO1 Estimate different types of hardness in water
	CO2 Illustrate purification techniques for water for domestic and industrial applications.
	CO3 Illustrate synthesis, properties and applications of polymers
	CO4 Illustrate different types of lubricants and their key properties and applications under varied operating parameters.
	CO5 Apply Gibb's Phase Rule to different chemical systems in equilibrium
	CO6 Illustrate synthesis, properties and applications of carbon nano-materials.

Module No	Module Name	Unit No.	Topics	Ref.	Hrs.
1	Water	1.1	Impurities in water, Hardness of water and types of hardness	1, 2, 4	1
		1.2	Determination of Hardness of water by EDTA method and numerical problems	1, 2	1
		1.3	Softening of water by Hot and Cold lime Soda method, Zeolite process, Ion Exchange process and numerical problems	1, 2	3
		1.4	Desalination of Brackish Water by electrodialysis, Reverse osmosis and ultra filtration	1, 2	1
		1.5	BOD, COD, Definition and Significance, numerical problems based on COD.	1, 2, 4	1



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Module No	Module Name	Unit No.	Topics	Ref.	Hrs.
2	Polymers	2.1	Introduction to polymers, Classification of polymers and Molecular weights	1, 2, 3	1
		2.2	Addition and Condensation Polymerization, Thermoplastic and Thermosetting plastic;	1, 2, 3	1
		2.3	Effect of heat on polymers (Glass transition temperature and melting)	1,2	1
		2.4	Fabrication of plastic by Compression, Injection and Extrusion moulding	1,2	1
		2.5	Preparation, properties and uses of Urea formaldehyde, Kevlar, PMMA	1, 2, 3	1
		2.6	Latest Applications: Conducting polymers, Liquid crystal polymers, Engineering Plastics, Polymers in medicine and surgery, Polymer blends and alloys,	1, 2, 3,4	2
		2.7	Rubbers: Drawbacks of natural rubber, Vulcanization of rubber, Preparation, properties and uses of Silicone and Polyurethane rubber.	1, 2, 3	1
3	Lubricants	3.1	Definition, functions of a lubricant, Mechanism of lubrication	1, 2, 4	1
		3.2	Solid lubricants (graphite), Semisolid lubricants (Grease, only general preparation, properties, and operating parameters), Additives in blended Oils,( Viscosity Index improvers, oiliness carriers, deposit inhibitors, antioxidants), Synthetic lubricants	1,2	2
		3.3	Properties of lubricants : viscosity index, Flash and fire points, Cloud and pour points, Acid value and numerical problems, Saponification value and numerical problems,	1, 2, 4	1
		3.4	Selection of lubricants; ICE, gears, refrigeration.	1, 2, 4	1
4	Phase Rule	4.1	Gibb's Phase Rule, Terms involved with examples, Advantages and Limitations of Phase Rule.	1, 2	1
		4.2	One Component System (Water),	1, 2	1
		4.3	Reduced Phase Rule, Two Component System (Pb- Ag).	1, 2	1



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Module No	Module Name	Unit No.	Topics	Ref.	Hrs.
5	Carbon Nano Materials	5.1	Introduction to nanomaterials, Fullerenes, Carbon nanotubes	1, 4	1
		5.2	Synthesis: Tops down and Bottoms Up Approach, (LASER ablation, CVD)	1, 4	1
		5.3	Properties of Fullerenes, Applications of nanomaterials in catalysis, electronics and communications, energy sciences, environment, medicine.	1, 4	1
Total					26

### References:

- [1] P. C. Jain & M. Jain, *Engineering Chemistry*, 16th ed , New Delhi, India:Dhanpat Rai Publishing Co. (P) Ltd., 2014
- [2] S. S. Dara & S. S. Umare, *A Textbook of Engineering Chemistry*, 12th ed., New Delhi, India: S. Chand & Co. Ltd., 2013
- [3] S. Chawla, *A Textbook of Engineering Chemistry*, 3rd ed., Delhi, India:Dhanpat Rai & Co. (Pvt.) Ltd., 2015
- [4] S. Agarwal, *Engineering Chemistry Fundamentals and Applications*, 1sted, Delhi, India: Cambridge Univ. Press., 2015



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ES11	Basic Electrical and Electronics Engineering	3	-	--	3	--	--	3	
		Examination Scheme							
		ISE		MSE		ESE			
		10		30		100 (60% Weightage)			

Pre-requisite Course Codes		--
Course Outcomes	CO1	Compute various electrical quantities of given dc circuit using circuit simplification techniques and various network theorems.
	CO2	Describe the concept of ac circuit and its resonance phenomena for a given RL, RC and RLC circuit.
	C03	Compare Diode, BJT, FET on the basis of their operation and applications.
	CO4	Implement applications using OPAMP and timer circuit.

Module No.	Unit No.	Topics	Ref.	Hrs.
Prerequisite	A	Concept of e.m.f, potential difference, current, ohm's law, resistance, resistivity, series and parallel connections, power dissipation in resistance, effect of temperature on resistance		02
	B	Capacitors, with uniform and composite medium, energy stored in capacitor, R-C time constant,		
	C	Magnetic field, Faraday's laws of Electromagnetic induction, Hysteresis and eddy current losses, energy stored in an inductor, time constant in R-L circuit		
1		DC circuit		
	1.1	Kirchhoff's laws, Ideal and practical voltage and current source, Source transformation, Star-delta transformation	1,2	03
	1.2	Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem	1,2	03
2		AC circuit		
	2.1	Generation of alternating voltage and currents, RMS and Average value, form factor, crest factor, AC through resistance, inductance and capacitance	2,3	03
	2.2	R-L, R-C and R-L-C series and parallel circuits, power and power factor	2,3	04
	2.3	Series and parallel resonance, Q-factor and bandwidth	2,3	03



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<b>3</b>	<b>Diode, BJT and applications</b>			
	<b>3.1</b>	Half wave, Full wave and Bridge rectifier circuit, Filter circuit, Zener as a regulator, Clipper and clamper circuit using diode	4	03
	<b>3.2</b>	BJT operation, CE, CB and CC configuration of BJT, BJT as a switch, BJT as a current amplifier and voltage amplifier, Testing of BJT using digital multimeter,	4	03
<b>4</b>	<b>FET operation and applications</b>			
	<b>4.1</b>	FET operation, Configuration of FET, Common source FET amplifier, Comparison between BJT and FET, advantages of negative feedback in CE and CS amplifiers,	4	03
	<b>4.2</b>	Barkhausen stability criterion in oscillator, RC phase shift oscillator, Hartley and colpitts oscillator, Crystal oscillator	4	03
<b>5</b>	<b>Operational amplifier</b>			
	<b>5.1</b>	Operational amplifier, block diagram representation, IDEAL opamp characteristics, open loop configuration	5	02
	<b>5.2</b>	Opamp applications: Opamp as an inverting and noninverting amplifier, opamp as a adder, subtractor, precision rectifier,	5	03
	<b>5.3</b>	Introduction of IC555 timer, Internal block diagram of IC555, Astable, monostable and bistable mode using IC555	5	03
<b>Total</b>				<b>39</b>

**References:**

- [1] B.L.Theraja "Electrical Technology" Vol-I and II, S. Chand Publications, 23<sup>rd</sup> ed. 2003.
- [2] Joseph A Edminister, "Schaum's ouline of theory and problems of electric circuits" Tata McGraw Hill, 2<sup>nd</sup> edition
- [3] S.Sivanagaraju, G. Kishor, C. Srinivasa Rao, " Electrical Circuit Analysis" CENGAGE Learning
- [4] David Bell, " Electronic Devices and Circuits" Fifth Edition, Oxford University Press
- [5] Ramakant A. Gayakwad, "OPAMP and Linear ICs", 4th Edition, Prentice Hall / Pearson Education, 2001.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ES12/ES22	Engineering Mechanics	3	1	--	3	1	--	4	
		Examination Scheme							
		ISE		MSE	ESE				
		10		30	100 (60% Weightage)				

## Course Outcomes:

ES12/ES22 Engineering Mechanics	Learners will be able to...
CO1	Determine resultant of coplanar force system or equivalent force system (force & couple)
CO2	Construct the Free Body Diagram of real world problems and apply the conditions of equilibrium to determine the reactive forces for a given coplanar force system
CO3	Analyse the equilibrium of rigid bodies subjected to dry friction by using the laws of friction
CO4	Determine vectorically the resultant force and the reactive force for a 3-Dimensional force system
CO5	Determine the position, velocity and acceleration in different frames of reference for motion of a particle and plot the motion curves for rectilinear motion. Also Locate the Instantaneous Center of Rotation & determine the angular velocity for rigid bodies
CO6	Determine velocities of particle after collision

Module No.	Unit No.	Topics	Ref.	Hrs.
1 System of Coplanar Forces	1.1	Resultant of Concurrent forces, Parallel forces, Non-Concurrent Non-Parallel system of forces, Moment of force about a point, Couples, Varignon's Theorem, Distributed Forces in a plane.	1, 3	7
2 Equilibrium of System of Coplanar Forces	2.1	Condition of equilibrium for concurrent forces, parallel forces and Non-concurrent Non-Parallel or general force system and Couples. Equilibrium of connected bodies.	1, 3	4
	2.2	Types of supports, loads, Beams, Determination of reactions at supports for various types of loads on beams.	2, 3	3
3 Friction	3.1	Introduction to Laws of friction, Cone of friction, Equilibrium of bodies on inclined plane, Application to problems involving wedges, ladders.	1, 3	5
4	4.1	Rectangular Components of Forces in Space, Resultant of	1, 2	5



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<b>Forces in space</b>		Space forces, Moment of a Force about a point, axis and line. Equilibrium of a particle in space.		
<b>5</b> <b>Kinematics</b>	5.1	<b>Kinematics of Particle</b> Motion along straight and curved path, Rectangular component of velocity and acceleration, Tangential & Normal component of acceleration, Motion curves(a-t, v-t, s-t curves), Projectile motion,	1, 2	7
	5.2	<b>Kinematics of Rigid Bodies</b> Instantaneous center of rotation for the velocity, velocity diagrams for bodies in plane motion, (up to 2 linkage mechanism)	1, 2	4
<b>6</b> <b>Kinetics of Particles</b>	6.1	<b>Impulse and Momentum:-</b> Principle of Linear Impulse and Momentum. Law of Conservation of momentum. Impact and collision.	1, 2	4
				<b>39 hrs</b>

### Recommended Books:

1. F.P. Beer, E.R. Johnston Jr., *Vector Mechanics for Engineers – Statics and Dynamics*, 9<sup>th</sup> ed., NY, USA, McGraw-Hill, 2010.
2. E.W. Nelson, C.L. Best, W.G. McLean, *Engineering Mechanic: Statics and Dynamics*, 5<sup>th</sup> ed., NY, USA, Schaum's Outline Series, McGraw-Hill, 1998.
3. A.K. Tayal, *Engineering Mechanics: Statics and Dynamics*, 13<sup>th</sup> ed., Delhi, Umesh Publications, 2005.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ESL11	Basic Electrical and Electronics Engineering Lab	--	--	2	--	--	1	1
				Examination Scheme				
		ISE	ESE			Total		
			Practical	Oral				
		40	--	--	20	--	60	

Pre-requisite Course Codes		
Course Outcomes	CO1	Compute electrical parameters for the given circuit using network theorem.
	CO2	Verify the resonance phenomenon for a given RLC circuit.
	CO3	Implement amplifier and oscillator using FET.
	CO4	Design amplifier for the given gain using operation amplifier .
	CO5	Compare astable, monostable and bistable multivibrator circuit using given IC.

Exp. No.	Experiment Details	Ref.	Marks
1	Verification of Kirchoff's law by comparing a simulation result and by implementing the circuit on breadboard.	1,2	5
2	Verification of superposition theorem by comparing a simulation result and by implementing the circuit on breadboard.	1,2	5
3	Verification of maximum power transfer theorem by comparing a simulation result and by implementing the circuit on breadboard.	1,2	5
4	Obtain bandwidth of the given RLC circuit by comparing a simulation result and by implementing the circuit on breadboard.	1	5
5	Obtain the given gain using a BJT amplifier circuit and observe input and output waveforms. Write a C program for BJT amplifier circuit.	1	5
6	Measure the oscillator frequency for a RC phase shift oscillator. Compare the oscillator circuit using hartley and colpitts oscillator circuit	1	5
7	Obtain the given gain using an OPAMP in inverting and non inverting mode.	3	5
8	Design a timer circuit to switch on LED after a given time duration also modify the circuit for different on time of the LED.	3	5
Total Marks			40



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### References:

- [1] Joseph A Edminister, "Schaum's outline of theory and problems of electric circuits" Tata McGraw Hill, 2<sup>nd</sup> edition
- [2] B.L.Theraja "Electrical Technology" Vol-I S. Chand Publications, 23<sup>rd</sup> ed. 2003.
- [3] M. B. Patil, V. Ramanarayanan, V. T. Ranganathan, "Simulation of Power Electronics Circuits", Narosa publication



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
		--	--	2	--	--	1	1	
Examination Scheme									
ESL12/ESL22	Engineering Mechanics Laboratory	ISE		ESE			Total		
				Practical	Oral				
				40				20	60

### Course Outcomes:

ESL12/ESL22 Engineering Mechanics Laboratory	Learners will be able to...
CO1	Draw force polygon for a coplanar force system and also determine resultant force using principle of moment
CO2	Determine reactive forces using conditions of equilibrium and Lami's theorem
CO3	Determine coefficient of friction for various contact surfaces
CO4	Obtain the various parameters for motion of a particle
CO5	Determine coefficient of restitution for collision
CO6	Design and conduct an experiment to demonstrate principles of statics and dynamics

Experiment No.	Experiment Details	Marks.
1	Draw the force polygon and determine the resultant of forces for concurrent coplanar force system.	05
2	Use the conditions of equilibrium for parallel force system and determine the support reactions.	05
3	Apply the principle of moment for equilibrium of levers.	05
4	Determine the coefficient of friction for glass slab and a metal plate on an inclined plane.	05
5	Determine the axial forces using Lami's theorem for Jib crane apparatus.	05
6	Use the conditions of equilibrium for non-concurrent non-parallel force system and draw the force polygon.	05
7	Measure the acceleration due to gravity with the help of simple pendulum apparatus.	05
8	Determine the range of projectile and the time of flight for the projectile motion.	05
9	Using the timing car apparatus 1. Plot the motion curves for linear motion under low friction; plot time vs distance, velocity	05



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	2. Demonstrate linear motion on an inclined plane 3. Verify the law of conservation of momentum 4. Determine the coefficient of restitution for collision	
10	Plot the motion of projectile using air-cushion table apparatus.	05

Note: Students should perform minimum eight experiments under ISE component for successful completion of course.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BSL14	Applied Science I Lab	-	-	2	-	-	1	1
		Examination Scheme						
		ISE	MSE			Total		50
			Practical		Oral			

**Applied Physics Lab**

Course Outcomes	Learners will be able to	
	C01	Develop experimental skills for the use of laboratory instruments and tools
	C02	Develop an ability of understanding of concepts and principles of physics
	C03	Develop practical abilities (observation, recording data and analyzing results)
	C04	Comprehend importance of precision, accuracy of the experimental data

Experiment No.	Experiment Details	Marks*
1	To study I-V characteristics of a zener diode	5
2	To determine energy band gap of a semiconductor	5
3	To determine Hall coefficient, the type, density and the mobility of majority charge carriers in extrinsic semiconductors using Hall effect	5
4	To determine the retentivity and coercivity of a ferromagnetic material from its hysteresis curve	5
5	To determine dielectric constant of a given material	5
6	To measure velocity of ultrasonic waves in liquid medium using ultrasonic interferometer	5
7	To determine Planck's constant using photo cell	5
Total Marks		25

\*Any 5 experiments



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### Applied Chemistry Lab

Course Outcomes	Learners will be able to		
	CO1	Estimate the different types of hardness in water	
	CO2	Remove hardness in water using suitable softening technique	
	CO3	Identify suitable method of disposal of wastewater based on its Chemical Oxygen Demand (COD)	
	CO4	Evaluate the molecular weight of polymer.	
	CO5	Evaluate key properties of lubricants such as temperature dependence of viscosity, acid value and flash point.	
	CO6	Illustrate the use of instruments like conductometer in acid base titrations	

Exp. No.	Experiment Details	Ref.	Marks
1	Determination of total, temporary and permanent hardness of water sample	1, 2	5
2	Removal of hardness using ion exchange column	1, 2	5
3	Determination of Chemical oxygen demand (COD) in a waste water sample	2	5
4	Molecular weight determination of polymers by Oswald's Viscometer	2	5
5	To determine flash point of a lubricating oil	2	5
6	Determination of Viscosity of oil by Redwood Viscometer	1, 2	5
7	Determination of acid value of lubricant oil	2	5
8	Determination of amount of strong acid present in a solution by conductometric titration	2	5
Total Marks			25*

\* Any five from the above list of experiments will be performed

### References:

- [1] P. C. Jain & M. Jain, *Engineering Chemistry*, XV thed reprint, New Delhi, India, Dhunpat Rai Publishing Co. (P) Ltd., 2010.
- [2] S. S. Dara, *A Text Book on Experiments and Calculations in Engineering Chemistry*, IXthed, New Delhi, India, S. Chand & Company Ltd., 2003.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		--	--	2	--	--	1	1
Examination Scheme								
ESL13	Workshop I	ISE			ESE			Total
		50			-			50

### Course Objective:

The objective is to develop technical life skill sets. This exercise also aims in inculcating respect for physical work and hard labor in addition to some amount of value addition by getting exposed to interdisciplinary engineering domains.

Trade No.	Topics	Ref.	Hrs.
1	<b>Carpentry</b> <ul style="list-style-type: none"> <li>Use and setting of hard tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood turning and modern wood turning methods.</li> <li>Term work to include one carpentry job involving a joint and report on demonstration of a job involving wood turning</li> </ul>	1	8
2	<b>Electrical board wiring</b> <ul style="list-style-type: none"> <li>House wiring, staircase wiring, wiring diagram for fluorescent tube light, Godown wiring and three phase wiring for electrical motors.</li> </ul>	6,7	8
3	<b>Hardware and Networking:</b> <ul style="list-style-type: none"> <li>Dismantling of a Personal Computer (PC), Identification of Components of a PC such as power supply, motherboard, processor, hard disk, memory (RAM, ROM), CMOS battery, CD drive, monitor, keyboard, mouse, printer, scanner, pen drives, disk drives etc.</li> <li>Assembling of PC, Installation of Operating System (Any one) and Device drivers, Boot-up sequence. Installation of application software (at least one)</li> <li>Basic troubleshooting and maintenance</li> <li>Identification of network components: LAN card, wireless card, switch, hub, router, different types of network cables (straight cables, crossover cables, rollover cables) Basic networking and crimping.</li> </ul>	4,5	8



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4	<b>Introduction to 3D Modelling</b>	3	4
<ul style="list-style-type: none"> <li>• Developing a CAD file <i>.iges</i> or <i>.step</i> of 3D model to export it as a <i>.stl</i> file for the purpose of 3D printing.</li> </ul>			

### References:

1. P. Kannaiah; K. L. Narayana, *Workshop Manual*, Scitech Publishers
2. Venkat Reddy, *Workshop Manual*, BS Publication
3. Sham Tickoo, *AutoCAD 2017*, Dreamtech Press
4. Gookin Dan, Troubleshooting your PC For Dummies, 2<sup>nd</sup> edition
5. Lowe Doug, Networking for Dummies
6. Frederic P Hartwell, Herbert P. Richter, W.C. Schwan, *Wiring simplified: Based on 2017 National Electrical Code*"
7. OSCAD, an open source tool for circuit design, simulation, analysis and PCB design" SPD publication.

ISE Distribution	Marks
Carpentry	10
Hardware & Networking	10
Electrical Board Wiring	10
3D modeling	10
Journal / Quiz	10



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
HSS11	Basic Communication Skills	1	2	-	1	1	-	2	
		Examination Scheme							
		ISE**		MSE*		ESE			
		30		20		50			

\* MSE will be evaluated on the basis of speech, to be delivered by students on a given topic.

\*\* ISE will be evaluated on the basis of marks scored in tutorials, out of 30.

Pre-requisite Course Codes	HSC level
After successful completion of the course, student will be able to	
Course Outcomes	CO1 Apply the principles of communication for professional communication
	CO2 Demonstrate the use of advanced vocabulary and grammar in spoken and written communication
	CO3 Assimilate and respond to received information using active listening and reading skills
	CO4 Prepare and confidently deliver a formal speech using right voice modulation
	CO5 Produce precise and concise business documents in the required format

Module No.	Module Name	Unit No.	Topics	Ref.	Hrs.
1	Communication Theory	1.1	Introduction, concept and meaning	3	1
		1.2	Barriers in communication	3	1½
		1.3	Methods – verbal, non-verbal, formal, informal	4	1 ½
		1.4	Organizational communication	4	1
2	Grammar & Vocabulary	2.1	Common grammatical concepts and structures	8	1
		2.2	Advanced grammar & enriching vocabulary	1	1
3	Listening & Reading	3.1	Listening Skills: Listening with a purpose	5	1
		3.2	Reading Skills: Skimming and scanning, comprehending the general idea and sub topics	5	1
		3.3	Note making	5	1
4	Speaking & Writing	4.1	Speaking Skills: Intonation & modulation	6	½
		4.2	Basics of public speech and gaining confidence	6	½
		4.3	Writing Skills: Summarizing	6	1
		4.4	Business Correspondence: Letter / Email writing basic structure & types	6	1
					<b>TOTAL</b> 13 hrs.



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Tutorial No.	Tutorial Details	Ref.	Marks
1	Making a presentation on George Bernard Shaw's <i>Pygmalion</i> to assert the importance of theory in enhancing communication skills	8	-
2	Performing a group activity in class to demonstrate the ability to identify and overcome barriers in communication	3	-
3	Performing listening sessions in the language lab	-	-
4	Completing exercises on grammar and vocabulary: one word substitutions, phrases, idioms, etc.	8	10
5	Undertaking reading sessions in the language lab	-	-
6	Completing exercises on reading comprehension and summarization	3	10
7	Writing formal letters and emails to exhibit business correspondence skills	6	10
8	Creating and putting up a blog	-	-
<b>TOTAL MARKS</b>			<b>30</b>

### References:

1. Michael McCarthy and Felicity O'Dell. *English Vocabulary in Use*. India: Cambridge University Press, 1999.
2. John Eastwood. *Oxford Practice Grammar*. India: Oxford, 1999.
3. Meenakshi Raman and Sangeeta Sharma. *Communication Skills*. India: Oxford India, 2011.
4. Shirley Mathew, *Communication Skills*. Pune, India: Technical Publications, 2013.
5. Rhoda A Doctor and Aspi H Doctor. *Communication Skills*. Mumbai, India: Sheth Publishers, 2009.
6. MeeraBharwani. *Communication Skills*. Mumbai, India: Synergy Knowledgeware, 2010.
7. Geoffrey Leech, Et al. *English Grammar for Today*. UK: Palgrave, 2005.
8. George Bernard Shaw. *Pygmalion*. London, UK: Penguin, 1914.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS21	Engineering Mathematics-II	4	1	--	4	1	--	5
Examination Scheme								
ISE			MSE			ESE		
10			30			100 (60% Weightage)		

**Course Objectives:** To develop mathematical skills for solving engineering problems.

Pre-requisite Course Codes		HSC level Mathematics			
After successful completion of the course, student will be able to					
Course Outcomes	CO1	To solve differential equations of first order			
	CO2	To solve differential equations of higher order using operators			
	CO3	To apply techniques of solving Differential Equations of first order to electrical engineering problems			
	CO4	To apply techniques of Numerical Integration, Beta & Gamma and Differentiation under integral sign to evaluate integrals			
	CO5	To evaluate integrals in various co-ordinate system			
	CO6	To calculate Area, Mass of Lamina and volume of regions			

Module No	Module name	Unit No.	Topics	Ref	Hrs.
1	Linear Differential Equations (First order )	1.1	Exact differential Equations, Equations reducible to exact form by using integrating factors.	1,2,3, 6,7	03
		1.2	Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation.		03
		1.3	Simple application of differential equation of first order and first degree to electrical engineering problem		02
		1.4	Numerical solution of ordinary differential equations of first order and first degree using (a)Taylor's series method (b)Euler's method (c) Modified Euler method (d) Runge-Kutta fourth order formula.	1,2,3, 6	04
2	Linear Differential Equations	2.1	Linear Differential Equation with constant coefficient- complementary function, particular integrals of differential equation of the type	1,2,3, 6,7	08



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	(Higher order)	f(D)y = X where X is $e^{ax}$ , $\sin(ax+b)$ , $\cos(ax+b)$ , $e^{ax}V$ , $xV$ .		
	2.2	Cauchy's homogeneous linear differential equation and Legendre's differential equation, Method of variation of parameters.		03
3	<b>Integration (One variable)</b>	3.1 Beta and Gamma functions and its properties.	1,2,3, 6	05
		3.2 Differentiation under integral sign with constant limits of integration.		02
4	<b>Multiple Integrals &amp; Applications</b>	4.1 Tracing of curves and standard solids.	1,2,3, 5,6	02
		4.2 Double integration-definition, Evaluation of Double Integrals.		03
		4.3 Change the order of integration, Evaluation of double integrals by changing the order of integration and changing to polar form.		05
		4.4 Triple integration definition and evaluation (Cartesian, cylindrical and spherical polar coordinates).		04
		4.5 Application of double integrals to compute Area, Mass and Volume. Application of triple integral to compute volume.		04
5	<b>Numerical Methods</b>	5.1 Numerical Integration by Trapezoidal, Simpson's 1/3 <sup>rd</sup> and 3/8 <sup>th</sup> rule and its applications to study motion of a moving body.	1,2,3, 4,6,8	04
			Total	52

**NOTE:** ISE component will be evaluated through assignments conducted in the tutorial sessions.

### References:

- [1] Kreyszig, "Advanced Engineering Mathematics", 9<sup>th</sup> edition, John Wiley
- [2] H.K.Dass, "Advanced Engineering Mathematics", 28<sup>th</sup> edition, S.Chand, 2010
- [3] Grewal B.S., "Higher Engineering Mathematics", 38<sup>th</sup> edition, Khanna Publication
- [4] S.C. Chapra and R.P. Canale, "Numerical Methods for Engineers with Programming and Software Applications", McGrawHill, Newyork 1998
- [5] Thomas & Finney, "Calculus & Analytic Geometry", 9<sup>th</sup> edition, Addison Wesley.
- [6] Jain and Iyengar, "Advanced Engineering Mathematics", 4<sup>th</sup> edition, Narosa Publishing House, Pvt Ltd, 2014
- [7] Dennis G. Zill, "A First Course in Differential Equations with Modelling Applications", Cengage Learning
- [8] S.S. Sastry, "Introductory Methods of Numerical Analysis", 4<sup>th</sup> edition, Prentice-Hall of India Pvt. Ltd.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
		3	-	-	3	-	-	3	
BS22		Examination Scheme							
		ISE		MSE		ESE			
		10		30		100 (60% weightage)			

## COURSE OBJECTIVE:

To make learners aware about the role and relevance of physics in engineering and technology.

Pre-requisite Course Codes		HSC level physics
After successful completion of the course, student will be able to		
Course Outcomes	C01	Comprehend the interference in thin films and Fraunhofer diffraction
	C02	Illustrate the principle, construction and working of various lasers and its applications
	C03	Explain the basics of fibre optics and its applications in optical fibre technology
	C04	Demonstrate the basic knowledge of quantum mechanics
	C05	Derive Maxwell's equations using the concepts of electrodynamics
	C06	Comprehend the significance of nanoscience and nanotechnology and its applications

Module No.	Module Name	Unit no.	Topics	Ref.	Hrs.
1	Interference and Diffraction	1.1	Interference by division of amplitude and division of wavefront; Thin film interference - interference in thin films of constant thickness due to reflected and transmitted light, origin of colours in thin films, interference in thin films of non-constant thickness (wedge-shaped) due to reflected light, formation of Newton's rings Applications of interference – testing of surface flatness, determination of thickness of thin wire, refractive index of a liquid, wavelength of incident light, radius of curvature of a lens; Anti-reflection coating, Highly reflecting films	2,3,4	07
		1.2	Fraunhofer diffraction at a single slit, Fraunhofer diffraction at a double slit, Fraunhofer diffraction due to N slits; Diffraction grating - Plane transmission grating	2,3,4	04
		1.3	Rayleigh's criterion, resolving power of a diffraction	2,3,4	02



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			grating, dispersive power of a diffraction grating; determination of wavelength of light using a plane transmission grating		
2	LASER	2.1	Processes - Absorption of light, spontaneous emission, stimulated emission; Einstein's equations Population inversion; metastable states; pumping and pumping schemes; optical resonance cavity	2,4	03
		2.2	Solid state laser – Ruby and Nd:YAG laser, Gas laser – Helium Neon laser, semiconductor laser; Applications of laser in industry, medicine and holography. (construction & reconstruction of holograms)	2,4	03
3	Fibre Optics	3.1	Total internal reflection, critical angle; optical fibre – construction and types; Numerical aperture, cone of acceptance; V-number, number of modes of propagation	2,4	03
		3.2	Losses in optical fibre – attenuation and dispersion; Applications – optical fibre communication link, optical fibre sensors, medical applications	2,4	01
4	Quantum Mechanics	4.1	Introduction to quantum mechanics, Wave particle duality, de Broglie wavelength; experimental verification of de Broglie theory; wave packet, group velocity and phase velocity; Wave function, Physical interpretation of wave function; Heisenberg's uncertainty principle; Electron diffraction experiment; Applications of uncertainty principle	1,2	04
		4.2	Schrodinger's time dependent wave equation, time independent wave equation; Application of time-independent Schrodinger equation - Particle trapped in one dimensional box and Potential barrier	1,2	03
5	Electromagnetism	5.1	Coulomb's law; divergence and curl of electrostatic field; continuous charge distribution; application of Gauss' law for spherical symmetry	2,5	03
		5.2	Divergence of magnetic induction, Biot-Savart law; Ampere's circuit law; Faraday's law of emf; Maxwell's equations	2,5	04
6	Nanotechnology	6.0	Introduction to nanotechnology; important tools in nanotechnology – SEM, TEM, AFM; Applications of nanomaterials	2	02
					Total 39



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### References:

- [1] Beiser Arthur, "Concepts of Modern Physics", 6<sup>th</sup> ed, McGraw Hill Education, 2009.
- [2] Bhattacharya D K and Tandon, "Engineering Physics", 1<sup>st</sup> ed, New Delhi, Oxford Press, 2015.
- [3] Halliday and Resnick, "Fundamentals of Physics", 10<sup>th</sup> ed, Wiley, 2013.
- [4] Ghatak A, "Optics", 5<sup>th</sup> ed, McGraw Hill Education, 2012.
- [5] Griffiths D, "Introduction to Electrodynamics", 4<sup>th</sup> ed, Pearson Education, 2015.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
BS23	Applied Chemistry - II	2	0	0	2	0	0	2	
		Examination Scheme							
		ISE		MSE	ESE				
		10		30	100 (60% Weightage)				

### Course Objective:

- To provide necessary background of applied chemistry suited for relevant areas of engineering

Pre-requisite Course Codes		HSC Level Chemistry
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Identify methods for corrosion control based on knowledge of different types of corrosion and factors affecting rate of corrosion
	CO2	Illustrate mechanism of combustion of fuels based on knowledge of their composition and properties
	CO3	Describe principle, construction and working of different types of batteries and fuel cells for varied applications
	CO4	Illustrate composition, properties and applications of different alloys
	CO5	Apply the principles of green chemistry to various industrial processes to minimize adverse impact on public health and environment
	CO6	Illustrate the properties and applications of different composite materials.

Module No	Module Name	Unit No.	Topics	Ref.	Hrs.
1	Corrosion	1.1	Introduction, Dry or Chemical Corrosion i) Due to oxygen ii) Due to other gases	1,2,4	1
		1.2	Wet or Electrochemical corrosion- Mechanism i) Evolution of hydrogen type ii) Absorption of oxygen	1,2	1
		1.3	Types of Electrochemical Corrosion- Galvanic cell corrosion, differential aeration and its various forms	1,2	1



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1	Corrosion	1.4	Factors affecting the rate of corrosion- i) Position of metal in galvanic series, ii) overvoltage, iii) relative area of anodic and cathodic parts, v) purity of metal, nature of the corrosion product, vi) temperature, vii) moisture, viii) influence of pH, and ix) conductance of the medium	1,2	1
		1.5	Methods to decrease the rate of corrosion- Material selection, Proper designing, Cathodic protection- i) Sacrificial anodic protection ii) Impressed current method, Metallic coatings, Cathodic and anodic coatings; Methods of application of coatings - i) hot dipping, (galvanizing, and tinning), ii) metal cladding, and iii) Electroplating		
2	Fuels	2.1	Definition, classification of fuels, Characteristics of a good fuel, Calorific value- Definition, Gross or Higher calorific value & Net or lower calorific value, units of heat, (only cal/g or kcal/kg).	1,2	1
		2.2	Dulong's formula & numerical for calculations of Gross and Net calorific values.	1	1
		2.3	Solid fuels- Analysis of coal- Proximate and Ultimate Analysis with Significance and numerical.	1,2	1
		2.4	Liquid fuels- Brief description of Fractional Distillation with diagram and fractions,	1,2	1
		2.5	Knocking, Octane number, Cetane number Antiknocking agents, Catalytic converter, unleaded petrol (use of MTBE),	1,2	1
		2.6	Combustion- Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid & gaseous fuels.	1,2	2
3	Batteries and Battery Technology	3.1	Introduction, electrochemical principles used in batteries.	2	1
		3.2	Primary cells, Secondary Batteries, (Nickel-Cadmium, Nickel-Hydrogen, Nickel-Metal Hydride, Rechargeable Lithium ion batteries)	2	2
		3.3	Reserve Batteries, Fuel cell.	2	1



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Module No	Module Name	Unit No	Topics	Ref No	Hours
4	Alloys	4.1	Introduction, Ferrous alloys, plain carbon steels, Limitations of plain carbon steels, Alloy Steels	1	1
		4.2	Application of alloy steels: heat resistant and corrosion resistant steels (only nichrome and stainless steel)	1	1
		4.3	Non-Ferrous alloys- Composition, properties and uses of- Alloys of Aluminum- i) Duralumin Alloys of Copper- (I) Brasses-i) Commercial brass ii) German silver, (II) Bronzes- i) Gun metal ii) High phosphorous bronze. Alloys of Pb - i) Wood's metal ii)Timmann's solder. Shape Memory Alloys: Definition, Properties and Applications.	1	1
5	Green Chemistry	5.1	Introduction, Twelve Principles of Green Chemistry, Numericals on Atom Economy	2	1
		5.2	Industrial Applications: Synthesis of Adipic Acid, Green Solvents (Water, Ionic Liquids, Supercritical Fluids), Green Fuels	2	2
6	Composite Materials	5.1	Composite: Introduction, Characteristic properties and applications of composite materials. Constitution- i) Matrix phase ii) Dispersed phase	1,2,3,4	1
		5.2	Classification of composites, Fiber reinforced Plastics, Structural -composites- i) Laminates (ii) Sandwich Panels,	1,2	1
		5.3	Cermets, Ceramics, Preparation and uses of Alumina and Silicon Carbide.	1,2,3,4	1
<b>Total</b>				<b>26hrs</b>	

### References:

- [1] P. C. Jain & M. Jain, *Engineering Chemistry*, 16th ed , New Delhi, India:Dhanpat Rai Publishing Co. (P) Ltd., 2014
- [2] S. S. Dara & S. S. Umare, *A Textbook of Engineering Chemistry*, 12th ed. , New Delhi, India: S. Chand & Co. Ltd., 2013
- [3] S. Chawla, *A Textbook of Engineering Chemistry*, 3rd ed., Delhi, India: Dhanpat Rai & Co. (Pvt.) Ltd., 2015
- [4] S. Agarwal, *Engineering Chemistry Fundamentals and Applications*, Isted , Delhi, India: Cambridge Univ. Press., 2015



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ES14/ES24	Programming Methodology & Data Structures	3	--	--	3	--	--	3
Examination Scheme								
ISE		MSE		ESE				
10		30		100 (60 % Weightage)				

## Pre-requisite Course Codes

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After successful completion of the course, student will be able to

Course Outcomes	CO1	Provide solutions using structured and modular programming approach.
	CO2	Apply four primary constructs - sequential, iterative branching and recursive.
	CO3	Perform file handling and basic input output.
	CO4	Apply Stack, Queue and linked list operations for simple problem solving

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	<b>Introduction to C-Programming:</b> Algorithm, flowchart, Character set, standard Data types <b>Operators:</b> Arithmetic, Relational and logical, Assignment, Unary, Conditional, Bitwise, Comma, other operators. Expression, statements, Library Functions, Preprocessors	1,2,3	11
	1.2	<b>Control structures:</b> <b>Branching Structures:</b> If statement, If-else Statement, multi-way decision, Switch statement, Continue statement, Break statement <b>Iterative Structures:</b> while , do-while , for , Nested Control Structures	1,2,3	
	1.3	<b>Structured Data types and pointers:</b> <b>Arrays:</b> Declaration, Definition, Accessing array element, One-dimensional array, Two-Dimensional array <b>Pointer:</b> Introduction to pointers, Definition and uses of Pointers, Address operator, Dereferencing Pointer, Void Pointer	1,2,3	
2	2.1	<b>Functions:</b> Defining a Function, Accessing a Function, Function Prototype, Passing Arguments to a Function, Recursion	1,2,3	04
	2.2	<b>Storage Classes:</b> Auto , Extern , Static, Register	1,2,3	02
	2.3	<b>Strings:</b> Array of strings, String functions	1,2,3	02
	2.4	<b>Structures &amp; Union:</b> Declaration, Initialization, structure within structure, Array of Structure, Operation on structures, Concept of Union, Difference between structure and union	1,2,3	02
3	3.1	<b>Pointers revisited:</b> Pointers to Pointers , Pointers and Array, Passing Arrays to Function, Pointers and Function, Pointers and two dimensional Array, Array of Pointers, Dynamic Memory	1,2,3	04



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Allocation				
	<b>3.2</b>	<b>File Handling:</b> Types of File, File operation- Opening, Closing, Creating, Reading, Processing File	1,2,3	03
4	<b>4.1</b>	<b>Introduction to Data Structure:</b> Linear and Non-Linear Stack:Stack as ADT, operations on stack, applications of stack.	4,5	04
	<b>4.2</b>	<b>Queue:</b> Queue as ADT , Operation on Queue,Types of Queue- Circular and Priority Queue, Applications of Queue.	4,5	04
5	<b>5.1</b>	<b>Linked List:</b> Linked List as ADT, Operations on Singly Linked List.	4,5	03
				<b>Total 39</b>

### References:

- [1] Kernighan , Ritchie, "The C programming Language", Prentice Hall of India.
- [2] Carlo Ghezi, Mehdi Jazayeri, "Programing Language Concepts", John Wiley & Sons.
- [3] Byron Gottfried, "Programing with C", Mc Graw Hill ( Schaum's outline series)
- [4] T.H.Coreman, C.E. Leiserson,R. L. Rivest, and C. Stein, "Introduction to algorithms", 2<sup>nd</sup> edition , PHI publications 2005.
- [5] Ellis Horowitz, SartajSahni,S.Rajsekaran, "Fundamentals of Computer algorithms" , University press.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ES15/ES25	Engineering Graphics	3	1	--	3	1	--	4
		Examination Scheme						
		ISE	MSE		ESE			
		10	30		100 (60% Weightage)			

### Course Outcomes:

ES15/ES25 Engineering Graphics	Learners will be able to...
CO1	Construct basic engineering curves
CO2	Draw projection of points and lines
CO3	Draw projection of regular solids inclined to both the reference planes
CO4	Draw the development of lateral surfaces of solids with sections
CO5	Read the 3 dimensional view and draw the orthographic projections
CO6	Read the orthographic projection and draw isometric views

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	<b>Introduction to Engineering Drawing:-</b> Types of Lines, Dimensioning Systems as per IS conventions. First angle method of projection only. <b>Engineering Curves:-</b> Basic construction of Cycloid and Involutes.	1,3	3
2	2.1	<b>Projection of Points and Lines:-</b> Lines inclined to both the Reference Planes (Excluding Traces of lines) and simple application based problems on Projection of lines.	1,3	6
3	3.1	<b>Projection of Solids:-</b> (Prism, Pyramid, Cylinder, Tetrahedron, Hexahedron and Cone only) Solid projection with the axis inclined to HP and VP. (Exclude Spheres, Composite, Hollow solids and frustum of solids). Use change of position or Auxiliary plane method	1,3	13
	3.2	<b>Section of Solids:-</b> Section of Prism, Pyramid, Cylinder, Tetrahedron, Hexahedron & Cone cut by plane perpendicular to at least one reference plane.( Exclude Curved Section Plane). Use change of position or Auxiliary plane method	1,3	
	3.3	<b>Development of Lateral Surfaces of Sectioned Solids:-</b> Lateral surface development of Prism, Pyramid,	1,3	



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		Tetrahedron, Hexahedron, Cylinder, Cone with section plane inclined to HP or VP only. (Exclude DLS of a solid with a hole in it and Reverse Development).		
4	4.1	<b>**Orthographic and Sectional Orthographic Projections:-</b> • Different views of a simple machine part as per the first angle projection method recommended by I.S. • Full or Half Sectional views of the Simple Machine parts. <b>**Introduction to AutoCAD:-</b> Basic Drawing and Editing Commands. Knowledge of setting up layers, Dimensioning, Hatching, plotting and Printing.	2.4	11
5	5.1	<b>**Isometric Views:-</b> Isometric View/Drawing of blocks of plain and cylindrical surfaces using plain/natural scale only. (Exclude Spherical surfaces). <b>**Introduction to AutoCAD:-</b> Commands for isometric snap, 3D modeling: Working in 3-dimensions, Viewing 3D Objects, Basic wireframe models, Extruding, simple revolved objects. Boolean operations.	2.4	6
				39 hrs

**\*\* These modules will be evaluated through laboratory work by using CAD tool.**

**NOTE:**

1. ISE component will be evaluated for the A3 size sketch-book for the following topics as a tutorial:

Sr. No.	Topics
1	Engineering Curves
2	Projection of Lines
3	Projection of Solids
4	Section of Solids
5	Development of Lateral Surfaces
6	Orthographic Projections
7	Sectional Orthographic Projections
8	Isometric View

2. The above topics done in tutorial will also be included in AutoCAD practice sheets.
3. MSE and ESE will be conducted for the module 1 – 3 (i.e. Manual Drawing)
4. ESE (Practical Exam) will be conducted for the module 4-5 (i.e. On AutoCAD 2017)



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### References:

1. N.D. Bhatt, *Engineering Drawing (Plane and solid geometry)*, Charotar Publishing House Pvt. Ltd.
2. N.D. Bhatt & V.M. Panchal, *Machine Drawing*, Charotar Publishing House Pvt. Ltd.
3. Dhananjay A Jolhe, *Engineering Drawing*, Tata McGraw Hill.
4. Prof. Sham Tickoo (Purdue University) & Gaurav Verma, "( CAD Soft Technologies) : Auto CAD 2017 (For engineers and Designers)", Dreamtech Press New Delhi.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ESL14/ESL24	Programming Methodology & Data Structure Lab	--	--	2	--	--	1	1
Examination Scheme								
ISE			ESE			Total		
			Practical		Oral		60	
			40		10		10	

### Pre-requisite Course Codes

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After successful completion of the course, student will be able to

Course Outcomes	CO1	Solve problems using structured programming approach
	CO2	Use various programming constructs.
	CO3	Develop applications using Linear Data Structures.
	CO4	Develop applications using Nonlinear Data Structures.
	CO5	Demonstrate debugging skill.
	CO6	Demonstrate documentation for simple programs.

Exp. No.	Experiment Details	Ref.	Marks
			5
1	To apply various control structures to solve given problem.	1,2,3	5
2	To apply concept of functions to incorporate modularity.	1,2,3	5
3	To develop an application by applying concepts of structures/union.	1,2,3	5
4	To develop an application to demonstrate functionality of Arrays.	1,2,3	5
5	To exploring files as data structure .	4,5	5
6	To explore concepts of Stack as linear data structure by developing application	4,5	5
7	To explore the concepts of Queue as linear data structure by developing application	4,5	5
8	To explore the concept of dynamic memory allocation using Linked list as Non- linear data structure.	1,2,3	5
		Total Marks	40

### References:

- [1] Kernighan , Ritchie, "The C programming Language", Prentice Hall of India.
- [2] Carlo Ghezi, Mehdi Jazayeri, "Programing Language Concepts", John Wiley & Sons.
- [3] Byron Gottfried, "Programing with C", McGraw Hill ( Schaum's outline series)
- [4] T.H.Coreman, C.E. Leiserson,R. L. Rivest, and C. Stein, "Introduction to algorithms", 2<sup>nd</sup> edition , PHI publications 2005.
- [5] Ellis Horowitz, SartajSahni,S.Rajsekaran, "Fundamentals of Computer algorithms" , University press.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		--	--	2	--	--	1	1
<b>Examination Scheme</b>								
ESL15/ESL25	Engineering Graphics Laboratory	ISE			ESE			Total
		50			50			100

### Course Outcomes:

ESL15/ESL25 Engineering Graphics Lab.	Learners will be able to...
CO1	Use CAD tool to draw and modify basic 2-dimensional objects with dimensions, line-types & layers as per IS conventions
CO2	Read the 3-dimensional view and draw orthographic projections using CAD tool
CO3	Read the orthographic projections and draw the isometric view using CAD tool
CO4	To read orthographic projections and draw the missing view using CAD tool

Session No.	AutoCAD Session Details	Marks
1	All the draw & modify commands	
2	Layer properties manager, page setup, plotting, etc.	
3	Drawing examples (5 sheets)	05
4	Orthographic Projections (1 problem)	
5	Orthographic Projections (1 problem)	10
6	Sectional Orthographic Projections (1 problem)	
7	Sectional Orthographic Projections (1 problem)	15
8	Isometric view (2 problems)	
9	Isometric view (2 problems)	15
10	Tutorial practice sheets or Missing View problems	05
	Total Marks	50 Marks

NOTE: ISE component will be evaluated based on above work and ESE (Practical Exam) will be conducted on CAD tool for 50 marks.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BSL24	Applied Science II Lab	-	-	2	-	-	1	1
		Examination Scheme						
		ISE	ESE			Total		50
			Practical	Oral				

### Applied Physics Lab

After successful completion of the course, student will be able to

Course Outcomes	C01	Develop experimental skills for the use of laboratory instruments and tools
	C02	Develop an ability of understanding of concepts and principles of physics
	C03	Develop practical abilities (observation, recording data and analyzing results)
	C04	Comprehend importance of precision, accuracy of the experimental data

Experiment No.	Experiment Details	Marks*
1	To measure radius of curvature of a plano-convex lens using Newton's Rings	5
2	To measure the thickness of a spacer using interference pattern at the air wedge between two glass plates	5
3	To determine the wavelengths of a mercury source using a plane diffraction grating	5
4	To determine the width of a slit from the diffraction pattern of a single-slit	5
5	To determine the grating element of a diffraction grating using a laser source	5
6	To determine numerical aperture of an optical fibre	5
7	To measure DC, AC Voltage and Frequency of AC signal using a Cathode-Ray Oscilloscope	5
		Total Marks 25

\*Any 5 experiments.



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### Applied Chemistry Lab

After successful completion of the course, student will be able to			
Course Outcomes	CO1	Estimate metal content in alloys using different methods	
	CO2	Estimate components of proximate analysis of coal	
	CO3	Analyze flue gas for its composition	
	CO4	Synthesis of bio fuel	

Exp. No.	Experiment Details	Ref.	Marks
1	Estimate percentage of Zinc in an alloy of Copper and Zinc by Complexometric titration	1	5
2	Estimate percentage of Nickel by Complexometric titration.	1,2	5
3	Estimate percentage of Copper in brass by Iodometric Titration	1, 2	5
5	Estimate moisture content in coal.	1, 2	5
6	Estimate ash content in coal.	1,2	5
7	Analyse Flue gas for its composition (by Orsat's Apparatus).	1, 2	5
8	Laboratory synthesis of biodiesel.	2	5
Total Marks			25*

\* Any five from the above list of experiments will be performed.

### References:

- [1] P. C. Jain & M. Jain, *Engineering Chemistry*, XV th ed reprint, New Delhi, India, Dhunpat Rai Publishing Co. (P) Ltd., 2010.
- [2] S. S. Dara & S. S. Umare, *A Textbook of Engineering Chemistry*, XII th ed reprint, New Delhi, India, S. Chand & Co. Ltd., 2013.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
--	--	2	--	--	1	1		
Examination Scheme								
ESL23	Workshop II	ISE			ESE			Total
		50			-			50

### Course Objective:

The objective is to develop technical life skill sets. This exercise also aims in inculcating respect for physical work and hard labor in addition to some amount of value addition by getting exposed to interdisciplinary engineering domains.

Trade No.	Topics	Ref.	Hrs.
1	<b>Sheet Metal Practice</b> <ul style="list-style-type: none"> <li>Introduction to primary technology processes involving bending, punching and drawing various sheet metal joints, development of joints.</li> <li>Term work to include a utility job in sheet metal.</li> </ul>	1	8
2	<b>PCB Laboratory Exercises</b> <ul style="list-style-type: none"> <li>Layout drawing, Positive and negative film making, PCB etching and drilling, Tinning and soldering technique.</li> </ul>	5	8
3	<b>Introduction to Electronic Components</b> <ul style="list-style-type: none"> <li>Exposure to usual electronic equipment/instruments such as Multi-meter, Oscilloscope, Function generator, IC tester and Power supply, Information about their front panels, Demonstrations on their working, Hands-on for measurement of component values and DC voltage using multi-meter, AC mains voltage/ 1 KHz Square wave/any small signal from function generator on Oscilloscope, Testing of sample digital ICs using IC tester.</li> </ul> <p style="text-align: center;"><b>OR</b></p> <b>Repairing of gadgets and appliances:</b> <ul style="list-style-type: none"> <li>Elementary skills of repairing juicer, mixer, grinder, etc.</li> </ul>	5	8
4	<b>3D Printing</b> <ul style="list-style-type: none"> <li>Importing the .stl file to generate a .gcode for 3D printing through the use of open source softwares like Cura, etc.</li> </ul>	4	4



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### References:

1. P. Kannaiah; K. L. Narayana, *Workshop Manual*, Scitech Publishers
2. Venkat Reddy, *Workshop Manual*, BS Publication
3. Sham Tickoo, *AutoCAD 2017*, Dreamtech Press
4. Think3D reference manual
5. Khandpur R.S., *Printed Circuit Boards*, Tata McGraw Hill, 2005.
6. Simon Monk, *Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards* McGrawHill publication.
7. Charles Platt, *Encyclopedia of Electronic Components* O'Reilly, 1 edition.

ISE Distribution	Marks
Carpentry	10
PCB Laboratory Exercises	10
Introduction to Electronic Components	
OR	10
Repairing of appliances	
3D printing	10
Journal / Quiz	10



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Course Code	Course Name	Teaching Scheme			Credits Assigned		
		L	T	P	L	T	P
MC21	Environmental Studies	1	0	0	1	0	0
		<b>Examination Scheme</b>					
		ISE		ESE		<b>Total</b>	
		20		30		50	

After successful completion of the course, student will be able to		
Course Outcomes	CO1	Describe various characteristics of ecosystems.
	CO2	Outline different strategies for sustainable development through case studies.
	CO3	Enumerate causes, effects and control measures along with detection tools for environmental pollution with the help of examples and case studies
	CO4	Explain the Clearance, Consent and Authorization Mechanism with the help of case Studies
	CO5	Illustrate the harnessing methods and benefits of renewable sources of energy through real life examples and case studies
	CO6	Illustrate recent trends in environment protection strategies with the help of examples and case studies

Module No	Module Name	Unit No	Topics	Ref	Hours
1	Ecosystems	1.1	Ecosystem (definition, and classification, nutrient and energy flow); ecological pyramids	1, 2, 3	1
2	Sustainable Development	2.1	Definition of sustainable development, Appropriate Technologies and life cycle studiesas control measures for sustainable development	1, 3	1
3	Environmental Pollution	3.1	Air Pollution: detection tools, causes and effects (climate change, Kyoto Protocol) depletion of ozone layer (Montreal Protocol), photochemical smog; Control measures: Venturi Scrubber and Electrostatic precipitator	4,5	2
		3.2	Water Pollution: detection tools, sources and effects (Biomagnification, eutrophication,), Activated sludge method for treatment of domestic wastewater, Industrial wastewater treatment,	2, 6	1
		3.3	E-Pollution, Solid waste management by landfill and incineration	3	1
4	Legal Provisions for	4.1	Clearance Control and Authorisation Mechanism, Environment Impact Assessment	4	1



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	environmental protection		(EIA)		
5	Renewable Sources of Energy	5.1	Renewable sources of energy : Solar, Wind and Hydropower	3, 4	1
6	Environment and Technology	6.1	Role of technology in environment, Green buildings, Indoor Air Pollution Carbon credits, Disaster management techniques	1, 3, 6	1
7	Presentation and Activity	7.1	Case Studies, Posters * Appropriate Technology Air Pollution Water Pollution Legislation Renewable energy sources Green Buildings Natural Disasters Man-made disasters		4
			Total		13

\* to be part of ISE for 20M

### List of References:

- [1] ErachBharucha, *Textbook of Environmental Studies*, 2nd ed, Hyderabad, India: University Press, 2013
- [2] Anubha Kaushik and P.C.Kaushik, *Perspectives in Environmental Studies*, 4th ed, New Delhi, India:New Age International (P) Ltd.
- [3] Dr. V.M.Balsaraf, *Environmental Studies*, 1st ed, Mumbai, India:Synergy Knowledgeware, 2013
- [4] R.Rajagopalan, *Environmental Studies*, 3rd ed. New Delhi, India: Oxford University Press, 2016
- [5] C.S.Rao, *Environmental Pollution Control Engineering*, 2nd ed, New Delhi, India:New Age International Publishers (P)Ltd.
- [6] AnanditaBasak, *Environmental Studies*, New Delhi, India:Pearson Education, 2013



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MC22	Constitution of India	1	-	-	1	-	-	1
Examination Scheme								
ISE			MSE			ESE		
10			30			100 (60% Weightage)		

Pre-requisite Course Codes ---		
Course Outcomes	CO1	Student will be able to understand constitution principles
	CO2	Student will be able to co-relate with political system
	CO3	Student will be able to pursue the values of civic life
	CO4	Student will be able to exercise their rights and duties

Day No.	Topics	Hrs.
1	Historical background of constitution	1
2	Philosophy of constitution	1
3	Fundamental Rights – Duties	1
4	Directive principles – with respect to issues	1
5	Separation of powers	1
6	Law making procedure	1
7	Party system – Electoral dynamics	1
8	Challenges to constitutional democracy	1
9	Judicial Administration	1
10	Working of quasi – judicial bodies	1
11	Amendment process and language	1
12	Local self government	1
13	Core issues (Uniform civil code, Article 370, Reservation)	1
14	Landmark cases – Nanavati case, Shah Bano, Keshvanand BhartiVishakha Case etc	1

### References:

- [1] D.C. Gupta – Indian Government and Politics
- [2] D.D. Basu – Introduction to the Constitution of India
- [3] P. M. Bakshi - The Constitution of India
- [4] M. V. Pylee - Constitutional History of India



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ES21	Basic Electrical Technology	3	-	--	3	--	--	3	
		Examination Scheme							
		ISE		MSE		ESE			
		10		30		100 (60% Weightage)			

Pre-requisite Course Codes		
Course Outcomes	CO1	Compute various electrical quantities of given dc circuit using circuit simplification techniques and various network theorems.
	CO2	Describe the concept of ac circuit and its resonance phenomena for a given RL, RC and RLC circuit.
	CO3	Analyze the series and parallel magnetic circuit.
	CO4	Describe characteristics of single phase, three phase ac circuits and transformer equivalent circuit theoretically and graphically
	CO5	Describe the constructional details and working principle of given AC and DC machines

Module No.	Unit No.	Topics	Ref.	Hrs.
Prerequisite	A	Concept of e.m.f, potential difference, current, ohm's law, resistance, resistivity, series and parallel connections, power dissipation in resistance, effect of temperature on resistance		02
	B	Capacitors, with uniform and composite medium, energy stored in capacitor, R-C time constant.		
	C	Magnetic field, Faraday's laws of Electromagnetic induction, Hysteresis and eddy current losses, energy stored in an inductor, time constant in R-L circuit		
1	1.1	Kirchhoff's laws, Ideal and practical voltage and current source, Source transformation, Star-delta transformation	1,2	04
	1.2	Mesh and Nodal analysis, super node and super mesh	1,2	02
	1.3	Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem	1,2	06
2	2.1	Basic definitions to understand concepts in magnetic circuit, ohm's law in a magnetic circuit, parallel magnetic circuit, coefficient of coupling, dot convention,	3	03
	2.2	Electrically joined coupled coils: Series adding, Series opposing, parallel adding, parallel opposing, comparison between magnetic and electrical circuit	3	02
3	3.1	Generation of alternating voltage and currents, RMS and Average	1,2	03



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		value, form factor , crest factor, AC through resistance, inductance and capacitance		
	3.2	R-L , R-C and R-L-C series and parallel circuits, power and power factor	1,2	03
	3.3	Series and parallel resonance, Q-factor and bandwidth	1,2	04
4	4.1	Three phase voltage and current generation, Star and delta connections, relationship between phase and line currents and voltages	1	01
	4.2	Power in three phase circuit, two wattmeter method	1	02
5	5.1	Single phase transformer : Construction, working principle, EMF equation, Phasor diagram with resistive, inductive and capacitive load	1,4	03
	5.2	DC machine: Construction, working principle, emf equation, Characteristic, applications	1,4	02
	5.3	Three phase induction motor: Construction, working principle, applications, equivalent circuit of three phase induction motor	1,4	03
	5.4	Single phase induction motor: Construction, working principle, double field revolving theory, split phase, capacitor start and shaded pole motor.	1,4	02
<b>Total</b>				<b>42</b>

**References:**

- [1] B.L.Theraja "Electrical Technology" Vol-I and II, S. Chand Publications, 23<sup>rd</sup> ed. 2003.
- [2] Joseph A Edminister, "Schaum's outline of theory and problems of electric circuits" Tata McGraw Hill, 2<sup>nd</sup> edition
- [3] S.Sivanagaraju, G. Kishor, C. Srinivasa Rao, " Electrical Circuit Analysis" CENGAGE Learning
- [4] D P Kothari and I J Nagrath "Electrical Machines", McGraw Hill, Fourth edition



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		--	--	2	--	--	1	1
<b>Examination Scheme</b>								
ESL21	Basic Electrical Technology Lab	ISE		ESE			Total	
		Practical		Oral			60	
40		--		20			60	

Pre-requisite Course Codes		
Course Outcomes	CO1	Compute electrical parameters for the given circuit using network theorem.
	CO2	Verify the resonance phenomenon for a given RLC circuit.
	CO3	Compare single phase and three phase circuit for various terminology.
	CO4	Identify different parts of given ac and dc machines and implement circuit to control speed of motors in clockwise and anticlockwise direction.
	CO5	Implement any application using electronic components.

Exp. No.	Experiment Details	Ref.	Marks
1	Verification of Kirchoff's law	1,2,3	5
2	Verification of superposition theorem	1,2,3	5
3	Verification of maximum power transfer theorem.	1,2,3	5
4	Obtain bandwidth of the given RLC circuit.	1,2,3	5
5	Verify the relationship between line voltage/ phase voltage and line current/ phase circuit in three phase circuit	2	5
6	Obtain equivalent circuit of transformer using OC and SC test	1,4	5
7	List different parts from cut section of DC motor and three phase induction motor and control the speed of both in clockwise and anticlockwise direction.	4	5
8	Implement +15V/1A power supply.	5, 6	5
Total Marks			40

**References:**

- [1] M. B. Patil, V. Ramanarayanan, V. T. Ranganathan, "Simulation of Power Electronics Circuits", Narosa publication
- [2] B.L.Theraja "Electrical Technology" Vol-I and II, S. Chand Publications, 23<sup>rd</sup> ed. 2003.
- [3] Schaum series
- [4] Sailendra Nath Bhadra, "Electric Machinery Experiment laboratory practices and simulation study", Narosa
- [5] David Bell, "Electronic Devices and Circuits", Oxford University Press
- [6] OSCAD by IITB

Academic  
2016-17

AC 14/7/2016, Item No. 4.64

**UNIVERSITY OF MUMBAI****Bachelor of Engineering**

First Year Engineering (Semester I & II), Revised course  
(REV- 2016) from Academic Year 2016 – 17,  
(Common for All Branches of Engineering)

(As per Choice Based Credit and Grading System  
 with effect from the academic year 2016–2017)

0 *[Signature]*

Principal  
 Sardar Patel Institute of Technology  
 Bhavans Andheri Campus  
 Mumbai - 400 058,  
 Mumbai - 400 058.

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### **From Coordinator's Desk:-**

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited. In line with this Faculty of Technology of University of Mumbai has taken a lead in incorporating philosophy of outcome based education in the process of curriculum development.

Faculty of Technology, University of Mumbai, in one of its meeting unanimously resolved that, each Board of Studies shall prepare some Program Educational Objectives (PEO's) give freedom to affiliated Institutes to add few (PEO's) course objectives course outcomes to be clearly defined for each course, so that all faculty members in affiliated institutes understand the depth approach of course to be taught, which will enhance learner's learning process. It was also resolved that, maximum senior faculty from colleges experts from industry to be involved while revising the curriculum. I am happy to state that, each Board of studies has adhered to the resolutions passed by Faculty of Technology, developed curriculum accordingly. In addition to outcome based education, **Choice Based Credit and Grading System** is also introduced to ensure quality of engineering education.

Choice Based Credit and Grading System enables a much-required shift in focus from teacher-centric to learner-centric education since the workload estimated is based on the investment of time in learning not in teaching. It also focuses on continuous evaluation which will enhance the quality of education. University of Mumbai has taken a lead in implementing the system through its affiliated Institutes. Faculty of Technology has devised a transparent credit assignment policy adopted ten points scale to grade learner's performance. Credit grading based system was implemented for First Year of Engineering from the academic year 2016-2017. Subsequently this system will be carried forward for Second Year Engineering in the academic year 2017-2018, for Third Year Final Year Engineering in the academic years 2018-2019, 2019-2020, respectively.

**Dr. S. K. Ukarande**  
Co-ordinator,  
Faculty of Technology,  
Member - Academic Council  
University of Mumbai, Mumbai

**Program Structure for  
First Year Engineering (Semester I & II)  
Mumbai University  
(With Effect from 2016-2017)**

**Semester I**

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total	
FEC101	Applied Mathematics-I	04	-	01	04	-	01	05	
FEC102	Applied Physics-I	03	01	-	03	0.5	-	3.5	
FEC103	Applied Chemistry -I	03	01	-	03	0.5	-	3.5	
FEC104	Engineering Mechanics	05	02	-	05	01	-	06	
FEC105	Basic Electrical Engineering	04	02	-	04	01	-	05	
FEC106	Environmental studies	02	-	-	02	-	-	02	
FEL101	Basic Workshop Practice-I	-	04	-	-	02	-	02	
<b>Total</b>		<b>21</b>	<b>10</b>	<b>01</b>	<b>21</b>	<b>05</b>	<b>01</b>	<b>27</b>	
Course Code	Course Name	Examination Scheme							
		Theory			End Sem Exam	Term Work	Pract	Oral	
		Internal Assessment	Test1	Test2					
FEC101	Applied Mathematics-I	20	20	20	80	25	-	-	125
FEC102	Applied Physics-I	15	15	15	60	25	-	-	100
FEC103	Applied Chemistry -I	15	15	15	60	25	-	-	100
FEC104	Engineering Mechanics	20	20	20	80	25	-	25	150
FEC105	Basic Electrical Engineering	20	20	20	80	25	-	25	150
FEC106	Environmental studies	15	15	15	60	-	-	-	75
FEL101	Basic Workshop Practice-I	-	-	-	-	50	-	-	50
<b>Total</b>				<b>105</b>	<b>420</b>	<b>175</b>		<b>50</b>	<b>750</b>

**Semester II**

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC201	Applied Mathematics-II	04	-	01	04	-	01	05
FEC202	Applied Physics-II	03	01	-	03	0.5	-	3.5
FEC203	Applied Chemistry -II	03	01	-	03	0.5	-	3.5
FEC204	Engineering Drawing	03	04	-	03	02	-	05
FEC205	Structured Programming Approach	04	02	-	04	01	-	05
FEC206	Communication Skills	02	02	-	02	01	-	03
FEL201	Basic Workshop Practice-II	-	04	-	-	02	-	02
<b>Total</b>		<b>19</b>	<b>14</b>	<b>01</b>	<b>19</b>	<b>07</b>	<b>01</b>	<b>27</b>
Course Code	Course Name	Examination Scheme						
		Theory			End Sem Exam	Term Work	Pract	Oral
Test1	Test2	Avg						
FEC201	Applied Mathematics-II	20	20	20	80	25	-	-
FEC202	Applied Physics-II	15	15	15	60	25	-	-
FEC203	Applied Chemistry -II	15	15	15	60	25	-	-
FEC204	Engineering Drawing	15	15	15	60	25	50	-
FEC205	Structured Programming Approach	20	20	20	80	25	25	-
FEC206	Communication Skills	10	10	10	40	25	-	-
FEL201	Basic Workshop Practice-II	-	-	-	-	50	-	-
<b>Total</b>				<b>95</b>	<b>380</b>	<b>200</b>	<b>75</b>	<b>750</b>

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total	
FEC101	Applied Mathematics-I	04	-	01	04	-	01	05	
Course Code	Course Name	Examination Scheme							
		Theory				End Sem Exam	Term Work	Pract	
		Internal Assessment			Av of Test 1 & 2				
FEC101	Applied Mathematics-I	20	20	20	80	25	-	-	125

**Objectives**

1. To provide students with sound foundation in applied mathematics to solve real life problems in industry.
2. To provide hands on experience in using Scilab software to handle real life problems.

**Outcomes:** Learner will be able to...

1. Apply the concepts of complex numbers to the engineering problems.
2. Apply the knowledge of nth order derivatives of standard functions to engineering problems.
3. Apply the principles of basic operations of matrices to the engineering problems.
4. Apply the basic principles of partial differentiation to engineering problems.
5. Apply concepts of partial differentiation (maxima and minima, Jacobian), expansion of functions as an application of successive differentiation.
6. Apply SCILAB programming techniques to model problems based on solution of simultaneous linear algebraic equations.

Module	Detailed Contents	Hrs.
01	<b>Complex Numbers</b> Pre-requisite: Review of Complex Numbers-Algebra of Complex Number, Different representations of a Complex number and other definitions, D'Moivre's Theorem. 1.1. Powers and Roots of Exponential and Trigonometric Functions. 1.2. Expansion of $\sin^n \theta$ , $\cos^n \theta$ in terms of sines and cosines of multiples of $\theta$ and Expansion of $\sin n\theta$ , $\cos n\theta$ in powers of $\sin \theta$ , $\cos \theta$ 1.3. Circular functions of complex number and Hyperbolic functions. Inverse Circular and Inverse Hyperbolic functions. Separation of real and imaginary parts of all types of Functions.	3 2 4
02	<b>Logarithm of Complex Numbers , Successive Differentiation</b> 2.1 Logarithmic functions, Separation of real and Imaginary parts of Logarithmic Functions. 2.2 Successive differentiation: nth derivative of standard functions. Leibnitz's Theorem (without proof) and problems	4 4
03	<b>Matrices</b> Pre-requisite: Inverse of a matrix, addition, multiplication and transpose of a matrix Types of Matrices (symmetric, skew-symmetric, Hermitian, Skew Hermitian, Unitary, Orthogonal Matrices and properties of Matrices). Rank of a Matrix using Echelon forms, reduction to normal form, PAQ in normal form, system of homogeneous and non-homogeneous equations, their consistency and solutions. Linear dependent and independent vectors. Application of inverse of a matrix to coding theory.	9
04	<b>Partial Differentiation</b> 4.1 Partial Differentiation: Partial derivatives of first and higher order. Total differentials, differentiation of composite and implicit functions.	6

	4.2. Euler's Theorem on Homogeneous functions with two and three independent variables (with proof). Deductions from Euler's Theorem	3
05	<b>Applications of Partial Differentiation , Expansion of Functions</b> 5.1 Maxima and Minima of a function of two independent variables, Jacobian. 5.2 Taylor's Theorem (Statement only) and Taylor's series, Maclaurin's series (Statement only). Expansion of $e^x$ , $\sin(x)$ , $\cos(x)$ , $\tan(x)$ , $\sinh(x)$ , $\cosh(x)$ , $\tanh(x)$ , $\log(1+x)$ , $\sin^{-1}(x)$ , $\cos^{-1}(x)$ , $\tan^{-1}(x)$ , Binomial series.	4
06	<b>Indeterminate forms, Numerical Solutions of Transcendental Equations and System of Linear Equations</b> 6.1 Indeterminate forms, L- Hospital Rule, problems involving series. 6.2 Solution of Transcendental Equations: Solution by Newton Raphson method and Regula -Falsi Equation. 6.3 Solution of system of linear algebraic equations, by (1) Gauss Elimination Method, (2) Gauss Jacobi Iteration Method, (3) Gauss Seidal Iteration Method. (Scilab programming for above methods is to be taught during lecture hours)	2 4 3

#### Term Work:

##### General Instructions:

- Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern for practicals.
- Students must be encouraged to write Scilab Programs in tutorial class only. Each Student has to write at least 4 Scilab tutorials (including print out) and at least 6 class tutorials on entire syllabus.
- SciLab Tutorials will be based on (i) Guass Elimination Method (ii) Guass Seidal Iteration method (iii) Guass Jacobi Iteration Method (iv) Newton Raphson Method (v) Regula -Falsi method (vi) Maxima and Minima of functions of two variables

The distribution of Term Work marks will be as follows -

- Attendance (Theory and Tutorial) : 05 marks
- Class Tutorials on entire syllabus : 10 marks
- SciLab Tutorials : 10 marks

#### Assessment:

##### Internal Assessment Test:

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

##### End Semester Theory Examination:

- Question paper will comprise of total 06 questions, each carrying 20 marks.
- Total 04 questions need to be solved.
- Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 5 marks will be asked.
- Remaining questions will be randomly selected from all the modules.
- Weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

**References:**

1. A text book of Applied Mathematics, P.N.Wartikar and J.N.Wartikar, Vol – I and –II by Pune VidyarthiGraha.
2. Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publication
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley EasternLimited, 9thEd.
4. Matrices, Shanti Narayan,S. Chand publication
5. Numerical Methods, Dr. P. Kandasamy ,S. Chand Publication
6. Howard Anton and Christ Rorres. Elementary Linear Algebra Application Version, 6th edition. John Wiley & Sons, INC.
7. Eisenberg, Murray. Hill Ciphers and Modular Linear Algebra. 3 Nov 1999 (accessed November - 2 December 2001)
8. <<http://www.math.umass.edu/~murray/Hillciph.pdf>>

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC102	Applied Physics - I	03	01	--	03	0.5	--	3.5
<b>Examination Scheme</b>								
Course Code	Course Name	Theory			End Sem Exam	Term Work	Pract	Oral
		Internal Assessment						
FEC102	Applied Physics - I	15	15	15	60	25	--	--
								100

### Objectives

1. To impart knowledge of basic concepts in applied physics.
2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

### Outcomes: Learner will be able to...

1. Apply the concepts of crystallography and to use XRD techniques for analysis of crystal structure .
2. Apply the knowledge of Quantum mechanics to uncertainty principle and motion of free particle.
3. To comprehend the basic concepts of semiconductor physics and apply the same to electronic devices.
4. Apply the knowledge of superconductivity to SQUID and Magnetic levitation.
5. Apply the reasons for Acoustic defects and use this in the proper design of a Hall/Auditorium.
6. Use the knowledge of Piezoelectric and Magnetostriction effect for production of ultrasonic waves and its application in various fields.

Module	Detailed Contents	Hrs.
01	<b>CRYSTAL STRUCTURE</b> Introduction to crystallography; Study of characteristics of unit cell of Diamond, ZnS, NaCl and HCP; Miller indices of crystallographic planes & directions; interplanar spacing; X-ray diffraction and Bragg's law; Determination of Crystal structure using Bragg's diffractometer; Frenkel and Schotkey crystal defects; Ionic crystal legancy (3,4,6,8); Liquid crystal phases.	07
02	<b>QUANTUM MECHANICS</b> Introduction, Wave particle duality; de Broglie wavelength; experimental verification of de Broglie theory; properties of matter waves; wave packet, phase velocity and group velocity; Wave function; Physical interpretation of wave function; Heisenberg's uncertainty principle; Electron diffraction experiment and Gama ray microscope experiment; Applications of uncertainty principle; Schrodinger's time dependent wave equation; time independent wave equation; Motion of free particle; Particle trapped in one dimensional infinite potential well.	09
03	<b>SEMICONDUCTOR PHYSICS</b> Splitting of energy levels for band formation; Classification of semiconductors(direct & indirect band gap, elemental and compound); Conductivity, mobility, current density (drift & diffusion) in semiconductors(n type and p type); Fermi Dirac distribution function; Fermi energy level in intrinsic & extrinsic semiconductors; effect of impurity concentration and temperature on fermi level; Fermi Level diagram for p-n junction(unbiased, forward bias, reverse bias); Breakdown mechanism (zener&avalanchy), Hall Effect	14

	Applications of semiconductors: Rectifier diode, LED, Zener diode, Photo diode, Photovoltaic cell, BJT, FET, SCR., MOSFET	
04	<b>SUPERCONDUCTIVITY</b> Introduction, Meissner Effect; Type I and Type II superconductors; BCS Theory (concept of Cooper pair); Josephson effect Applications of superconductors- SQUID, MAGLEV	03
05	<b>ACOUSTICS</b> Conditions of good acoustics; Reflection of sound(reverberation and echo); absorption of sound; absorption coefficient; Sabine's formula; Acoustic Design of a hall; Common Acoustic defects and acoustic materials	03
06	<b>ULTRASONICS</b> Ultrasonic Wave generation; Magnetostriction Oscillator; Piezoelectric Oscillator; Applications of ultrasonic: Eco sounding; NDT; ultrasonic cleaning(cavitation); ultrasonic sensors; Industrial applications of ultrasonic(soldering, welding, cutting, drilling)	03

**Suggested Experiments: (Any five)**

1. Study of Diamond, ZnS, NaCl crystal structure.
2. Study of HCP structure.
3. Study of Miller Indices, Plane and direction.
4. Study of Hall Effect.
5. Determination of energy band gap of semiconductor.
6. Study of Ultrasonic Distance Meter.
7. Study of I / V characteristics of Zener diode.
8. Determination of 'h' using Photo cell.
9. Study of I / V characteristics of semiconductor diode

The distribution of Term Work marks will be as follows –

1. Attendance (Theory and Practical) : 05 marks
2. Assignments : 10 marks
3. Laboratory work (Experiments and Journal) : 10 marks

**Assessment:****Internal Assessment Test:**

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

**End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 15 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 3 marks will be asked.
4. Remaining questions will be randomly selected from all the modules.
5. In question paper weightage of each module will be proportional to number of respective 1. lecture hrs as mentioned in the syllabus.

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### References:

1. A text book of Engineering Physics-Avadhanulu&Kshirsagar, S.Chand
2. Applied Solid State Physics –Ranikant, Wiley India
3. Solid State Electronic Devices- B. G. Streetman, Prentice Hall Publisher
4. Physics of Semiconductor Devices- S. M. Sze, John Wiley & sons publisher
6. Modern Engineering Physics – Vasudeva, S.Chand
7. Concepts of Modern Physics- ArtherBeiser, Tata McGraw Hill
8. Engineering Physics- V. Rajendran, Tata McGraw Hill
9. Introduction to Solid State Physics- C. Kittle, John Wiley & Sons publisher
10. Engineering Physics-H. K. Malik, McGraw Hill

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total	
FEC103	Applied Chemistry – I	03	01	--	03	0.5	--	3.5	
Course Code	Course Name	Examination Scheme							
		Theory			Internal Assessment	Term Work	Pract	Oral	
		Test1	Test2	Av of Test 1 & 2		End Sem Exam			
FEC103	Applied Chemistry – I	15	15	15	60	25	--	--	100

**Objectives**

1. To provide necessary background in applied chemistry relevant to chemical industries.
2. To provide exposure in conducting experiments and interpret and report the results in professional format.

**Outcomes: Learner will be able to...**

1. Apply the knowledge of types of hardness of water and its estimation.
2. Apply the knowledge of various softening and disinfecting methods.
3. Apply the knowledge of various polymers, their synthesis, properties and uses along with their fabrication techniques.
4. Apply the knowledge of thermodynamics in studying different chemical systems in equilibrium obeying Gibb's phase rule.
5. Apply the knowledge of lubricants, types, properties and mechanisms to avoid frictional resistance.
6. Demonstrate the knowledge of Portland cement and carbon nanomaterials.

Module	Detailed Contents	Hrs.
01	<b>Water</b> Impurities in water, Hardness of water, Determination of Hardness of water by EDTA method and problems, Softening of water by Hot and Cold lime Soda method and numerical problems. Zeolite process and numerical problems. Ion Exchange process and numerical problems. Potable water standard as per BIS w.r.t. i) pH, ii) Alkalinity, iii) TDS, iv) Hardness; Drinking water or Municipal water -Treatments removal of microorganisms by adding Bleaching powder, Chlorination (no breakpoint chlorination), Disinfection by Ozone, Electrodialysis, Reverse osmosis, and Ultra filtration. BOD, COD- definition & significance, sewage treatment (only activated sludge process), Numerical problems related to COD.	12
02	<b>Polymers</b> Introduction to polymers, Classification, Types of polymerization, Thermoplastic and Thermosetting plastic; Compounding of plastic, Fabrication of plastic by Compression, Injection, Transfer and Extrusion moulding. Preparation, properties and uses of Phenol formaldehyde, PMMA, Kevlar. Effect of heat on the polymers (Glass transition temperature), Viscoelasticity. Conducting polymers, Engineering Plastics, Polymers in medicine and surgery. Rubbers : Natural rubber- latex, Drawbacks of natural rubber, Vulcanization of rubber, Preparation, properties and uses of Buna-S, Silicone and Polyurethane rubber.	12
03	<b>Lubricants</b> Introduction, Definition, Mechanism of lubrication, Classification of lubricants, Solid lubricants (graphite & Molybdenum disulphide), Semisolid lubricants, Liquid lubricants, Additives in blended Oils. Important properties of lubricants - Definition and significance of - Viscosity, Viscosity index, Flash and fire points, Cloud and pour points, Oiliness,	07

	Emulsification, Acid value and numerical problems, Saponification value and numerical problems.	
04	<b>Phase Rule</b> Gibb's Phase Rule, Terms involved with examples, One Component System (Water), Reduced Phase Rule, Two Component System (Pb- Ag), Advantages and Limitations of Phase Rule.	04
05	<b>Important Engineering Materials</b> Cement – Manufacture of Portland Cement, Chemical Composition and Constitution of Portland Cement, Setting and Hardening of Portland Cement, Concrete, RCC and Decay. Nanomaterials, preparation (Laser and CVD) method, properties and uses of CNTS, Fullerene - properties and uses.	05

#### **Suggested Experiments:**

- 1) To determine total, temporary and permanent hardness of water sample.
- 2) Removal of hardness using ion exchange column.
- 3) To determine acid value of a lubricating oil.
- 4) To determine free acid pH of different solutions using pHmeter
- 5) To determine metal ion concentration using colorimeter.
- 6) To determine flash point and fire point of a lubricating oil
- 7) To determine Chloride content of water by Mohr's Method.
- 8) To determine melting point and /or glass transition temperature of a polymer
- 9) Molecular weight determination of polymers by Oswald Viscometer.
- 10) To determine the percentage of lime in cement.
- 11) Hardening and setting of cement using Vicat's apparatus
- 12) Determination of Viscosity of oil by Redwood Viscometer.

Term Work shall consist of minimum five experiments. The distribution of marks for term work shall be as follows:

- 1 Attendance (Practical and Theory) : 05 marks
- 2 Laboratory Work (Experiments and journal) : 10 marks
- 3 Assignments and Viva on practical's : 10 marks

#### **Assessment:**

##### **Internal Assessment Test:**

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

##### **End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 15 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 3 marks will be asked.
4. Remaining questions will be mixed in nature. ( e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3 )
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

**References:**

1. Engineering Chemistry - Jain& Jain (DhanpatRai)
2. Engineering Chemistry – Dara&Dara (S Chand)
3. Engineering Chemistry - Wiley India (ISBN – 9788126519880)
4. A Text Book of Engineering Chemistry – Shashi Chawla (DhanpatRai)

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC104	Engineering Mechanics	05	02	-	05	01	-	06

Course Code	Course Name	Examination Scheme								
		Theory				End Sem Exam	Term Work	Pract	Oral	Total
		Internal Assessment		Test 1	Test 2					
FEC104	Engineering Mechanics	20	20	20	80	25	--	25	150	

### Objectives

1. To acquaint the concept of equilibrium in two and three dimensional system.
2. To study and analyse motion of moving bodies.

### Outcomes: Learner will be able to...

1. Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three dimensional systems with the help of FBD.
2. Demonstrate the understanding of Centroid and its significance and locate the same.
3. Correlate real life application to specific type of friction and estimate required force to overcome friction.
4. Establish relation between velocity and acceleration of a particle and analyse the motion by plotting the relation
5. Illustrate different types of motions and establish Kinematic relations for a rigid body
6. Analyse body in motion using force and acceleration, work-energy, impulse-momentum principles

Module	Detailed Contents	Hrs.
01	<b>1.1 System of Coplanar Forces:</b> Resultant of concurrent forces, parallel forces, non-concurrent Non-parallel system of forces, Moment of force about a point, Couples, Varignon's Theorem, Force couple system, Distributed Forces in plane. <b>1.2 Centroid for plane Laminas.</b>	05
02	<b>2.1 Equilibrium of System of Coplanar Forces:</b> Condition of equilibrium for concurrent forces, parallel forces and non-concurrent non-parallel general forces and Couples. <b>2.2 Types of support:</b> Loads, Beams, Determination of reactions at supports for various types of loads on beams.(Excluding problems on internal hinges) <b>2.3 Analysis of plane trusses:</b> By using Method of joints and Method of sections. (Excluding pin jointed frames).	04
03	<b>3.1 Forces in space:</b> <b>Resultant of Non-coplanar Force Systems:</b> Resultant of concurrent force system, parallel force system and non-concurrent non-parallel force system. <b>Equilibrium of Non-coplanar Force Systems:</b> Equilibrium of Concurrent force system, parallel force system and non-concurrent non-parallel force system. <b>3.2 Friction:</b> Introduction to Laws of friction, Cone of friction, Equilibrium of bodies on inclined plane, Application to problems involving wedges, ladders. <b>1.3 Principle of virtual work:</b> Applications on equilibrium mechanisms, pin jointed frames.	07
		04

04	<b>4.1 Kinematics of a Particle:</b> -Rectilinear motion, Velocity & acceleration in terms of rectangular co-ordinate system, Motion along plane curved path, Tangential & Normal component of acceleration, Motion curves ( $a-t$ , $v-t$ , $s-t$ curves), Projectile motion.	10
05	<b>5.1 Kinematics of a Rigid Body :-</b> Introduction to general plane motion, Instantaneous center of rotation for the velocity, velocity diagrams for bodies in plane motion.	06
06	<b>6.1 Kinetics of a Particle: Force and Acceleration:</b> -Introduction to basic concepts, D'Alemberts Principle, Equations of dynamic equilibrium, Newton's second law of motion. <b>6.2 Kinetics of a Particle: Work and Energy:</b> Principle of work and energy, Law of conservation of energy. <b>6.3 Kinetics of a Particle: Impulse and Momentum:</b> Principle of linear impulse and momentum, Law of conservation of momentum, Impact and collision.	04 03

**List of Experiments:-**

- Polygon law of coplanar forces.
- Non-concurrent non-parallel (General).
- Bell crank lever.
- Support reaction for beam.
- Inclined plane (to determine coefficient of friction).
- Collision of elastic bodies (Law of conservation of momentum).
- Kinematics of particles
- Kinetics of particles

Any other experiment based on above syllabus.

**Term work:-**

Term work shall consist of minimum six experiments (at least one experiments on Dynamics), assignments consisting numerical based on above syllabus, at least 3 numerical from each module.

The distribution of marks for term work shall be as follows:

- |   |            |
|---|------------|
| 1. Attendance (Theory and Practical)                  | : 05 marks |
| 2. Laboratory work (Experiment/ programs and journal) | : 10 marks |
| 3. Assignments  | : 10 marks |

**Assessment:****Internal Assessment Test:**

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

**End Semester Theory Examination:**

- Question paper will comprise of total 06 questions, each carrying 20 marks.
- Total 04 questions need to be solved.
- Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 5 marks will be asked.
- Remaining questions will be mixed in nature. ( e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3 )
- In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

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Oral Examination: - Oral examination will be based on entire syllabus

**References:**

1. Engineering Mechanics by R. C. Hibbeler.2
2. Engineering Mechanics by Beer & Johnston, Tata McGraw Hill
3. Engineering Mechanics by F. L. Singer, Harper & Raw Publication
4. Engineering Mechanics by Macklin & Nelson, Tata McGraw Hill
5. Engineering Mechanics by Schaum Series,
6. Engineering Mechanics by A K Tayal, Umesh Publication.
7. Engineering Mechanics by Kumar, Tata McGraw Hill
8. Engineering Mechanics (Statics) by Meriam and Kraige, Wiley Books
9. Engineering Mechanics (Dynamics) by Meriam and Kraige, Wiley Books

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total	
FEC105	Basic Electrical Engineering	04	02	-	04	01	-	05	
Course Code	Course Name	Examination Scheme							
		Theory			End Sem Exam	Term Work	Pract	Oral	Total
		Internal Assessment		Av of Test 1 & 2					
FEC105	Basic Electrical Engineering	20	20	20	80	25	--	25	150

### Objectives

1. To provide knowledge on fundamentals of D.C. circuits and its applications.
2. To impart knowledge on fundamentals of 1-Φ A.C. circuits and its applications.
3. To inculcate knowledge on the basic operation and the performance of 1-Φ transformer.
4. To impart knowledge on fundamentals of 3-Φ A.C. circuits and its applications.
5. To provide knowledge on fundamentals of DC machines.

### Outcomes: Learner will be able to...

1. To evaluate D.C. circuits using network theorems.
2. To evaluate 1-Φ AC circuits.
3. To illustrate constructional features and operation of 1-Φ transformer.
4. To evaluate 3-Φ AC circuits.
5. To illustrate working principle of DC machines.
6. To conduct experiments on D.C. circuits and AC circuits.

Module	Detailed Contents	Hrs.
01	DC Circuits(Only Independent Sources): Kirchhoff's laws, Ideal and practical voltage and current source, Mesh and Nodal analysis, Super node and Super mesh analysis, Source transformation, Star-delta transformation, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, (Source transformation not allowed for Superposition theorem, Mesh and Nodal analysis).	18
02	AC Circuits: Generation of alternating voltage and currents, RMS and Average value, form factor, crest factor, AC through resistance, inductance and capacitance, R-L, R-C and R-L-C series and parallel circuits, phasor diagrams, power and power factor, series and parallel resonance, Q factor and bandwidth.	12
03	Three Phase Circuits: Three phase voltage and current generation, star and delta connections(balanced load only), relationship between phase and line currents and voltages, Phasor diagrams, Basic principle of wattmeter, measurement of power by one and two wattmeter methods.	06
04	Single Phase Transformer: Construction, working principle, emf equation, ideal and practical transformer, transformer on no load and on load, phasor diagrams, equivalent circuit, OC and SC test, regulation and efficiency.	12
05	DC Machines: Principle of operation of DC motors and DC generators, construction and classification of DC machines, emf equation.	04

### **Term work:**

Term work consists of performing minimum 06 practical mentioned as below.  
Final certification and acceptance of the term work ensures satisfactory performance of laboratory work.

The distribution of marks for term work shall be as follows:

Attendance (Theory and Practical)	: 05 marks
Laboratory work (Experiment/journal)	: 10 marks
Assignments	: 10 marks

### **List of laboratory experiments (Minimum Six):**

1. Mesh and Nodal analysis.
2. Verification of Superposition Theorem.
3. Verification Thevenin's Theorem.
4. Study of R-L series and R-C series circuit.
5. R-L-C series resonance circuit
6. R-L-C parallel resonance circuit.
7. Relationship between phase and line currents and voltages in three phase system (star & delta)
8. Power and phase measurement in three phase system by one wattmeter method.
9. Power and phase measurement in three phase system by two wattmeter method.
10. OC and SC test on single phase transformer

### **Assessment:**

#### **Internal Assessment Test:**

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

#### **End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 20 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 3 marks will be asked.
4. Remaining questions will be mixed in nature. ( e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3 )
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

#### **Text Books**

1. V. N. Mittal and Arvind Mittal "Basic Electrical Engineering" Tata McGraw Hill, (Revised Edition)
2. Electrical Engineering Fundamentals" by Vincent Del Toro, PHI Second edition, 2011
3. Edward Hughes: Electrical and Electrical Technology, Pearson Education (Tenth edition)
4. D P Kothari and I J Nagrath "Theory and Problems of Basic Electrical Engineering", PHI 13 th edition 2011,

#### **Reference Books:**

1. B.L.Theraja "Electrical Engineering " Vol-I and II,
2. S.N.Singh, "Basic Electrical Engineering" PHI , 2011 Book name and author

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total	
FEC106	Environmental Studies	02	--	--	02	--	--	02	
Course Code	Course Name	Examination Scheme							
		Theory			End Sem Exam	Term Work	Pract	Oral	
		Internal Assessment							
FEC106	Environmental Studies	15	15	15	60	--	--	--	75

**Objectives**

- Creating the awareness about environmental problems among students.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating students to participate in environment protection and environment improvement.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.

**Outcomes:** Learner will be able to...

- Illustrate Depleting Nature of Environmental Resources, Global Environmental Crisis, Ecosystem concept.
- Adapt to 3R (Reuse, Recovery, Recycle).
- Study different control measures related to Environmental Pollution.
- Illustrate and analyse various Case Studies related to Environmental Legislation.
- Demonstrate the working of Renewable energy sources & Equipments.
- Illustrate the Techniques of Disaster Management and Green Building.

Module	Detailed Contents	Hrs.
01	<b>Overview of Environmental Aspects:</b> <ul style="list-style-type: none"> <li>Definition, Scope and Importance of Environmental Study</li> <li>Need for Public awareness of environmental education</li> <li>Introduction to depletion of natural resources: Soil, Water, Minerals and Forests.</li> <li>Global crisis related to – Population, water, sanitation &amp; Land.</li> </ul> <b>Ecosystem:</b> <ul style="list-style-type: none"> <li>Study of ecosystems : Forest, desert and aquatic (in brief).</li> <li>Energy flow in Ecosystem, overview of Food Chain, Food Web and Ecological Pyramid.</li> <li>Concept of ecological succession and its impact on human beings (in brief).</li> </ul> <b>Case Study on Chipko Movement (Uttarakhand, India), (began in 1973).</b>	4
02	<b>Aspects of Sustainable Development:</b> <ul style="list-style-type: none"> <li>Concept and Definition of Sustainable Development.</li> <li>Social, Economical and Environmental aspects of sustainable development.</li> <li>Control measures: 3R (Reuse, Recovery, Recycle).</li> <li>Resource utilization as per the carrying capacity (in brief).</li> </ul> <b>Case Study on Narmada Bachao Andolan (Gujarat, India, in the mid and late 1980s).</b>	2

03	<p><b>Types of Pollution:</b></p> <ul style="list-style-type: none"> <li>• Water pollution: Sources of water pollution and Treatment of Domestic and industrial waste water (with flow-diagram of the treatment).</li> <li>• Land Pollution: Solid waste, Solid waste management by land filling, composting and incineration</li> <li>• Air pollution: Sources of air pollution, Consequences of air pollution :- Greenhouse effect (Explanation with schematic diagram), Photochemical Smog (Explanation with chemical reaction).</li> </ul> <p>Cleaning of gaseous effluents to reduce air contaminants namely dust particle or particulate matters by using:- (i) Electrostatic precipitators (ii) Venturi scrubber (Schematic diagram and working).</p> <ul style="list-style-type: none"> <li>• Noise pollution: Sources, effects, threshold limit for different areas and control methods.</li> <li>• E-Pollution: Definition, Sources and effects.</li> <li>• Nuclear pollution: Sources and effects.</li> </ul> <p><b>Case study on Water Pollution of Ganga River.</b> <b>Case study on London smog (U. K.) (December, 1952).</b> <b>Case Study of Fukushima Disaster (March, 2011).</b></p>	8
04	<p><b>Pollution Control Legislation:</b></p> <ul style="list-style-type: none"> <li>• Functions and powers of Central and State Pollution Control Board.</li> <li>• Environmental Clearance, Consent and Authorization Mechanism.</li> </ul> <p><b>Case Study of Dombivali MIDC- Boiler Blast Tragedy (Thane, Maharashtra, India), (May, 2016).</b></p>	3
05	<p><b>Renewable Sources of Energy:</b></p> <ul style="list-style-type: none"> <li>• Importance of renewable sources of energy.</li> <li>• Principle and working with schematic diagram of :- (i) Solar Energy: (a) Flat plate collector and (b) Photovoltaic cell. (ii) Wind Energy: Wind Turbines. (iii) Hydropower: Hydropower generation from water reservoir of the dam. (iv) Geothermal Energy: Utilisation of underground sources of steam for power generation.</li> </ul>	4
06	<p><b>Technological Advances to overcome Environmental problems:</b></p> <ul style="list-style-type: none"> <li>• Concept of Green Buildings,</li> <li>• Various indoor air pollutants and their effects on health.</li> <li>• Carbon Credit: Introduction and general concept.</li> <li>• Disaster Management: Techniques of Disaster Management to cope up with (i) Earthquake and (ii) Flood.</li> </ul> <p><b>Case Study on Earthquake in Latur (Maharashtra, India), (September, 1993).</b> <b>Case Study on Cloudburst and Landslides at Kedarnath (Uttarakhand, India), (June, 2013).</b></p>	5

### Assessment:

#### Internal Assessment Test:

1. Each test will be of 15 marks.
2. At least one question will be based on case study. Candidate is expected to explain the salient features of the incident and suggest preventive measures.

#### End Semester Theory Examination:

1. Question paper will comprise of total six question, each carrying 15 marks.
2. Total four questions need to be solved.
3. Question Number One will be compulsory and it will be based on entire syllabus wherein sub-questions of 2 to 3 marks will be asked.
4. Remaining questions i.e. Q.2 to Q.6 will be mixed in nature and will be divided in three parts (a), (b) & (c) and they will belong to different modules.
5. In question paper, weight of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

**References:**

1. Environmental Studies by Benny Joseph, TataMcGraw Hill.
2. Environmental Studies by R.Rajagopalan, Oxford University Press.
3. Environmental Studies by Anandita Basak, Pearson Education.
4. Essentials of Environmental Studies by Kurian Joseph & Nagendran, Pearson Education.
5. Fundamentals of Environmental Studies by Varadbal G. Mhatre, Himalaya Publication House.
6. Perspective of Environmental Studies, by Kaushik and Kaushik, New Age International.
7. Renewable Energy by Godfrey Boyle, Oxford Publications.
8. Textbook of Environmental Studies by Dave and Katewa, Cengage Learning.
9. Textbook of Environmental studies by ErachBharucha, University Press.
10. Environmental pollution control engineering by C.S. Rao, New Age International (P) Limited Publishers.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total	
FEL101	Basic Workshop Practice - I	--	04	--	--	02	--	02	
Course Code	Course Name	Examination Scheme							
		Theory			End Sem Exam	Term Work	Pract	Oral	
		Internal Assessment		Av of Test 1 & 2					
FEL101	Basic Workshop Practice - I	--	--	--	--	50	--	--	50

	Detailed Contents	Hrs.
Note:	<p>The syllabus and the Term- work to be done during semester I and Semester II is given together. Individual Instructor for the course is to design the jobs for practice and demonstration and spread the work over entire two semesters. The objective is to impart training to help the students develop engineering skill sets. This exercise also aims in inculcating respect for physical work and hard labor in addition to some amount of value addition by getting exposed to interdisciplinary engineering domains.</p> <p>The two compulsory trades (Trade 1 – Fitting and Trade 2 – Carpentry) shall be offered in separate semesters.</p> <p>Select any four trade topics (two per semester) out of the topic at trade 3 to 11. Demonstrations and hands on experience to be provided during the periods allotted for the same. Report on the demonstration including suitable sketches is also to be included in the term – work</p>	
Trade 1	<b>Fitting (compulsory)</b> <ul style="list-style-type: none"> <li>Use and setting of fitting tools for chipping, cutting, filing, marking, center punching, drilling, tapping.</li> <li>Term work to include one job involving following operations : filing to size, one simple male- female joint, drilling and tapping</li> </ul>	30
Trade 2	<b>Carpentry (compulsory)</b> <ul style="list-style-type: none"> <li>Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood tuning and modern wood turning methods.</li> <li>Term work to include one carpentry job involving a joint and report on demonstration of a job involving wood turning</li> </ul>	30
Trade 3	<b>Forging (Smithy)</b> <ul style="list-style-type: none"> <li>At least one workshop practice job (Lifting hook and handle) is to be demonstrated.</li> </ul>	15
Trade 4	<b>Welding</b> <ul style="list-style-type: none"> <li>Edge preparation for welding jobs. Arc welding for different job like, Lap welding of two plates, butt welding of plates with simple cover, arc welding to join plates at right angles.</li> </ul>	15
Trade 5	<b>Machine Shop</b> <ul style="list-style-type: none"> <li>At least one turning job is to be demonstrated.</li> </ul>	15
Trade 6	<b>Electrical board wiring</b> <ul style="list-style-type: none"> <li>House wiring, staircase wiring, wiring diagram for fluorescent tube light, Godown wiring and three phase wiring for electrical motors.</li> </ul>	15
Trade 7	<b>PCB Laboratory Exercises</b> <p>Layout drawing, Positive and negative film making, PCB etching and drilling, Tinning and soldering technique.</p>	15
Trade 8	<b>Sheet metal working and Brazing</b> <ul style="list-style-type: none"> <li>Use of sheet metal, working hand tools, cutting , bending , spot welding</li> </ul>	15

<b>Trade 9</b>	<b>Plumbing</b> <ul style="list-style-type: none"> <li>• Use of plumbing tools, spanners, wrenches, threading dies, demonstration of preparation of a domestic line involving fixing of a water tap and use of coupling, elbow, tee, and union etc.</li> </ul>	<b>15</b>
<b>Trade 10</b>	<b>Masonry</b> <ul style="list-style-type: none"> <li>• Use of masons tools like trowels, hammer, spirit level, square, plumb line and pins etc. demonstration of mortar making, single and one and half brick masonry , English and Flemish bonds, block masonry, pointing and plastering.</li> </ul>	<b>15</b>
<b>Trade 11</b>	<b>Hardware and Networking:</b> <ul style="list-style-type: none"> <li>• Dismantling of a Personal Computer (PC), Identification of Components of a PC such as power supply, motherboard, processor, hard disk, memory (RAM, ROM), CMOS battery, CD drive, monitor, keyboard, mouse, printer, scanner, pen drives, disk drives etc.</li> <li>• Assembling of PC, Installation of Operating System (Any one) and Device drivers, Boot-up sequence. Installation of application software (at least one)</li> <li>• Basic troubleshooting and maintenance</li> <li>• Identification of network components: LAN card, wireless card, switch, hub, router, different types of network cables (straight cables, crossover cables, rollover cables) Basic networking and crimping.</li> </ul>	<b>15</b>

**NOTE:** Hands on experience to be given in a group of not more than four students.

#### **Term work:**

Term work shall consist of respective reports and jobs of the trades selected the distribution of marks for term work shall be as follows.

- |                                     |            |
|-------------------------------------|------------|
| 1 Laboratory work (Job and Journal) | : 40 marks |
| 2 Attendance (Practical and Theory) | : 10 marks |

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total	
FEC201	Applied Mathematics-II	04	--	01	04	--	01	05	
Course Code	Course Name	Examination Scheme							
		Theory			End Sem Exam	Term Work	Pract	Oral	Total
		Internal Assessment		Av of Test 1 & 2					
FEC201	Applied Mathematics-II	20	20	20	80	25	--	--	125

### Objectives

1. To provide students with sound foundation in applied mathematics to solve real life problems in industry.
2. To provide hands on experience in using Scilab software to handle real life problems.

### Outcomes: Learner will be able to...

1. Apply the concepts of First Order and first degree Differential equation to the engineering problems.
2. Apply the concepts of Higher Order Linear Differential equation to the engineering problems.
3. Apply concepts of Beta and Gamma function to the engineering Problems.
4. Apply SCILAB programming techniques to solve differential equation to model complex engineering activities.
5. Apply concepts of Double integral of different coordinate systems to the engineering problems.
6. Apply concepts of triple integral of different coordinate systems to the engineering problems.

Module	Detailed Contents	Hrs.
01	<b>Differential Equations of First Order and First Degree</b> 1.1 Exact differential Equations, Equations reducible to exact form by using integrating factors. 1.2 Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation. 1.3: Simple application of differential equation of first order and first degree to electrical and Mechanical Engineering problem (no formulation of differential equation)	4 3 2
02	<b>Linear Differential Equations With Constant Coefficients and Variable Coefficients Of Higher Order</b> 2.1. Linear Differential Equation with constant coefficient- complementary function, particular integrals of differential equation of the type $f(D)y = X$ where X is $e^{ax}$ , $\sin(ax+b)$ , $\cos(ax+b)$ , $x^n$ , $e^{ax}V$ , $xV$ . 2.2. Cauchy's homogeneous linear differential equation and Legendre's differential equation, Method of variation of parameters.	6 3
03	<b>Numerical solution of ordinary differential equations of first order and first degree, Beta and Gamma Function</b> 3.1. (a) Taylor's series method (b) Euler's method (c) Modified Euler method (d) Runge-Kutta fourth order formula (SciLab programming is to be taught during lecture hours) 3.2 .Beta and Gamma functions and its properties.	4
04	<b>Differentiation under Integral sign, Numerical Integration and Rectification</b> 4.1. Differentiation under integral sign with constant limits of integration. 4.2. Numerical integration- by (a) Trapezoidal (b) Simpson's 1/3rd (c) Simpson's 3/8th rule (all with proof). (Scilab programming on (a) (b) (c) (d) is to be taught during lecture hours) 4.3. Rectification of plane curves.	2 3 3

05	<b>Double Integration</b> 5.1. Double integration-definition, Evaluation of Double Integrals. 5.2. Change the order of integration, Evaluation of double integrals by changing the order of integration and changing to polar form.	2 7
06	<b>Triple Integration and Applications of Multiple Integrals.</b> 6.1. Triple integration definition and evaluation (Cartesian, cylindrical and spherical polar coordinates). 6.2. Application of double integrals to compute Area, Mass, Volume. Application of triple integral to compute volume.	3 6

**Term Work:****General Instructions:**

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern for practical.
2. Students must be encouraged to write Scilab Programs in tutorial class only. Each Student to write atleast 4 Scilab tutorials (including print out) and at least 6 class tutorials on entire syllabus.
3. SciLab Tutorials will be based on (i)Curve Tracing (ii) Taylor's series method, Euler's method Modified Euler method, RungeKutta fourth order formula (iii) Ordinary Differential Equation and (iv) Trapezoidal Simpson's 1/3rd and Simpson's 3/8th rule.

**The distribution of Term Work marks will be as follows -**

Attendance (Theory and Tutorial): 05 marks

Class Tutorials on entire Syllabus: 10 marks

SciLab Tutorials : 10 marks

**Assessment:****Internal Assessment Test:**

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

**End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 20 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 3 to 4 marks will be asked.
4. Remaining questions will be mixed in nature. ( e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3 )
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

**References:**

1. A text book of Applied Mathematics, P.N.Wartikar and J.N.Wartikar, Vol – I and –II by Pune VidyarthiGraha.
2. Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publication
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley EasternLimited, 9thEd.
4. Numerical methods by Dr. P. Kandasamy ,S.Chand Publications

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total	
FEC202	Applied Physics - II	03	01	--	03	0.5	--	3.5	
		Examination Scheme							
Course Code	Course Name	Theory			End Sem Exam	Term Work	Pract	Oral	
		Internal Assessment							
		Test1	Test2	Av of Test 1 & 2					
FEC202	Applied Physics - II	15	15	15	60	25	--	--	100

### Objectives

1. To impart knowledge of basic concepts in applied physics.
2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

### Outcomes: Learner will be able to...

1. Comprehend principles of interference and diffraction.
2. Illustrate the principle, construction and working of various LASERS and its applications.
3. Identify various applications of optical fibres.
4. Comprehend the concepts of electrodynamics and Maxwell's equations and their use in telecommunication systems.
5. Apply the concepts of electromagnetism in focusing systems and CRO.
6. Comprehend the significance of nanoscience and nanotechnology, its applications.

Module	Detailed Contents	Hrs.
01	<b>INTERFERENCE AND DIFFRACTION OF LIGHT</b> Interference by division of amplitude and by division of wave front; Interference in thin film of constant thickness due to reflected and transmitted light; origin of colours in thin film; Wedge shaped film(angle of wedge and thickness measurement); Newton's rings Applications of interference - Determination of thickness of very thin wire or foil; determination of refractive index of liquid; wavelength of incident light; radius of curvature of lens; testing of surface flatness; Anti-reflecting films and Highly reflecting film. Diffraction of Light -Fraunhofer diffraction at single slit, Fraunhofer diffraction at double slit, Diffraction Grating, Resolving power of a grating, dispersive power of a grating Application of Diffraction - Determination of wavelength of light with a plane transmission grating	14
02	<b>LASERS</b> Quantum processes as absorption, spontaneous emission and stimulated emission; metastable states, population inversion, pumping, resonance cavity, Einsteins's equations; Helium Neon laser; Nd:YAG laser; Semiconductor laser, Applications of laser- Holography (construction and reconstruction of holograms) and industrial applications(cutting, welding etc), Applications in medical field	04
03	<b>FIBRE OPTICS</b> Total internal reflection; Numerical Aperture; critical angle; angle of acceptance; Vnumber; number of modes of propagation; types of optical fiber; Losses in optical fibre(Attenuation and dispersion) Applications of optical fibre - Fibre optic communication system; sensors (Pressure, temperature, smoke, water level), applications in medical field	04

04	<b>ELECTRODYNAMICS</b> Cartesian, Cylindrical and Spherical Coordinate system; Scaler and Vector field, Physical significance of gradient, curl and divergence, Determination of Maxwell's four equations. Applications-design of antenna, wave guide, satellite communication etc.	08
05	<b>CHARGE PARTICLE IN ELECTRIC AND MAGNETIC FIELDS</b> Fundamentals of Electromagnetism, Motion of electron in electric field (parallel, perpendicular, with some angle); Motion of electron in magnetic field (Longitudinal and Transverse); Magnetic deflection; Motion of electron in crossed field; Velocity Selector; Velocity Filter, Electron refraction; Bethe's law; Electrostatic focusing; Magnetostatic focusing; Cathode ray tube (CRT); Cathod ray Oscilloscope (CRO) Application of CRO: Voltage (dc,ac), frequency, phase measurement.	05
06	<b>NANOSCIENCE AND NANOTECHNOLOGY</b> Introduction to nano-science and nanotechnology, Surface to volume ratio, Two main approaches in nanotechnology -Bottom up technique and top down technique; Important tools in nanotechnology such as Scanning Electron Microscope, Transmission Electron Microscope, Atomic Force Microscope. Nano materials; Methods to synthesize nanomaterials (Ball milling, Sputtering, Vapour deposition, solgel), properties and applications of nanomaterials.	04

**Suggested Experiments: (Any five)**

1. Determination of radius of curvature of a lens using Newton's ring set up
2. Determination of diameter of wire/hair or thickness of paper using Wedge shape film method.
3. Determination of wavelength using Diffraction grating. (Hg/ Ne source)
4. Determination of number of lines on the grating surface using LASER Source.
5. Determination of Numerical Aperture of an optical fibre.
6. Determination of wavelength using Diffraction grating. (Laser source)
7. Use of CRO for measurement of frequency and amplitude.
8. Use of CRO for measurement of phase angle.
9. Study of divergence of laser beam
10. Determination of width of a slit using single slit diffraction experiment (laser source)

The distribution of Term Work marks will be as follows –

4. Attendance (Theory and Practical) : 05 marks
5. Assignments : 10 marks
6. Laboratory work (Experiments and Journal) : 10 marks

**Assessment:****Internal Assessment Test:**

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

**End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 15 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 3marks will be asked.
4. Remaining questions will be mixed in nature.( e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3 )
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

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### References:

1. A text book of Engineering Physics-Avadhanulu&Kshirsagar, S.Chand
2. Fundamentals of Optics by Jenkins and White, McGraw-Hill
3. Optics - Ajay Ghatak, Tata McGraw Hill
4. Concepts of Modern Physics- ArtherBeiser, Tata Mcgraw Hill
5. A textbook of Optics - N. Subramanyam and Brijlal, S.Chand
6. Engineering Physics-D. K. Bhattacharya, Oxford
7. Concepts of Modern Physics- ArtherBeiser, Tata Mcgraw Hill
8. Classical Electrodynamics – J. D. Jackson, Wiley
9. Introduction to Electrodynamics- D. J. Griffiths, Pearson publication
10. Intoduction to Nanotechnology- Charles P. Poole, Jr., Frank J. Owens, Wiley India edition
11. Nano: The Essential – T. Pradeep, McGraw-Hill Education

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC203	Applied Chemistry – II	03	01	--	03	0.5	--	3.5

Course Code	Course Name	Examination Scheme								
		Theory				End Sem Exam	Term Work	Pract	Oral	Total
		Internal Assessment		Test1	Test2					
FEC203	Applied Chemistry – II	15	15	15	60	25	--	--	100	

### Objectives

- To provide necessary background in applied chemistry relevant to chemical industries.
- To provide exposure in conducting experiments and interpret and report the results in professional format.

### Outcomes: Learner will be able to...

- Identify types of corrosion and factors affecting it related to problems affecting all industries.
- Identify different types of corrosion control methods to study corrosion control in various industries.
- Apply the knowledge of different types of fuels, including their production and refining methods and combustion mechanisms.
- Illustrate composition and properties of different types of alloys and the process of powder metallurgy
- Illustrate principles of green chemistry.
- Illustrate properties and applications of different types of composite materials.

Module	Detailed Contents	Hrs.
01	<p><b>Corrosion:</b>            Introduction: Types of Corrosion- (I) Dry or Chemical Corrosion-i) Due to oxygen ii) Due to other gases (II) Wet or Electrochemical corrosion- Mechanism i) Evolution of hydrogen type ii) Absorption of oxygen. Types of Electrochemical Corrosion- Galvanic cell corrosion, Concentration cell corrosion (differential aeration), Pitting corrosion, Intergranular corrosion, Stress corrosion. Factors affecting the rate of corrosion- Nature of metal, position of metal in galvanic series, potential difference, overvoltage, relative area of anodic and cathodic parts, purity of metal, nature of the corrosion product, temperature, moisture, influence of pH, concentration of the electrolytes. Methods to decrease the rate of corrosion- Material selection, Proper designing, <u>Use of inhibitors</u>, <u>Cathodic protection-</u> i) Sacrificial anodic protection ii) Impressed current method, Anodic protection method, Metallic coatings- hot dipping- galvanizing and tinning, metal cladding, metal spraying, Electroplating, Cementation. Organic coatings – Paints (only constituents and their functions).</p>	11
02	<p><b>Alloys</b>            Introduction, purpose of making alloys, Ferrous alloys, plain carbon steel, heat resisting steels, stainless steels (corrosion resistant steels), effect of the alloying element- Ni, Cr, Co, Mn, Mo, W and V;            Non-Ferrous alloys- Composition, properties and uses of- Alloys of Aluminium- i) Duralumin ii) Magnalium. Alloys of Cu- (I) Brasses-i) Commercial brass ii) German silver, (II) Bronzes- i) Gun metal ii) High phosphorous bronze. Alloys of Pb- i) Wood's metal ii)</p>	07

	Tinmann's solder. Powder Metallurgy- Introduction, (1)Methods of powder metal formation- i) Mechanical pulverization ii) Atomization iii) Chemical reduction iv) Electrolytic process v) Decomposition (2) Mixing and blending. (3) Sintering (4) Compacting- i) Cold pressing ii) Powder injection moulding (iii) Hot compaction. Applications of powder metallurgy. Shape Memory Alloys- Definition, properties and Uses.	
03	Fuels Definition, classification of fuels-solid, liquid and gaseous. Calorific value- Definition, Gross or Higher calorific value & Net or lower calorific value, units of heat (no conversions), Dulong's formula & numerical for calculations of Gross and Net calorific values. Characteristics of a good fuel. Solid fuels- Analysis of coal- Proximate and Ultimate Analysis with Significance and numericals. Liquid fuels- Crude petroleum oil, its composition and classification and mining (in brief). Refining of crude oil- i) Separation of water ii) Separation of 'S' & iii) Fractional Distillation with diagram and composition and uses table. Cracking- Definition, Types of cracking- I) Thermal cracking – (i) Liquid phase thermal cracking (ii) Vapour phase thermal cracking. II) Catalytic cracking- (i) Fixed-bed catalytic cracking (ii) Moving-bed catalytic cracking. Advantages of Catalytic cracking. Petrol- Refining of petrol, unleaded petrol ( use of MTBE), Catalytic converter, Power alcohol, Knocking, Octane number, Cetane number, Antiknocking agents. Combustion- Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid & gaseous fuels. Biodiesel- Method to obtain Biodiesel from vegetable oils (Trans-esterification), advantage and disadvantages of biodiesel. Fuel cell- Definition, types and applications.	12
04	Composite Materials Introduction, Constitution- i) Matrix phase ii) Dispersed phase. Characteristic properties of composite materials. Classification- (A) Particle - reinforced composites- i) Large – particle reinforced composites ii) Dispersion – strengthened composites. (B) Fiber – reinforced composites- i) Continuous – aligned ii) Discontinuous – aligned (short)- (a) aligned (b) randomly oriented (C) Structural Composites- i) Laminates (ii) Sandwich Panels.	04
05	Green Chemistry Introduction, Twelve Principles of Green chemistry, numerical on atom economy, Conventional and green synthesis of Adipic acid, Indigo, Ibuprofen and Carbaryl. Green solvents (water, supercritical CO <sub>2</sub> ) and products from natural materials.	06

#### Suggested Experiments: (Any five)

1. Estimation of Zn- Complexometric titration.
2. Estimation of Ni- Complexometric titration.
3. Estimation of Al- Complexometric titration.
4. Flue gas analysis using Orsat's apparatus.
5. Estimation of Fe from plain carbon steel
6. Estimation of Ni by gravimetric method.
7. Estimation of Sniodometrically.
8. Preparation of Biodiesel from edible oil.
9. Estimation of Cu- Iodometrically.
10. Estimation of percentage moisture in coal.
11. Estimation of percentage ash in coal.
12. To estimate the emf of Cu-Zn system by potentiometry.
13. Demonstration of Electroplating.

### **Term work**

Term Work shall consist of minimum five experiments. The distribution of marks for term work shall be as follows:

1. Attendance (Practical and Theory) : 05 marks
2. Laboratory Work (Experiments and journal) : 10 marks
3. Assignments and Viva on practicals : 10 marks

### **Assessment:**

#### **Internal Assessment Test:**

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

#### **End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 15 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 3 marks will be asked.
4. Remaining questions will be mixed in nature. ( e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3 )
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

#### **References:**

1. Engineering Chemistry - Jain & Jain (DhanpatRai)
2. Engineering Chemistry – Dara & Dara (S Chand)
3. Engineering Chemistry - Wiley India (ISBN – 9788126519880)
4. A Text Book of Engineering Chemistry - ShashiChawla (DhanpatRai)
5. A Text Book of Green Chemistry – V.K. Ahluwalia (Springer)

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total	
FEC204	Engineering Drawing	03	04	--	03	02	--	05	
Course Code	Course Name	Examination Scheme							
		Theory			End Sem Exam	Term Work	Pract	Oral	
		Internal Assessment		Av of Test 1 & 2					
FEC204	Engineering Drwng	15	15	15	60	25	50	--	150

### Objectives

1. To impart and inculcate proper understanding of the theory of projection.
2. To impart the knowledge of reading a drawing.
3. To improve the visualization skill.
4. To teach basic utility of computer aided drafting (CAD) tool.

### Outcomes: Learner will be able to...

1. Apply the basic principles of projections in 2D drawings.
2. Apply the basic principles of projections in converting 3D view to 2D drawing.
3. Read a given drawing.
4. Visualize an object from the given two views.
5. Use CAD tool to draw different views of a 3D object.
6. Use CAD tool to draw an object in 3D.

Module	Detailed Contents	Hrs.
01	<b>Introduction to Engineering Drawing:-</b> Types of Lines, Dimensioning Systems as per IS conventions. <b>Engineering Curves:-</b> Basic construction of Cycloid, Involutes and Helix (of cylinder) only. <b>** Introduction to Auto CAD:-</b> Basic Drawing and Editing Commands, Knowledge of setting up layers, Dimensioning, Hatching, plotting and Printing.	3
02	<b>Projection of Points and Lines:-</b> Lines inclined to both the Reference Planes (Excluding Traces of lines) and simple application based problems on Projection of lines. <b>@Projection of Planes:-</b> Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular planes inclined to either HP or VP only. (Exclude composite planes)	6
03	<b>Projection of Solids:-</b> (Prism, Pyramid, Cylinder, Tetrahedron, Hexahedron and Cone only) Solid projection with the axis inclined to HP and VP. (Exclude Spheres, Composite, Hollow solids and frustum of solids). Use change of position or Auxiliary plane method <b>Section of Solids:-</b> Section of Prism, Pyramid, Cylinder, Tetrahedron, Hexahedron & Cone cut by plane perpendicular to at least one reference plane. ( Exclude Curved Section Plane). Use change of position or Auxiliary plane method <b>Development of Lateral Surfaces of Sectioned Solids:-</b> Lateral surface development of Prism, Pyramid, Tetrahedron, Hexahedron, Cylinder, Cone with section plane inclined to HP or VP only. (Exclude DLS of a solid with a hole in it and Reverse Development). (Exclude Reverse Development)	14
04	<b>Orthographic and Sectional Orthographic Projections:-</b> <ul style="list-style-type: none"> <li>Different views of a simple machine part as per the first angle projection method recommended by I.S.</li> <li>Full or Half Sectional views of the Simple Machine parts.</li> <li>**Drawing of orthographic projections using Auto CAD.</li> </ul>	12

05	<p><b>Isometric Views:-</b> Isometric View/Drawing of blocks of plain and cylindrical surfaces using plain/natural scale only. (Exclude Spherical surfaces).</p> <ul style="list-style-type: none"> <li>• **Drawing of Isometric views using Auto CAD.</li> <li>• @Reading of Orthographic Projections. [Only for Practical Exam (AutoCAD) and Term Work]</li> <li>• **Orthographic Reading using Auto CAD.</li> </ul> <p><b>**Introduction to 3D in AutoCAD</b> Working in 3-dimensions, Viewing 3D Objects, Basic wireframe models, Extruding, simple revolved objects, Boolean operations.</p>	10
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\*\*Should be covered during Auto CAD practical sessions.

@ Should be covered only in Term work. (i.e. Questions will not be asked for the End semester Examination).

#### TERM WORK:

##### Component – 1

Drawing Sheet – 1: Projection of Solids (3 Problems)

Drawing Sheet – 2: Section of Solids and Development of lateral surfaces (2 Problems)

Drawing Sheet – 3: Orthographic Projection without section (2 Problems)

Drawing Sheet – 4: Orthographic Projection with section (2 Problems)

Drawing Sheet – 5: Isometric Views (3 Problems)

##### Component -2

One A-3 size sketch book consisting of:-

1) Two problems each from Engineering Curves, Projection of Lines, Planes and Solids.

One problem from Section of solids without DLS and one problem from section of solids with DLS of that sectioned Solid.

2) Two problems from Orthographic Projections (with Section), One problem on Reading of Orthographic projections and Two problems on Isometric views.

##### Component-3

Printouts (preferably on A3 size sheet) of each from:

1. Orthographic Projections with Section – 3 problems.
2. Isometric Views – 4 problems
3. Reading of Orthographic Projections – 1 problem.

Note:- 2 hrs /week Auto CAD Practical is essential for completing the Auto CAD Drawings and take required printouts.

#### AUTO CAD PRACTICAL EXAMINATION: (2hrs – 50 marks):

- 1) Minimum 1 problem from 1 OR 3 of Component-3 for 30 marks.  
(All three views with at least 12 dimensions must be asked in the exam)  
**AND**

- 2) Minimum 1 problem from 2 of Component-3 for 20 marks.

Note:- Print out of the Answers have to be taken preferably in A3 size sheets and should be Assessed by External examiner only. Knowledge of concepts and accuracy of drawing should be considered during evaluation.

**INTERNAL ASSESSMENT TEST: (1 hr - 15 marks)**

Out of the two tests, one test must be conducted by conventional way and another test must be Practical Exam (using AutoCAD software). Average of the two tests must be considered for Internal Assessment.

**END SEMESTER EXAMINATION: (3 hrs – 60 marks)**

- 1) Question paper will comprise of 6 questions, each carrying 15 marks.
- 2) Any 4 questions need to be solved. There won't be any compulsory Question.
- 3) Marks of each topic should be proportional to number of hours assigned to each Module.

**Text Books,**

- 1 N.D. Bhatt, "Engineering Drawing (Plane and solid geometry)", Charotar Publishing House Pvt. Ltd.
- 2 N.D. Bhatt & V.M. Panchal, "Machine Drawing", Charotar Publishing House Pvt. Ltd.

**References.**

- 1 M.B Shah & B.C Rana, "Engineering Drawing", Pearson Publications.
- 2 P.J. Shah, "Engineering Graphics", S Chand Publications.
- 3 Dhananjay A Jolhe, "Engineering Drawing" Tata McGraw Hill.
- 4 Prof. Sham Tickoo (Purdue University) & Gaurav Verma, "( CAD Soft Technologies) : Auto CAD 2012 (For engineers and Designers)", Dreamtech Press New Delhi.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC205	Structured Programming Approach	04	02	--	04	01	--	05

Course Code	Course Name	Examination Scheme								
		Theory				End Sem Exam	Term Work	Pract	Oral	Total
		Internal Assessment		Test1	Test2					
FEC205	Structured Programming Approach	20	20	20	80	25	25	--	150	

### Objectives

1. To familiarise the logic of structured programming approach.
2. To provide exposure in developing algorithm, flowchart and thereby writing efficient codes for user defined problem.

### Outcomes: Learner will be able to...

1. Illustrate the basic terminology used in computer programming.
2. Illustrate the concept of data types, variables and operators using C.
3. Design and Implement control statements and looping constructs in C.
4. Apply function concept on problem statements.
5. Demonstrate the use of arrays, strings, structures and files handling in C.
6. Demonstrate the dynamics of memory by the use of pointers to construct various data structures.

Module	Topic	Detailed Contents	Hrs.
01	Introduction to Computer, Algorithm And Flowchart	<b>1.1 Basics of Computer:</b> Turing Model, Von Neumann Model, Basics of Positional Number System, Introduction to Operating System and component of an Operating System. <b>1.2 Algorithm &amp; Flowchart :</b> Three construct of Algorithm and flowchart: Sequence, Decision (Selection) and Repetition	06
02	Fundamentals of C-Programming	<b>2.1</b> Character Set, Identifiers and keywords, Data types, Constants, Variables. <b>2.2</b> Operators-Arithmetic, Relational and logical, Assignment, Unary, Conditional, Bitwise, Comma, other operators. Expression, statements, Library Functions, Preprocessor, <b>2.3</b> Data Input and Output – getchar( ), putchar( ), scanf( ), printf( ), gets( ), puts( ), Structure of C program .	06
03	Control Structures	<b>3.1</b> Branching - If statement, If-else Statement, Multiway decision. <b>3.2</b> Looping – while , do-while, for <b>3.3</b> Nested control structure- Switch statement, Continue statement Break statement, Goto statement.	12
04	Functions and Parameter	<b>4.1</b> Function -Introduction of Function, Function Main, Defining a Function, Accessing a Function, Function Prototype, Passing Arguments to a Function, Recursion. <b>4.2</b> Storage Classes –Auto , Extern , Static, Register	06

05	<b>Arrays , String Structure and Union</b>	<b>5.1 Array-Concepts, Declaration, Definition, Accessing array element, One-dimensional and Multidimensional array.</b> <b>5.2 String- Basic of String, Array of String , Functions in String.h</b> <b>5.3 Structure- Declaration, Initialization, structure within structure, Operation on structures, Array of Structure.</b> <b>5.4 Union - Definition , Difference between structure and union , Operations on a union</b>	14
06	<b>Pointer and Files</b>	<b>6.1 Pointer :</b> Introduction, Definition and uses of Pointers, Address Operator, Pointer Variables, Dereferencing Pointer, Void Pointer, Pointer Arithmetic, Pointers to Pointers, Pointers and Array, Passing Arrays to Function, Pointers and Function, Pointers and two dimensional Array, Array of Pointers, Dynamic Memory Allocation. <b>6.2 Files:</b> Types of File, File operation- Opening, Closing, Creating, Reading, Processing File.	08

**Laboratory Assignments:**

1. Students are expected to solve and execute at least 20 programming problems based on above Syllabus.
2. Journal work should comprise of writing the problem definition, solution of problem either as algorithm and flow chart and source code in C (Advisable hand written) for all the 20 problems.

**Assessment:****Internal Assessment Test:**

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

**End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 20 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 3 to 5 marks will be asked.
4. Remaining questions will be mixed in nature.( e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3 )
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

**Text Books:**

- 1 "MASTERING C" by K.R.Venugopal and SudeepR.Prasad , Tata McGraw-Hill Publications.
- 2 "A Computer Science -Structure Programming Approaches using C ", by BehrouzForouzan , Cengage Learning .
- 3 Schaum's outlines "Programming with C", by Byron S. Gottfried, Tata McGraw-Hill Publications.

**Reference Books:**

- 1 "Basics of Computer Science", by BehrouzForouzan , Cengage Learning .
- 2 "Programming Techniques through C", by M. G. Venkateshmurthy, Pearson Publication.
- 3 "Programming in ANSI C", by E. Balaguruswamy, Tata McGraw-Hill Education.
- 4 "Programming in C", by Pradeep Day and Manas Gosh, Oxford University Press.
- 5 "Let Us C", by YashwantKanetkar, BPB Publication.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC206	Communication Skills	02	02	--	02	01	--	03

Course Code	Course Name	Examination Scheme							
		Theory			End Sem Exam	Term Work	Pract	Oral	Total
		Internal Assessment		Av of Test 1 & 2					
FEC206	Communication Skills	10	10	10	40	25	--	--	75

**Objectives**

1. To acquaint the students with appropriate language skills with the purpose of improving the existing ones – LSRW
2. To make the learners understand the importance and effective use of non-verbal communication
3. To make the learner proficient in public speaking and presentation skills
4. To guide and teach the students to utilize the principles of professional business and technical writing for effective communication in the global world
5. To make the learner capable of creating official content digitally for further communication in the corporate environment

**Outcomes:** Learner will be able to...

1. Understand and evaluate information they listen to and express their ideas with greater clarity
2. Speak and respond effectively along the various channels of communication in a business organization
3. Speak convincingly before an audience with the help of an expanded vocabulary and enhanced digital content
4. Read and summarize effectively
5. Communicate through result oriented writing both within and outside the organization.
6. Write a set of effective and easy to understand technical description, instructions and convey the same using global information technology

Module	Detailed Contents	Hrs.
01	Communication Theory: Concept and Meaning, Communication cycle, Objectives, Barriers to communication (linguistic and semantic, psychological, physical, mechanical, cultural), Methods of communication (verbal and non-verbal), Networks of communication (formal and informal), Language skills (listening, speaking, reading, writing), Corporate communication: Digital Content Creation.	13
02	Business Correspondence: Principles of Business Correspondence, Parts of a business letter, Formats (Complete block and Modified block), Types of letters: Enquiry, Reply to enquiry, Claim, Adjustment and Sales letter.	05
03	Grammar and Vocabulary: Common errors, Concord (subject- verb agreement), Pairs of confused words, Lexicon (Enriching vocabulary through one-word substitutes, synonyms, antonyms, etc.)	02

04	Summarization and Comprehension: Passages to test the analytical skills and expression	02
05	Technical writing : Techniques to define an object, writing instructions, language exercises based on types of expositions (description of an object, explanation of a process)	02
06	Information Communication Technology (ICT) enabled communication media: E-mail, Blog and Website.	02

The distribution of Term Work marks will be as follows -

Attendance : 05 marks

Assignments : 20 marks

#### List of assignments:

1. Communication theory: 02
2. Business Correspondence: 02
3. Grammar and vocabulary: 01
4. Summarization & Comprehension: 01
5. Technical writing: 01
6. ICT enabled communication media: 01

#### Assessment:

##### **Internal Assessment Test:**

Assessment consists of two class tests of 10 marks each. The first test should be conducted in the form of a three-minute public speech. The second test should be based on theory and application exercises as mentioned in the syllabus.

##### **End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 10 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 3 to 5 marks will be asked.
4. Remaining questions will be mixed in nature.( e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3 )
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.
6. The first module (Communication Theory) will carry 40 % weightage.

#### **References:**

1. Communication in Organizations by Dalmar Fisher, Jaico Publishing House
2. Communication Skills by Meenakshi Raman & Sangeeta Sharma,
3. Oxford University Press.
4. Business Correspondence & Report-writing by R.C. Sharma& Krishna Mohan, Tata McGraw-Hill Education.
5. Effective Technical Communication by Ashraf Rizvi, Tata McGraw-Hill.
6. Technical Writing & Professional Communication for non-native speakers of English by Thomas N. Huckin & Leslie A. Olsen, McGraw –Hill.
7. Mastering Communication by Nicky Stanton, Palgrave Master Series
8. [www.businesscommunicationsskills.com](http://www.businesscommunicationskills.com)
9. [www.kcitraing.com](http://www.kcitraing.com)
10. [www.mindtools.com](http://www.mindtools.com)
11. Journal of Business Communication

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEL201	Basic Workshop Practice - II	--	04	--	--	02	--	02

Course Code	Course Name	Examination Scheme								
		Theory				End Sem Exam	Term Work	Pract	Oral	Total
		Internal Assessment		Test1	Test2					
FEL201	Basic Workshop Practice - II	--	--	--	--	50	--	--	50	

Detailed Syllabus is given in Basic Workshop Practice-I

#### Term work:

Term work shall consist of respective reports and jobs of the trades selected the distribution of marks for term work shall be as follows:

Laboratory work (Job and Journal) : 40 marks

Attendance (Practical and Theory) : 10 marks

The final certification and acceptance of term – work ensures the satisfactory performance of laboratory work.

Bharatiya Vidya Bhavan's  
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Minutes of

Fourth Meeting of the

Academic Council

On

Wednesday, January 16, 2019 at 3.00 PM

at

Conference Room No. 105  
 Sardar Patel Institute of Technology  
 Andheri (West), Mumbai-58



*For  
16/01/19*



Bharatiya Vidya Bhavan's  
**SARDAR PATEL INSTITUTE OF TECHNOLOGY**

Munshi nagar, Andheri(W), Mumbai – 400 058.  
(Autonomous Institute Affiliated to University of Mumbai)

Minutes and Action taken report for 4<sup>th</sup> Academic Council Meeting  
of S.P.I.T., Andheri (West), Mumbai.

Meeting Date: Wednesday, January 16, 2018

Time: 3.00 p.m.

Venue – Sardar Patel Institute of Technology

Following Members were present:

Sr. No	Name
1	Dr. Prachi Ghpure, Principal & Chairman
2	Dr. Shubha Pandit, Mumbai University Nominee
3	Dr. R.D. Daruwala, Mumbai University Nominee
4	Prof. Sunil Bhagwat, Mumbai University Nominee
5	Dr. Zia Saquib, External Expert
6	Dr. Jonathan Joshi, External Expert
7	Dr. Satyanarayana Bhasatte, TIFR, External Expert
8	Dr. Kushal Tuckley, IIT Bombay, Invitee
9	Dr. Y.S.Rao, Head Electronics and Telecommunication Engineering Department, Member
10	Dr. Radha Shankar Mani, Head Information Technology Department, Member
11	Dr. D.R.Kalbande, Head Computer Engineering Department, Member
12	Dr. Pooja Roundale, Head Master of Computer Applications, Member
13	Prof. Kailash Devadkar, Associate Professor, Information Technology Department, Member
14	Prof. D.D. Ambawade, Associate Professor, Electronics & Telecommunication Engineering Department, Member
15	Prof. Kiran Talele, Associate Professor, Electronics Engineering Department, Member
16	Prof. Surekha Dholay, Associate Professor, Computer Engineering Department, Member
17	Dr. Rajendra Sutar, Associate Professor, Electronics Engineering Department, Invitee
18	Dr. Sudhir Dhage, Professor, Computer Engineering Department, Invitee
19	Prof. D.M.Patil, Associate Professor, Applied Sciences & Humanities Department, Invitee
20	Mrs. Apurva Mohite, Controller of Examination, Invitee
21	Dr. Surendra Rathod, Dean(Academics) & Member Secretary

Leave of absence was requested by Dr. Milind Sohoni, Dr. Sameer S Sahasrabuddhe, Dr. V. B. Chandrade, Dr. M. B. Patil, Dr. Suresh Ukarande and Dr. Rita Das





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Sr. No.	Agenda Item	Discussion/Remarks	Decision	Action Taken
1.	Welcome to members of the Academic Council for Fourth Meeting.	Member secretary, Academic Council Dr. S. S. Rathod started meeting by welcoming members. He informed that Dr. M. B. Patil, IIT Bombay, Dr. Shubha Pandit, KJSCE, Dr. R. D. Daruwala, VJTI and Dr. Sunil Bhagwat, ICT, are the nominee of Mumbai University in AC. Dr. Rathod presented agenda of the meeting and then proceedings of the meeting started	--	--
2.	Confirmation of Minutes and Action Taken Report of the Third Meeting of Academic Council held on 14th July 2018.	Member secretary asked about confirmation of minutes of third academic council meeting held on 14 <sup>th</sup> July 2018. No corrections or suggestions are given by the members and minutes are approved.	Minutes of Academic Council held on 14 <sup>th</sup> July 2018 are unanimously approved by all the members.	Minutes taken and ATR noted
3.	Approval of revised scheme and course contents for semesters VII and VIII from academic year 2019-20 for UG program in Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering and Information Technology	Please refer Annexure-I for detail discussion.	All departments will once again look for minor revisions. AC authorized chairperson to implement final year scheme and contents for all branches from 2019-20 after minor revisions. In order to maintain uniformity for finding rank or award purpose, CGPI to be taken on the basis of VII semester.	Final year scheme, courses and their contents are approved Unanimously. To be implemented from academic year 2019-20.



27/07/19  
R.S. Rathod



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4.	Liberal art courses	Dr. Rathod Presented various new Liberal art courses added to the present liberal arts courses. He proposed to offer these courses from 2019-20 to First year and Second Year as per scheme. Dr. Daruwala recommended to change the name 'Liberal Art'.	Courses and their contents are approved Unanimously	To be implemented from academic year 2019-20. Liberal arts name is changed to 'Life Skill Courses'
5.	Mandatory elective courses	Put forward for approval of addition of new courses Mandarin and Japanese. It was recommended to change 'Mandatory Elective Course' to 'Mandatory Elective'	Courses and their contents are approved Unanimously. MEC will be changed to MC for students admitted in first year in 2019-20.	To be implemented from academic year 2019-20.
6.	Minor Changes in SE and TE course contents	Put forward for approval.	Approved Unanimously	EXTC department instructed to do the changes in syllabus and upload on website immediately.
7.	Monitoring and Evaluation of Internship	Dr. Rathod presented the monitoring and evaluation of semester long Internship and the detail manual prepared by Dean Industry Relations Dr. D. R. Kalbande. Dr. Jonathan Joshi suggested that institute can allow for research internships under institute faculty. Dr. Shubha Pandit recommended to put 'attendance' as a criteria in Internship evaluation rather than discipline and there should be redressal mechanism on case to case basis for evaluation of Internships.	Monitoring and evaluation mechanism in unanimously approved.	To be implemented from academic year 2019-20.



(Rathod)  
27/01/19



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		Dr Daruwala recommended that for all internships, S.P.I.T. approval is must and there should be a grade penalty for students accepting internship and not joining a company or joining a company but not completing internship.		
8.	First year Curriculum Scheme to be implemented from academic year 2019-20.	Please refer Annexure- II for detail discussion.	Applied Mechanics can be part of Physics and not offered as a separate course. Chemistry can contain thermodynamics. One more relevant 'open elective' course in the area of mechanics at SEM VI level can be offered as a prerequisite to automation and robotics courses. The proposed first year curriculum scheme was unanimously approved as it is.	Faculty to prepare the detail syllabus as per the scheme approved in AC.
9.	Curriculum scheme for UG Courses as per new AICTE Guidelines for 160 Credits	Dr. Rathod presented the new scheme for Second Year, Third Year and Final Year to be adopted for first year batch admitted in 2019-20. Dr. Rathod presented the idea of offering additional courses to fast learners. It was well appreciated by everyone. Dr. Daruwala recommended having CGPA as a CAP for	The scheme was unanimously finalized and approved. Now respective departments can put the course names in the scheme and get approval of respective BoS.	All departments will be instructed to prepare the scheme as per the decided format and put for approval in next academic council.



21/01/15



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		student registrations. It can be interdisciplinary course. He also suggested using terminology 'Non-credit' and not 'audit' courses.		
10.	Student Exchange Programme	Postponed for next meeting.	Postponed for next meeting.	--
11	Any other matter with permission of chair.	Dr. Daruwala said that 'Open Elective' can be offered from first year faculty also.	To be informed to first year faculty.	--
		Member secretary informed that all the items of agenda are discussed and meeting ended with vote of thanks.		

**Annexure-I**

Dr. Rathod presented revised scheme and course contents for semesters VII and VIII from academic year 2019-20 for UG program in Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering and Information Technology are presented. Dr. Y. S. Rao suggested to look once again to overall credits offered in final year and recommended to make IP as 3 credit course. Dr. Rathod replied that it was done to have uniform credits across all the departments. To this Dr. Daruwala and Dr. Shubha Pandit said that it is not necessary to have same credits for all branches to offer the degree. Then it is decided that these schemes can be once again looked by the department and minor changes can be done. Dr. Jonathan suggested having a look on project I and II nomenclature for category I and II students. Dr. Rathod informed that it was a typing mistake. Dr. Shubha Pandit recommended being careful about the calculation of CGPI and conduct of examination for 'Open Elective' courses. She suggested that in order to maintain uniformity for finding rank or award purpose, CGPI to be taken on the basis of VII semester. This can be further discussed in examination committee.

**Annexure-II**

Dr. Rathod proposed scheme for First Year 2019-20. Dr. Rathod invited Prof. D. M. Patil to express his opinion about 'Mechanics' course. Prof. D. M. Patil expressed his displeasure in shifting of the 'Mechanics' course. He spoke for more than 20 minutes quoting various examples/survey/applications. He raised his concerns about introduction of digital circuit's course in first year and intentions about removing mechanics course.

Then Dr. Rathod gave the justification of necessity of introducing digital circuits at first year level. He clarified why it is necessary to shift one common course from all branches to first year by presenting detail scheme with 160 credits.

Dr. Sunil Bhagwat started discussion on this point stating that primary beneficiary of education should be society. He has asked for the comparison of existing first year and the proposed curriculum which was then shown by Dr. Rathod.



(Signature)  
21/08/19



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Dr. Prachi Gharpure explained the necessity of shifting Applied Mechanics course to higher semester. She informed that S.P.I.T. recruiters are majorly financial & IT companies needing applied courses related to the domain.

Prof. Surekha Dhole said that engineering mechanics is useful in Robotics and Automation. Dr. Sudhir Dhage and Prof. Surekha Dhole were of the opinion that Engineering Mechanics is the fundamental Engineering course. Its basic principles are required in Robotics, artificial intelligence, Machine learning and automation. Dr. Jonathan Joshi, Dr. Shubha Pandit, Dr. Kushal Tuckley and Dr. Zia Saquib discussed about solution to this problem. Dr. Sunil Bhagwat was of the opinion that we should keep what society wants in the syllabus to which Dr. Rathod explained about various other courses introduced in the curriculum.

Dr. Satyanarayana said industries always want students ready to work from day one. It does not mean we should chop the basics and keep advance courses in lower semesters.

Dr. Sunil Bhagwat asked whether this course will affect skills of students to which Dr. Rathod replied that as per NBA graduate attributes it will not affect because there are many courses through which application of engineering knowledge, analysis and design skills can be taught. Dr. Y. S. Rao suggested that correct positioning of the course in higher semester. Dr. Rathod also read the messages of Dr. M. B. Patil and Dr. Sameer Sahastrabudhe supporting the shift in the mechanics course to higher semester.

When asked about the % distribution Dr. Rathod presented it to the council. After observing that there is no professional core course taught in first year, it was decided that digital circuit credits can come under professional core in first year. Dr. Sunil Bhagwat then suggested to put branch relevant contents of mechanics course in physics course.

He said physics and mechanics can be one course which was seconded by Dr. Y. S. Rao. Finally it is unanimously resolved that Applied Mechanics can be part of Physics and not offered as a separate course. Modify Physics and Chemistry Syllabus. Chemistry can contain thermodynamics. The contents of these courses must be modified as per requirement of branches.

Dr. Rathod suggested having one more relevant 'open elective' course at SEM VI level can be offered as a prerequisite to automation and robotics which was unanimously accepted by all. After decision Dr. Rathod asked to Prof. D. M. Patil whether he agree to it to which he has given affirmative reply.

Signature and Date

Dr. S. S. Rathod

Dean (Academics) and Member Secretary,  
 Academic Council

Signature and Date

Dr. Prachi Gharpure

Principal and Chairman,  
 Academic Council





## Board of Studies: Applied Sciences and Humanities

Sr. No.	Name	Category
1.	Dr. Rita Das	Head of Department (Chairman)
2.	Mr. D.M.Patil	Deputy HOD
3.	Mr C. R. Gajbhiye	
4.	Ms. Nida Bakereywala	
5.	Mr. H.B.Vasaikar	
6.	Mrs. Meghana Naik	
7.	Mr. Kaisar Katchi	
8.	Mrs. Ananthalakshmi V.	Entire faculty of Applied Sciences and Humanities Engineering
9.	Mr. Shoaib Shaik	
10.	Mr. Gaurish Nerurkar	
11.	Dr. Vidya Nikumbh	
12.	Mr. Udayan Chakraborty	
13.	Ms. Umangi Mehta	
14.	Mr. Priyesh Keekan	
15.	Prof. G.K.Srinivasan I.I.T., Bombay	External Expert (Mathematics)
16.	Dr. Ajit Kumar I.C.T., Mumbai	External Expert (Mathematics)



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17.	Prof. K.G. Suresh I.I.T., Bombay	External Expert (Physics)
18.	Prof. B.M. Bhanage I.C.T., Bombay	External Expert (Chemistry)
19.	Prof. S.M. Khot Fr. C. Rodrigues Institute of Technology, New Mumbai	External Expert (Engineering Mechanics, Engineering Graphics and Workshop)
20.	Mrs. Usha Nair V.J.T.I., Mumbai	External Expert (HSS)
21.	Mr. Kaustubh Waingankar CITIUSTECH, Mumbai	Industry Representation



**Board of Studies Meeting on 15 May, 2017 at 10:30 am**

## Agenda

- i. Welcome by Dr. Rita Das, Head
- ii. Presentation of First Year Scheme by Mr. D.M.Patil, Deputy Head
- iii. Presentation of syllabi of Engineering Mathematics I & II and Bridge Course by Mr. C.R. Gajbhiye
- iv. Presentation of syllabi of Applied Mathematics I & II (For Etrx and Extc) by Ms. Nida Bakereywala
- v. Presentation of syllabi of Applied Mathematics I & II (For IT and Comp) by Ms. Meghana Naik
- vi. Presentation of syllabi of Applied Physics I & II by Mr. Gaurish Nerurkar
- vii. Presentation of syllabi of App Chemistry I & II by Dr. Vidya Nikumbh
- viii. Presentation of syllabus of Engineering Mechanics by Mr. Kaisar Kutchi
- ix. Presentation of syllabus of Engineering Graphics by Mr. Hemant Vasaikar
- x. Presentation of syllabus of Workshop I & II by Mr. Shoaib Shaik
- xi. Presentation of syllabus of Environmental Studies by Ms. Ananthalakshmi V.
- xii. Presentation of syllabus of Basic Communication Skills by Mr. Udayan Chakroborty
- xiii. Approval of Proposed First Year Scheme
- xiv. Approval of syllabi of all courses taken by the faculty members of our department for first and second year engineering students

# SARDAR PATEL INSTITUTE OF TECHNOLOGY

## Department of Applied Sciences and Humanities

Board of Studies Meeting – 15<sup>th</sup> May, 2017

Meeting called to order at 11.00 am by meeting chairperson and head, Dr. Rita Das

### Proceedings:

1. Dr. Rita Das welcomed all external delegates to the first meeting of the board of studies. She read out the agenda of the meeting.
2. Principal Dr. Prachi Gharpure also welcomed all the external delegates to the meeting and announced that the work of creating a new curriculum for the institution is a new exercise being done for the first time. This exercise was preceded by a feedback from the students and faculty. This meeting is restricted to the principal courses for FE students and Mathematics courses for Second year.
3. Dy HOD, Mr. D.M. Patil introduced Bharatiya Vidya Bhavan's trust and SPIT to the external delegates. He also showed a brief glimpse of placement achievements and student activities and proceeded to elaborate on the First Year scheme for the syllabus.
4. Mr. C.R. Gajbhiye in the presence of two external subject experts presented the proposed syllabus for Engineering Mathematics for FE. The committee made an observation regarding the nomenclature of the subject which should be on the basis of the content rather than being generic. The ESE could also be out of 60 marks instead of 100 marks. The CO5 needs to be changed into "systems of linear equations". The formulations need to be application based, similarly the CO mapping also will get easier with application based COs.
5. For the Sem – II syllabus, book on applications by Dennis Jin is recommended. The CO needs to be revised to include the word 'applications'. All COs can be edited to begin with 'formulate and solve'. Interaction with higher class faculty is recommended before adding or removing any topic from the proposed syllabus.
6. For the course titled 'fundamentals of mathematics' which is a bridge course, the committee made the following observations. The course could be an audit course instead of a credit course. The repeating content could be covered in extra classes rather than in regular classes. The industry representative was of the opinion that only the bridge course should be provided to the students instead of regular course, as the combined weight of the two would be very stressful to the students. The bridge course could also be conducted immediately upon the commencement of the semester, the regular course could follow it thereafter.
7. Mr. Gaurish Nerurkar presented the proposed syllabus for Applied Physics. The CO1 for Sem I syllabus needs to be modified. For the Sem II syllabus, the COs need to be rephrased. Words like 'explain', 'discuss' not to be used as they cannot be quantified. Content is good.
8. For the lab course, The CO2 needs to be rephrased. The COs need to be skill based and not theoretical, as it is a lab course. In experiment details, 'plot' should be used in 3<sup>rd</sup> and 4<sup>th</sup> experiment. For the Sem II lab course, COs 3 and 6 need to be modified. This will enable direct CO mapping with experiments.

9. Dr. Vidya Nikumbh presented the proposed syllabus for applied chemistry. The subject expert suggested that the modules could be named. Module 1 – Water, Module 2 – Polymers, Module 3 – Lubricants, Module 4 – Nanomaterial synthesis. CO1 sounds complex, needs to be simplified. All COs can be simplified similarly. For the second module, classification could be done in different ways. The same can be open ended. Theoretical background for polymers is necessary.
10. For the sem II syllabus, module 2 could be cut short as the content is too extensive. The content can be revised depending on the need for the respective branches where it is being taught. The topic on batteries is very important. Module 4 could be included in EVS and not chemistry. Weightage given to alloys can be reduced.
11. For the lab course, reword the experiments and COs. Begin COs using Verbs and not Nouns. For the sem II lab course, new experiments related to material analysis could be added. Repeated experiments can be changed – 2,3,4 and 5.
12. Ms Ananthalakshmi presented the proposed syllabus for EVS. Tools to detect pollution could be added. COs could be clearer.
13. Mr. Hemant Vasalkar presented the proposed syllabus for Engineering Mechanics. Following were the observations. Weightage on statistics can be reduced. More topics on dynamics could be included. The topics on centroid can be reduced. Linking the topics in the proper sequence is important. The COs need to be reframed to make them more specific. That would make CO attainment mapping easier. The COs need to be in reference to specific topics rather than in reference to multiple topics or in combinations.
14. For the lab course, each experiment should have a particular course outcome. More stress on practical examination would be appreciated. Term work and ISE needs to be in continuous evaluation. Different words for experiments need to be used. Use scenarios and then approach rather than direct experiments. More skill based activities required.
15. Mr. Kaiser Katchi presented the proposed syllabus for Engineering Graphics. The following were the observations made. It is not possible to map COs with words such as visualization and imagination, so need to be rephrased. Mention the type of projection to be used and followed. 2 COs for lab course not acceptable. Around 6 COs required. Tutorial activities need to be mentioned clearly. The lab proposal does not seem to be appropriately coming out. The problems need to be mentioned in detail. The description must begin with "description of....". More detail on how to evaluate CO is required. It is recommended to do away with tutorials and use that time in lectures since we have labs for that purpose. Things that are being taught are not getting reflected in the content of the syllabus. Why is an entire course in AUTOCAD required? Reconsider the same.
16. Mr. Shoailb presented the proposed syllabus for workshop. Sheet metal design must be considered as it is important.
17. Mr. Udayan Chakraborty presented the proposed syllabus for Communication Skills. In Module 1, be clearer on the topic for 1.1. CO1 needs to be application based. Barriers can be used for a case study. Rubric assessment will get easier. For tutorials part, add details on what students are expected to do. Rework all tutorials to make them student centric.
18. Mrs Nida Bakereywala presented the proposed syllabus on SE Mathematics, for ETRX and EXTC streams. The following were the observations. Fourier series need to be added at the beginning. Hours of teaching should be uniform. Rephrase the COs. Application of Cayley Hamilton Theorem is required. In Module 1.3, solving differential equations is required. Need to add

application to google ranking. A brief intro to binomial equations is required, without which, teaching will not be effective.

19. Mrs Meghana Naik presented the proposed syllabus for SE Mathematics, for COMPS and IT Streams. Laplace transform is necessary. Application of the same can also be covered. 11 hrs of teaching is sufficient. Two face syntax has to be covered. Can reduce number of hours of necessary from other topics. Solving problems through software can also be taught. Book by Louis Berger for optimization is recommended. Matric factorization is a required topic. The same can be covered in three hours. Regression at the end is necessary. Number of hours from Probability can be reduced to accommodate regression. Books for applications of statistics for engineers and scientists need to be recommended to students. Sheldon Ross and Montgomery are ideal authors worth recommending.
20. The board of studies approved the First Year syllabus and scheme proposed by the faculties.

Meeting adjourned at 2.40 pm.

Udayan

Minutes prepared by Mr. Udayan Chakraborty

Approved by Dr. Bta Dw

Dr. Bta Dw  
15/05/2017



**Sardar Patel Institute of Technology**  
**Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India**  
**(Autonomous Institute Affiliated to University of Mumbai)**

## Applied Sciences and Humanities Department

Board of Studies Meeting 15 May 2017 at 10:30 am

### ATTENDANCE

Sr. No.	Name	Sign
1.	Dr. Rita Das	Rita Das
2.	Mr. D.M.Patil	Patil
3.	Mr. C. R. Gajbhiye	C. R. Gajbhiye
4.	Ms. Nida Bakereywala	Nida
5.	Mr. H.B.Vasaikar	H.B. Vasaikar
6.	Mrs. Meghana Naik	Meghana Naik
7.	Mr. Kaisar Katchi	Kaisar Katchi
8.	Mrs. Ananthalakshmi V.	Ananthalakshmi V.
9.	Mr. Shoaib Shaik	Shoaib Shaik
10.	Mr. Gaurish Nerurkar	Gaurish Nerurkar
11.	Dr. Vidya Nikumbh	Vidya Nikumbh 15/5/17
12.	Mr. Udayan Chakraborty	Udayan Chakraborty
13.	Ms. Umangi Mehta	Umangi Mehta
14.	Mr. Priyesh Keekan	Priyesh Keekan



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## Applied Sciences and Humanities Department

Board of Studies Meeting 15 May 2017 at 10:30 am

### ATTENDANCE

Sr. No.	Name	Sign
1.	Prof. G.K.Srinivasan I.I.T., Bombay	
2.	Dr. Ajit Kumar I.C.T., Mumbai	
3.	Prof. K.G. Suresh I.I.T., Bombay	
4.	Prof. B.M. Bhanage I.C.T., Mumbai	 15/05/2017
5.	Prof. S.M. Khot Fr. C. Rodrigues Institute of Technology, New Mumbai	 15/05/2017
6.	Mrs. Usha Nair V.J.T.I., Mumbai	 15/05/2017
7.	Mr. Kaustubh Waingankar CITIUSTECH, Mumbai	 15/05/2017



Bharatiya Vidya Bhavan's

## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai 400058-India  
(An Empowered Autonomous Institute Affiliated to University of Mumbai)

### Department of Computer Engineering

#### Syllabus Revision Report

#### Undergraduate Program

2017-18 to 2022-23 Revision

Years	Percentage Change*
2017-18	20%
2018-19	16.67%
2019-20	17.86%
2020-21	18.75%
2021-22	8.7%
2022-23	17.39%

\*Percentage Change = (Number of new courses / Number of Total courses) \* 100





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### Department of Computer Engineering

#### Syllabus Revision Report

#### Undergraduate Program

2022-23

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
<b>Computer Engineering</b>			
Deep Learning	CS413	2022-23	64.4
Cloud Computing	CS322	2022-23	57.14
Internet of Things	CS431(1P)	2022-23	100
Blockchain Technology	CS432(1Q)	2022-23	100





2022-23

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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Internet of Things

Course Code Old (2017-18): NA

Course Code New (Autonomy 2020-21): CS431(1P)

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: TE/BE Elective Sem-V to VIII

### Change/Addition in the Syllabus: New Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Introduction to IoT	The course is introduced so that, At the End of the course students will be able to describe the Internet of Things and its components, protocols, architecture and services, design IoT systems through Python, Physical Servers. Develop IoT system through IoT Cloud solutions. Perform IoT Systems and Security Management.	28/28=100%
2	IoT Logical design and Physical Server		
3	IoT Cloud Services and Security		
4	IoT System Management		

Name & Signature:

(Dr. Y. S. Rao)



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com



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Blockchain Technology

Course Code Old (2017-18): NA

Course Code New (Autonomy 2020-21): CS432(1Q)

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: TE/BE Elective Sem-V to VIII

Change/Addition in the Syllabus: New Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Introduction to Blockchain Technology	The course is introduced so that, At the End of the course students will be able to apply the basics concepts of blockchain technology, Bitcoin and Ethereum and implement a smart contract on the Ethereum test network. Build a Decentralized Application running on a decentralized peer-to-peer network and evaluate the use cases for a new blockchain and/or cryptocurrency.	28/28=100%
2	Cryptocurrency		
3	Hyperledger Fabric		
4	Applications Blockchain Technology		

Name & Signature:

Prof. D.D. Ambawade





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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Cloud Computing

Course Code Old (2016-17): CPL801

Course Code New (Autonomy 2020-21): CS322

Class and Semester in Old Syllabus: BE Sem-VIII

Class and Semesters in New Syllabus: TE/BE Elective Sem-VI to VII

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Defining Cloud Computing, Cloud and other similar configurations, Components of Cloud Computing, Cloud types: NIST and Cloud Cube Models, Cloud Deployment Models and Service Models Cloud computing architecture, Advantages and Disadvantages of Cloud Computing.	Introduction to Cloud Computing	16/28=57.14 %
2	Virtualization: Characteristics of virtualized environment, Understanding the importance of Hypervisors, Type I & Type II Hypervisors. Taxonomy of virtualization, Implementation Levels of Virtualization, Virtualization of CPU, Memory and I/O Devices , Virtualization and Cloud Computing, Pros and Cons of virtualization,	Compare different virtualization technologies.	
3	Exploring Cloud Computing Services: SPI Model: Software as a service, Platform as a service, and Infrastructure as a service.	Understanding cloud services	
4	Mobile Cloud Computing: Definition, architecture, benefits and challenges of mobile cloud computing	Cloud Implementation, Programming and Mobile Cloud Computing	

Name & Signature:

D. P. Ambawade  
( Prof. D. P. Ambawade )

Sekharia



21/12/2023



Bharatiya Vidya Bhavan's

**Sardar Patel Institute of Technology**(Autonomous Institute Affiliated to University of Mumbai)  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India**Department of Computer Engineering**

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(PE)		2	0	2	5	10	2	0	1	3
Examination Scheme										
CS322	Cloud Computing	Component	ISE		MSE		ESE		Total	
		Theory	50		50		100		200	
		Laboratory	50		-		50		100	

Pre-requisite Course Codes, if any.	CS206: Operating Systems, CS207: Computer Communications and Networks, CS304: Distributed Computing
<b>Course Objective:</b> To get the knowledge of Basics of cloud computing, Key concepts of virtualization, Different Cloud Computing services, Cloud Implementation, Programming and Mobile cloud computing	
<b>Course Outcomes (CO):</b> At the End of the course students will be able to	
CS322.1	Illustrate cloud service models, deployment models and mobile cloud computing.
CS322.2	Compare different virtualization technologies.
CS322.3	Use different cloud computing services for a given scenarios.
CS322.4	Analyze the components of open stack and Google Cloud platform.

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS322.1	-	3	-	-	-	-	-	-	-	2	-	-
CS322.2	-	-	2		3	-	-	-	-	-	-	-
CS322.3	-	-	2	-	-	-	-	-	-	2	-	2
CS322.4	-	-	-	-	2	-	-	-	-	-	-	-

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PSO1	PSO2
CS322.1	2	-	-	-	-
CS322.2	-	-	-	-	-
CS322.3	2	-	-	-	-
CS322.4	-	-	2	-	2

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	Apply	Analyze	Evaluate	Create
			✓		

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Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Introduction to Cloud Computing	1,2	4
	1.1	Defining Cloud Computing, Cloud and other similar configurations, Components of Cloud Computing, Cloud types: NIST and Cloud Cube Models, Cloud Deployment Models and Service Models		
	1.2	Cloud computing architecture, Advantages and Disadvantages of Cloud Computing.		
2	Title	Virtualization	1,2	8
	2.1	Virtualization: Characteristics of virtualized environment, Understanding the importance of Hypervisors, Type I & Type II Hypervisors		
	2.2	Taxonomy of virtualization, Implementation Levels of Virtualization, Virtualization of CPU, Memory and I/O Devices, Virtualization and Cloud Computing		
	2.3	Pros and Cons of virtualization, Technology Examples: KVM, Xen, Vmware and HyperV, VirtualBox, Containers/docker, image building registry ,volumes secrets, networks		
3	Title	Cloud Computing Services	1,2,3	8
	3.1	Exploring Cloud Computing Services: SPI Model: Software as a service, Platform as a service, and Infrastructure as a service,		
	3.2	Anything as a service or Everything as a service (XaaS): Security as a Service, Identity management as a Service, Database as a Service, Storage as a Service, Collaboration as a Service		
	3.3	Compliance as a Service, Monitoring as a Service, Communication as a Service, Network as a Service, Disaster recovery as a service, Analytics as a Service, Backup as a Service.		
4	Title	Cloud Implementation, Programming and Mobile Cloud Computing	2,3,4	8
	4.1	OpenStack Cloud Architecture: Feature of Open stack, Components of Open stack, mode of operations		
	4.2	Programming support for Google apps engine GFS, Bigtables, Chubby, Google APIs.		
	4.3	Mobile Cloud Computing: Definition, architecture, benefits and challenges of mobile cloud computing		
5	Self Study	AWS cloud computing Platform, a) Elastic Compute Cloud(EC2): Compute Basics, Instance types, Life cycle of instances. b) Simple Storage Service (S3): Basics and Operations, Features, Amazon Glacier, Glacier vs S3. c) Elastic Block Storage (EBS):Basics and Types of EBS Volumes d)Amazon Virtual Private Cloud (Amazon VPC): Subnets, Route tables, Elastic IP Addresses (EIP).	1 to 5	5*
Total(* Not included)				28





Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Deep Learning

Course Code Old (2017-18): OES

Course Code New (Autonomy 2020-21): CS413

Class and Semester in Old Syllabus: Open Elective Sem-VI to VIII

Class and Semesters in New Syllabus: Program Elective Sem-VI

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Deep L-layer Neural Network, Building Blocks of Deep Neural Networks, Forward and Backward Propagation, Parameters vs Hyper parameters	Introduction to Deep Neural Networks.	18/28=64.4%
2	Train / Dev / Test sets, Bias / Variance, Basic Recipe for Machine Learning, Regularization, Dropout, Normalizing Inputs, Vanishing / Exploding Gradients, Weight Initialization for Deep Networks, Numerical Approximation of Gradients. Optimization Algorithm: Mini-batch Gradient Descent, Exponentially Weighted Averages, Bias Correction in Exponentially Weighted Averages, Gradient Descent with Momentum, RMSprop, Adam Optimization Algorithm, Learning Rate Decay and Problem of Local Optima	Practical Aspects of Deep Learning	
3	Introduction, Notations, Recurrent Neural Network Model, Backpropagation Through Time, Different Types of RNNs, Language Model and Sequence Generation, Sampling Novel Sequences, Vanishing Gradients with RNNs, Gated Recurrent Unit (GRU), Long Short Term Memory (LSTM), Bidirectional RNN, Deep RNNs	Understanding the Sequential Model	
4	Autoregressive, Reversible, Autoencoders, Variational autoencoder Architecture, Generative Adversarial Networks, GAN Cost Function. DCGAN	Representation learning & Generative Learning using Autoencoders and GAN	

Name & Signature:



*Sevalshik* → *Dr. P.R. Kolbande*

*Dr. P.R. Kolbande*



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Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India**Department of Computer Engineering**

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(PE)		2	0	2	4	8	2	0	1	3
Examination Scheme										
CS413	Deep Learning	Component	ISE		MSE		ESE		Total	
		Theory	50		50		100		200	
		Laboratory	50		-		50		100	

Pre-requisite Course Codes, if any.	The prerequisites for this course are: 1) Basic knowledge of Python. 2) Basic linear algebra and probability.
Course Objective:	This course aims to present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data. This data should be 2D-4D images, text and speech. Selected topics of Deep Learning, discussing its origination from neural networks to major trends, giving rise to deep learning models. Special emphasis will be on Optimization techniques, hyper parameters tuning, Convolutional architectures, Sequential architecture and Generative Adversarial Networks. Also lab oriented objectives are full filled through various experiments
Course Outcomes (CO): <i>At the End of the course students will be able to</i>	
CS413.1	Compare the architectures of Neural network and deep neural networks and relevant properties.
CS413.2	Identify various ways of selecting suitable model parameters, hyper parameters and stochastic optimization methods that are crucial for training deep neural networks.
CS413.3	Determine characteristics of datasets and suitable computing environment to select suitable building blocks of neural networks including fully connected layers, convolutional and recurrent layers.
CS413.4	Apply deep Learning techniques like generative, representative or discriminative to solve various real life problems using modern tools.

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS413.1	3	-	3	-	-	-	-	-	-	-	-	-
CS413.2	-	-	3	-	-	-	-	-	-	-	-	-
CS413.3	3	-	-	-	-	-	-	-	-	-	-	-
CS413.4	3	-	-		3	-	-	-	-	-	-	-

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*[Handwritten signatures]*



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**Sardar Patel Institute of Technology**(Autonomous Institute Affiliated to University of Mumbai)  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India**Department of Computer Engineering****CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
CS413.1	2	-	-	-	-	-	-
CS413.2	-	2	-	-	-	-	-
CS413.3	2	-	-	-	-	-	-
CS413.4	-	2	-	-	-	2	-

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	Apply	Analyze	Evaluate ✓	Create

**Theory Component**

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Neural Networks and Deep learning	1,2	7
	1.1	Introduction to Deep Learning: What is a Neural Network?, Supervised Learning with Neural Networks, Why is Deep Learning taking off? Analyze the major trends driving the rise of deep learning, and give examples of where and how it is applied today.		
	1.2	Neural Networks: Binary Classification, Logistic Regression, Logistic Regression Cost Function, Gradient Descent, Derivatives and relevant examples, Computation Graph, Derivatives with a Computation Graph, Logistic Regression Gradient Descent and relevant example, Vectorization and Vectorizing Logistic Regression's Gradient.		
	1.3	Deep Neural Networks: Deep L-layer Neural Network, Building Blocks of Deep Neural Networks, Forward and Backward Propagation, Parameters vs Hyper parameters		
2	Title	Optimization, Tuning and Interpretability	1,2,4	7





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	2.1	Practical Aspects of Deep Learning: Train / Dev / Test sets, Bias / Variance, Basic Recipe for Machine Learning, Regularization, Dropout, Normalizing Inputs, Vanishing / Exploding Gradients, Weight Initialization for Deep Networks, Numerical Approximation of Gradients.		
	2.2	Optimization Algorithm: Mini-batch Gradient Descent, Exponentially Weighted Averages, Bias Correction in Exponentially Weighted Averages, Gradient Descent with Momentum, RMSprop, Adam Optimization Algorithm, Learning Rate Decay and Problem of Local Optima		
	2.3	Hyperparameter Tuning, Batch Normalization and Programming Frameworks: Tuning Process, Using an Appropriate Scale to pick Hyperparameters, Hyperparameters Tuning in Practice: Pandas vs. Caviar, Normalizing Activations in a Network, Batch Normalization, Softmax Regression, Training a Softmax Classifier.		
3	Title	Convolutional Neural Net (CNN) and Sequential Model	1,2,3	7
	3.1	Foundation of CNN: Computer Vision, Edge Detection Example, Padding, Strided Convolutions, Convolutions Over Volume, One Layer of a Convolutional Network, Simple Convolutional Network Example, Pooling Layers, CNN Example		
	3.2	Sequential Model: Introduction, Notations, Recurrent Neural Network Model, Backpropagation Through Time, Different Types of RNNs, Language Model and Sequence Generation, Sampling Novel Sequences, Vanishing Gradients with RNNs, Gated Recurrent Unit (GRU), Long Short Term Memory (LSTM), Bidirectional RNN, Deep RNNs		
4	Title	Representation learning & Generative Learning using Autoencoders and Generative Adversarial Network (GAN)	1,2,3,4	7
	4.1	Autoregressive, Reversible, Autoencoders, Variational autoencoder Architecture,		
	4.2	Generative Adversarial Networks, GAN Cost Function, DCGAN		
5	Self Study	Pytorch, Tensor Flow, Keras, etc		2*
Total(* not included)				28

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epw  
epw**Schulz*



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### Department of Computer Engineering

Laboratory Component, if any. (Minimum 10 Laboratory experiments are expected)

Sr. No	Title of the Experiment
1	Learning TensorFlow API and Keras API
2	Build and train deep neural networks, identify architecture parameters, implement vectorized neural networks and deep learning to applications
3	Train test sets, analyze variance for DL applications, use standard techniques and optimization algorithms, and build neural network in TensorFlow
4	Implement convolutional neural networks (convnets): Using data augmentation to mitigate overfitting + Using a pre-trained convnet to do feature extraction + Fine-tuning a pre-trained convnet + Visualizing what convnets learn and how they make classification decisions
5	Build and train RNNs, work with NLP and word embeddings
6-10	Capstone project covering the concepts of Deep Learning on real world problem statements.

#### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Deep Learning	First Edition	Goodfellow, I., Bengio, Y., and Courville, A.	MIT Press	2016
2	Fundamentals of Deep Learning	First Edition	Nikhil Buduma	O'Reilly	2017
3	Generative Deep Learning	First Edition	David Foster	O'Reilly	2019
4	Deep Learning using Python	First Edition	Dr. S Lovelyn Rose, Dr. L Ashok Kumar, Dr. D Karthika Renuka	Wiley	2019





**Bharatiya Vidya Bhavan's  
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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Internet Technology Lab

Course Code Old (2017-18): CEL55

Course Code New (Autonomy 2020-21): CS305

Class and Semester in Old Syllabus: TE Sem-V

Class and Semesters in New Syllabus: TE Sem-V

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Web content management system	Introduction to Web CMS, different types of Web CMS	12/14=85.7%
2	Web services	Introduction to web service, REST architecture	
3	Web mashups	Introduction to web mashups, server side mashups, client side mashups	
4	Secured Web application	Introduction to Web Tokens, Auth2.0, OAuth, Access token	
5	Integration of web services Integrating Web Services using Any point studio	Introduction to Mule ESB, Introduction to Anypoint studio,	
6	Web crawlers	Introduction to web crawler, role of crawler in the internet, concept of page ranking	
7	Testing web applications	Introduction to different types of testing, manual testing, automated testing, performance testing and functional testing, open source tools used for testing	

Name & Signature:

Aparna Halbe



Dr. S. D. Patil



Bharatiya Vidya Bhavan's  
**Sardar Patel Institute of Technology**  
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Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

**Department of Computer Engineering**

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned				
		L	T	P	O	E	L	T	P	Total	
SBC											
Internet Technology Lab											
CS305/IT305		1	0	2	5	8	1	0	1	2	
Examination Scheme											
		Component		ISE		MSE		ESE		Total	
		Theory		--		--		--		--	
		Laboratory		100		--		100		200	

Pre-requisite Course Codes, if any.	CS208/IT208 Mini Project
Course Objective:	To impart a knowledge of different Internet Technologies.
Course Outcomes (CO):	<i>At the End of the course students will be able to</i>
CS305.1/IT305.1	Develop a sophisticated web UX
CS305.2/IT305.2	Create, integrate and test REST based web services
CS305.3/IT305.3	Design secured web application/ web services
CS305.4/IT305.4	Demonstrate behaviour of web crawlers and testing of web application

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS305.1 /IT305.1	-	-	1		3	-	-	-	-	-	-	-
CS305.2 /IT305.2	-	-	-	2	3	-	-	-	-	-	-	-
CS305.3 /IT305.3	-	-	-	1	3	-	-	-	-	-	-	-
CS305.4 /IT305.4	-	-	-	1	3	-	-	-	-	-	-	-

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
CS305.1/I T305.1	-	-	-	-	-	3(CS)	3(IT)
CS305.2/I T305.2	-	-	-	-	-	3(CS)	3(IT)
CS305.3/I T305.3	-	-	-	-	-	3(CS)	3(IT)
CS305.4/I T305.4	-	-	-	-	-	3(CS)	3(IT)

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	Apply	Analyze	Evaluate	Create ✓
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Bharatiya Vidya Bhavan's

**Sardar Patel Institute of Technology**(Autonomous Institute Affiliated to University of Mumbai)  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India**Department of Computer Engineering****Theory Component**

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Designing UI</b>		
	1.1	Fundamentals of UX Design, Defining UX Solutions, Design Communication and Visualizing Ideas	1	2
2		<b>Web content management system</b>		
	2.1	Introduction to Web CMS, different types of Web CMS	2	1
3		<b>Web services</b>		
	3.1	Introduction to web service, REST architecture	3	2
4		<b>Web mashups</b>		
	4.1	Introduction to web mashups, server side mashups, client side mashups	2	1
5		<b>Secured Web application</b>		
	5.1	Introduction to Web Tokens, Auth2.0, OAuth, Access token	2	2
6		<b>Integration of web services</b>		
	6.1	Introduction to Mule ESB, Introduction to Anypoint studio, Integrating Web Services using Any point studio	4	2
7		<b>Web crawlers</b>		
	7.1	Introduction to web crawler, role of crawler in the internet, concept of page ranking	3	2
8		<b>Testing web applications</b>		
	8.1	Introduction to different types of testing, manual testing, automated testing, performance testing and functional testing, open source tools used for testing	2	2
				14

**Laboratory Component, if any. (Minimum 10 Laboratory experiments are expected)**

Sr. No	Title of the Experiment
1	Design web pages using HTML, CSS and javascript
2	Design UX for a given problem definition by using open source UX tools
3	Create a website using web CMS (Node Js/Angular Js/React Js/Flask/Django/Wordpress/Joomla etc.)
4	Create a Restful webservice to demonstrate different HTTP methods
5	Testing of restful web service using Postman/ARC
6	Create a web mashup of web services using open source framework
7	Design secured Web application using web token
8	Integration of web services using open source integration tools like Mulesoft
9	Demonstrate the behavior of Web Crawlers/ spiders (use XPATH,CSS PATH),extract information and store it in the database.
10	Test the web application using open source testing tools like Selenium, Test runner and Junit

Mr.  
Apurva Patele2  
caz



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Artificial Intelligence and Machine Learning

Course Code Old (2017-18): CE71

Course Code New (Autonomy 2020-21): CS307B

Class and Semester in Old Syllabus: BE Sem VII

Class and Semesters in New Syllabus: TE Sem-V

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Environments and Its Properties, PEAS Representation for an Agent	Introduction to Intelligent Agents and Environment	21/42=50%
2	Introduction: What is Machine Learning, History and overview of machine learning, Types of Machine Learning – Supervised, Unsupervised Semi-Supervised Learning and Reinforcement Learning, Design a Learning System, The curse of dimensionality. Evaluating a hypothesis: Model selection, training/validation/testing procedures, diagnosing bias versus variance and vice versa, regularization and bias/variance, learning curves	Introduction to Machine Learning	
3	Linear Models for Regression Two Simple Approaches to Prediction: Least Squares and Nearest Neighbors Linear Regression, Multivariate Regression, Subset Selection, Shrinkage Methods	Learn Machine learning algorithms	

Name & Signature:



Dr. D.R. Kolhadre  
Signature



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**Department of Computer Engineering**

Course(Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(PC)	Artificial Intelligence and Machine Learning	3	0	2	5	10	3	0	1	4
		Examination Scheme			Component	ISE	MSE	ESE	Total	
CS307B		Theory			75	75	150	300		
		Laboratory			50	--	50	100		

Pre-requisite Course Codes, if any.	CS202/IT202: Data Structures, MA203: Probability and Statistics
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**Course Objective:** This course covers the fundamental concepts of Artificial Intelligence and machine learning.

**Course Outcomes (CO):** *At the End of the course students will be able to*

CS307B.1	Understand AI building blocks presented in intelligent agents
CS307B.2	Solve the problems using suitable searching methods.
CS307B.3	Solve the problems using suitable reasoning and knowledge representation methods.
CS307B.4	Apply suitable machine learning technique for a given problem
CS307B.5	Design an intelligent system using different AIML techniques for real life problems.

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1 I	PO1 II
CS307B.1	2	3	-	-	2	-	-	-	-	-	2	-
CS307B.2	2	3	2	2	-	-	-	-	-	-	2	-
CS307B.3	2	3	2	2	-	-	-	-	-	1	2	-
CS307B.4	2	3	-	-	2	-	-	-	-	2	2	-
CS307B.5	2	3	2	2	2	-	-	-	-	2	2	2

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
CS307B.1	-	-	-	-	-	-	-
CS307B.2	-	-	-	-	-	-	-
CS307B.3	-	-	-	-	-	-	-
CS307B.4	CS1/IT-1	CS1/IT-1	CS1/IT-1	-	-	-	-
CS307B.5	CS: 2 IT-2	CS: 2/IT- 2	CS: 2/IT- 2	-	IT-2	CS: 2	-

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	Apply	Analyze	Evaluate/	Create
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**Theory Component**

UG Syllabus 2020 iteration/CS(V-VIII) pg. 28





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**Department of Computer Engineering**

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Introduction to Artificial Intelligence</b>	1	04
	1.1	Definition of AI, History and Future of AI, Problem solving Approach to Typical AI problem.		
	1.2	<b>Intelligent Agents and Environment</b> What is an Intelligent Systems, Types of Agents, structure of agent.		
2	1.3	Environments and Its Properties, PEAS Representation for an Agent		
	Title	<b>Problem solving by Searching</b>	1	10
	2.1	Searching: characteristics and issues in design of search programs		
	2.2	Uninformed search techniques: State Space Search, Depth First Iterative Deepening		
3	2.3	Informed Search methods: Heuristic Search, Hill Climbing.		
	2.4	Adversarial Search: Game playing, Min-Max Search, Alpha-Beta Pruning		
	Title	<b>Knowledge Representation and Reasoning</b>	08	
	3.1	Reasoning: Representing and Reasoning with Uncertain Knowledge		
	3.2	Knowledge representation: A Knowledge-Based Agent, The Wumpus World.		
4	3.3	Propositional Logic, First-order predicate logic, Forward and Backward Chaining		
	Title	<b>Introduction to Machine Learning</b>	12	
	4.1	Introduction: What is Machine Learning, History and overview of machine learning.		
	4.2	Types of Machine Learning – Supervised, Unsupervised Semi-Supervised Learning and Reinforcement Learning, Design a Learning System, The curse of dimensionality		
5	4.3	Evaluating a hypothesis: Model selection, training/validation/testing procedures, diagnosing bias versus variance and vice versa, regularization and bias/variance, learning curves	2,3	
	Title	<b>Linear Models for Regression</b>		
	5.1	Two Simple Approaches to Prediction: Least Squares and Nearest Neighbors		
	5.2	Linear Regression, Multivariate Regression, Subset Selection, Shrinkage Methods		
6	Self Study	<b>Linear model for Classification:</b> Logistic Regression, Linear Discriminant Analysis, Perceptron, Support Vector Machines, PCA	3,4	5*
Total(* Not included)			42	





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**Department of Computer Engineering**

Laboratory Component, if any. (Minimum 10 Laboratory experiments are expected)

Sr. No	Title of the Experiment
1	Implement an Intelligent agent.
2	Implement a given problem using the searching technique.
3	Implement a given problem using knowledge representation and reasoning rules
4	To design and implement an intelligent system, incorporating the matching algorithm and the rule language. 1. It should provide a fact base updating function. 2. It should provide a function that checks the rules' LHS and return which rules were matched. 3. It should support firing RHS according to matches. Using SWISH Prolog or Java or Python or any other open-source tool
5	Implement supervised learning algorithms.
6	Implement unsupervised learning algorithms.
7	Implement the regression model
8	Minor project covering the concepts of AIML on the real life problem statements.

**Text Books**

Sr. No	Title	Edition	Authors	Publisher	Year
1	Artificial Intelligence: A Modern Approach	Third Edition	Stuart Russell and Peter Norvig	Prentice-Hall	2009
2	Machine Learning A Probabilistic Perspective	First Edition	Kevin P. Murphy	Massachusetts Institute of Technology	2012
3	Machine Learning,	First Edition	Tom.M.Mitchell	McGraw Hill International Edition	1997
4	The Elements of Statistical Learning	Second Edition	Trevor Hastie Robert Tibshirani Jerome Friedman	Springer	2009

**Reference Books**

Sr. No	Title	Edition	Authors	Publisher	Year
5	Artificial Intelligence: Making a System Intelligent	First Edition	Nilakshi Jain	Wiley Publication	2019
6	Pattern Recognition and Machine Learning,	First Edition	C. M. Bishop	Springer	2013



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**Department of Computer Engineering**

**Syllabus Revision Report**

**Undergraduate Program**

**2020-21**

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
<b>Computer Engineering</b>			
Probability and Statistics	MA203	2020-21	50
Linear Algebra	MA201	2020-21	50
Foundation of Mathematics-II	MA204	2020-21	100





2020-21

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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Foundation of mathematics -II

Course Code Old (2017-18): NA

Course Code New (Autonomy 2020-21): MA 204

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: SE Summer Sem-IV

### Change/Addition in the Syllabus: New Course/Bridge Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Integral Calculus	The course is a bridge course for diploma(lateral) students who lacks expertise required for degrees education.	100
2	Complex Numbers		
3	Differential Equations		

Name & Signature: Meghana Maiti  
*Meghana Maiti*

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



*Sekhrib*  
L.C.W.  
25/07/2020



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## Theory Course Revision Report

### Theory Course Information

Course Name: Probability and Statistics  
Course Code Old (2017-18): BS41  
Course Code New (Autonomy 2020-21): MA 203  
Class and Semester in Old Syllabus: SE Sem-IV  
Class and Semesters in New Syllabus: SE Sem-III

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	1.1 Classical, relative Frequency and Axiomatic definitions of probability, addition rule and multiplication rule, Conditional Probability, Bayes' theorem and independence.	Basic of probability.	$\frac{4+3+4+3+3+4}{42} = 50\%$
2	Bernoulli, Geometric Distribution	For investigating discrete random variables and its behavior.	
3	Standard continuous distributions – Uniform, Exponential, Joint distribution and Joint density functions	For investigating continuous random variables and its behavior.	
4	Statistical hypothesis, Null and Alternate hypothesis, test of hypothesis and significance, Type I and Type II errors, Level of Significance, Tests involving the Normal distribution, One-Tailed and Two-Tailed tests, P value.	For understanding Hypothesis set before starting a test	
5	Small sample and ANOVA	Testing sample in give population.	
6	Linear and Non-linear Regression, Multiple regressions, Curve fitting by method of least squares, fitting of straight lines, Polynomials, Exponential curves.	Acts as introduction in machine learning.	

Name & Signature: Meghana Naik  
*Meghana Naik*

*Sehdev*



*scr. am*



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### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Probability and Random Variables	1, 2	12
	1.1	Classical, relative frequency and axiomatic definitions of probability, addition rule and multiplication rule. Conditional Probability, Bayes' theorem and independence.		04
	1.2	Discrete, continuous and mixed random variables, probability mass function(PMF), Probability Density Function(PDF) and cumulative distribution function(CDF). Joint Distributions: Joint, marginal and conditional distribution.		04
	1.3	Mathematical expectation, moments, moments generating function, Chebyshev's inequality.		04
2	Title	Probability Distributions	1, 2	12
	2.1	Standard discrete distributions: Bernoulli, Binomial, Poisson and Geometric distributions, Probability density function, Cumulative distribution function, Expectation and Variance,		06
	2.2	Standard continuous distributions – Uniform, Normal, Exponential, Joint distribution and Joint density functions		06
3	Title	Test of Hypothesis and Significance	1, 2	12
	3.1	Statistical hypothesis, Null and Alternate hypothesis, test of hypothesis and significance, Type I and Type II errors, Level of Significance, Tests involving the Normal distribution, One-Tailed and Two-Tailed tests, P value.		03
	3.2	Special tests of significance for Large samples and Small samples (F, chi-square, z, t-test), ANOVA.		09
4	Title	Correlation and Regression	1, 2	06
	4.1	Correlation, Rank correlation, Regression Analysis, Linear and Non-linear Regression, Multiple regressions, Curve fitting by method of least squares, fitting of straight lines, Polynomials, Exponential curves.		
5	Self Study	1. Applicability of Bayes theorem 2. Proofs for mean & variance for all distribution: Included in module 2 3. Examples to test goodness of fit using Chi-square		01* 02* 02*
<b>Total</b>				<b>42</b>

\* Not included in Total 42 hrs.





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### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Introduction to Probability and Statistics for Engineers and Scientists	Fourth	Sheldon M. Ross	Academic Foundation	2011
2	Probability and Statistics for Engineers and Scientists	Eighth	E. Walpole, R. H. Mayers, S. L. Mayers and K. Ye	Pearson Education	2007

### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Probability and Statistics in Engineering	Fifth	Douglas C. Montgomery	Wiley India	2012
2	Probability & Statistics	Third	Spiegel, M. R., Schiller, J. and Srinivasan, R. A.	Tata McGraw Hill	2010





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## Theory Course Revision Report

### Theory Course Information

Course Name: Linear Algebra

Course Code Old (2017-18): BS11/BS21

Course Code New (Autonomy 2020-21): MA201

Class and Semester in Old Syllabus: FE Sem-I/II

Class and Semesters in New Syllabus: SE Sem-IV

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Gauss Jacobi Iteration method Method. LU Decomposition -Crout's method	For system solution of algebraic equations	14/28=50%
2	Vector space, subspace, span, linear dependence and independence of vectors, basis, dimension, orthogonal projection & gram-Schmidt process. Null space, row space, column space, Rank-Nullity theorem (only statement). Least square method.	For solution of vector spaces	
3	Diagonalization of matrices. Derogatory and Non-derogatory matrices.	For solving matrices	
4	Solving system of differential equations using diagonalization.	For solving differential equations	

Name & Signature: Meghna Naik

*Meghna Naik*



*Ranjit*

*EE*



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## CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2
MA201.1						
MA201.2						
MA201.3						
MA201.4						
MA201.5						
MA201.6						

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create

### Theory Component

Module No.	Unit No.	Topics	Ref	Hrs.
1	Title	Basics of matrices	3,5	03
	1.1	Revision of basic matrices and types of matrices.		01
	1.2	Row echelon form, Reduced Row Echelon form, Rank of a matrix.		02
2	Title	Linear equations & its solutions	1,2,3,5	07
	2.1	Consistency and solution of simultaneous linear homogeneous and non-homogeneous equations.		02
	2.2	Application of solving systems of equations in traffic control.		01
	2.3	Solution of system of linear algebraic equations, by (1) Gauss Elimination Method (2) Gauss Jordan method (3) Gauss Jacobi Iteration method (4) Gauss Seidel Method. (5) LU Decomposition -Crout's method		04
	3	Title	Vector spaces (over field of real numbers)	1,2,5
	3.1	Vector space, subspace, span, linear dependence and independence of vectors, basis, dimension, orthogonal projection & gram-Schmidt process. Null space, row space, column space, Rank-Nullity theorem (only statement). Least square method.		08





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4	Title	Encoding & decoding using Matrices.	4	02
	4.1	Application of matrices to Coding and Decoding		02
5	Title	Eigenvalues and Eigenvectors	1,2,3,5	08
	5.1	Eigenvalues, Eigenvectors and its properties. Cayley Hamilton theorem and its applications. Diagonalisation of matrices. Derogatory and Non-derogatory matrices.		04
	5.2	Application to find google page rank. Functions of a square matrix. Solving system of differential equations using diagonalisation.		04
6	Self Study	1.2 Normal form. 2.2 Forming equations using KVL for circuits and solving them using matrices. 3.1 Singular Value Decomposition. 5.1 Additional properties with proofs of eigenvalues and eigenvectors.	1,2,3,5	05
				Total 28*

\*Total of 28 hours does not include the self-study hours.

Laboratory Component (Minimum 10 Laboratory experiments are expected)

Sr. No	Title of the Experiment
1	Introduction to Scilab (getting started) and its benefits to use as a mathematics tool.
2	Basic commands of Scilab and vectors & matrix operations.
3	Conditional branching and Iterations using Scilab.
4	Solution of linear equations using row-echelon and inverse of a matrix.
5	Solutions of linear equations using Gauss Elimination method.
6	Solutions of linear equations using Gauss Jordan method.
7	Solutions of linear equations using Gauss-Jacobi method.
8	Solutions of linear equations using Gauss-Seidel method.
9	Solutions of linear equations using Crout's method.
10	To find Eigenvalues and Eigenvectors using Scilab

### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Linear Algebra and its applications	Fourth	Gilbert Strang	Cengage	2014
2	Higher Engineering Mathematics	Forty Fourth	Dr. B. S. Grewal	Khanna Publications	2020





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**Department of Computer Engineering**

**Syllabus Revision Report**

**Undergraduate Program**

**2019-20**

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
<b>Computer Engineering</b>			
Fundamentals of Computational Intelligence	OES	2019-20	100
Fundamentals of Data Structures and Algorithms	OE6	2019-20	100
Data Science	CEE82B	2019-20	52
Data Science Lab	CEEL82B	2019-20	85.7
Internship	INT	2019-20	100

  
 → 

2019-20



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Computer Engineering Department

## Course Revision Report

### Internship Information

Course Name: Internship

Course Code Old (2016-17): NA

Course Code New (Autonomy 2017-18): INT

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: B. Tech. Sem-VIII

Change/Addition in the Syllabus: New Course

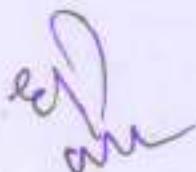
Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Students can take up internship instead for 6 months and complete a project in industry	The new course was introduced so that students will be able to solve real world problems. And gain professional experience.	100%

Name & Signature:

  
11/12  
(Mr. Vinod Sikka)









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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: Data Science Lab

Course Code Old (2016-17): CPEL8031

Course Code New (Autonomy 2017-18): CELE82B

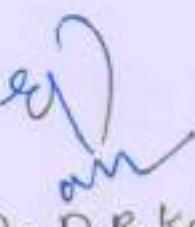
Class and Semester in Old Syllabus: BE/TE Elective Sem-VI to VIII

Class and Semesters in New Syllabus: BE/TE Elective Sem-VI to VIII

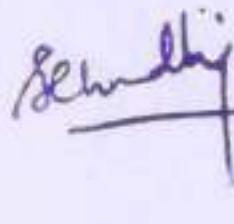
### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	Implement linear discriminant analysis	Students must be apt in handling different kinds of data and process them as per the need of application and hence. The experiments are based accordingly	6/7=85.7%
2	Implement principal component analysis		
3	Implement Independent Component Analysis		
4	Implementation of text analytics		
5	Implement sentiment analysis		
6	Mini Project	To provide project management perspective for such projects.	

Coordinators Name & Signature:

  
(Dr. D.R. Kolhadre)



  
S. B. Shinde

  
S. B. Shinde



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEEL82B	Data Science Lab	..	..	2	..	..	1	1
				Examination Scheme				
		ISE		MSE		ESE		Total
		40		--		--		40

**Pre-requisite Course Codes** CE53 (Data Warehousing and Mining )

At the End of the course students will be able to

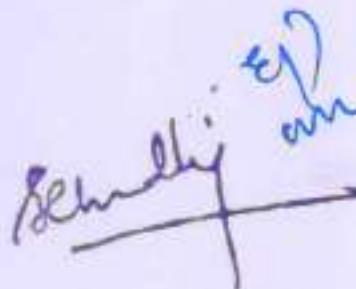
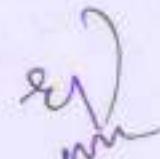
Course Outcomes	CEEL82B.1	Demonstrate prediction using Logistic Regression
	CEEL82B.2	Understand Dimensionality reduction techniques
	CEEL83B.3	Apply text analytics concepts on real datasets
	CEEL84B.4	Apply the concepts of sentiment analysis

Exp. No.	Experiment Details	Ref.	Marks
1	Implement Logistic Regression. Case Study: a) Estimating horse fatalities from colic- use logistic regression to try to predict if a horse with colic will live or die b) Credit Scoring- decision making process of accepting or rejecting a loan	1-7	5
2	Implement linear discriminant analysis	1-7	5
3	Implement principal component analysis	1-7	5
4	Implement Independent Component Analysis	1-7	5
5	Implementation of text analytics	1-7	5
6	Implement sentiment analysis	1-7	5
7	Mini Project	1-7	10
Total Marks			40

**References:**

- [1] Kevin P. Murphy, "Machine Learning a Probabilistic Perspective", The MIT Press
- [2] Joel Grus, Data Science from Scratch: First Principles with Python, O'Reilly Media
- [3] Dean Abbott, "Applied Predictive Analytics: Principles and Techniques for the Professional Data Analyst", Wiley, 2014
- [4] Noel Cressie, Christopher K. Wikle , "Statistics for Spatio-Temporal Data, Wiley
- [5] Rachel Schutt and Cathy O'Neil, "Doing Data Science", O'Reilly Media
- [6] EMC Education Services, "Data Science and Big Data Analytics", Wiley
- [7] Peter Harrington "Machine Learning In Action", DreamTech Press





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(Autonomous College Affiliated to University of Mumbai)  
Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Data Science

Course Code Old (2016-17): CPE8031

Course Code New (Autonomy 2017-18): CEE82B

Class and Semester in Old Syllabus: BE/TE Elective Sem-VI to VIII

Class and Semesters in New Syllabus: BE/TE Elective Sem-VI to VIII

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Data science process: Defining goal, retrieving data, pre-processing data, exploratory data analysis, model building and data visualization, Ethical issues in data science.	Introduction to Data Science	22/42=52%
2	Probability: review of probability theory, normal distribution, Gaussian discriminant analysis: Linear discriminant analysis (LDA),	Prerequisite for statistical analysis	
3	Descriptive Modelling: Principal components analysis (PCA), singular value decomposition (SVD), probabilistic PCA, applying PCA to new data, PCA for data interpretation., EM algorithm for PCA, Independent Component Analysis (ICA), Maximum likelihood estimation using EM. Introduction to time series analysis and time series mining. Introduction to spatio-temporal data, spatio-temporal model, fast dynamic time warping	Understanding Predictive and descriptive models	
4	Data Communication: cost Function, how to Minimize cost function, coefficients of determination. Information visualization: effective information visualization, visual Encodings, perception of visual cues, data scales, visualizing time series data, data journalism, dashboards	Investigating the data visualization tools	

Name & Signature:



*Dr. D.R. Kalberde*  
S. R. Kalberde

*Dr. D.R. Kalberde*



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEE82B	Data Science	3	1	--	3	1	--	4
Examination Scheme								
		ISE		MSE		ESE		Total
		20		20		60		100

## Pre-requisite Course Codes

CE53 Data Warehousing and Mining

At the End of the course students will be able to

Course Outcomes	CEE82B.1	Understand the foundations of the Data Science process, methods and techniques
	CEE82B.2	Apply mathematical models and tools for large-scale data analysis and reasoning
	CEE82B.3	Evaluate Data at Scale – Working with Big Data
	CEE82B.4	Exhibit the knowledge and techniques of Machine Learning and text analytics
	CEE82B.5	Visualize the information in different forms.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Introduction to Data Science			08
	1.1	Data science process: Defining goal, retrieving data, pre-processing data, exploratory data analysis, model building and data visualization, Ethical issues in data science.	1,2	
	1.2	Probability: review of probability theory, normal distribution, Gaussian discriminant analysis; Linear discriminant analysis (LDA), Logistic regression: Bayesian logistic regression,	1,2	
2	Predictive and Descriptive Models			12
	2.1	Descriptive Modelling: Principal components analysis (PCA), singular value decomposition (SVD), probabilistic PCA, applying PCA to new data, PCA for data interpretation, EM algorithm for PCA, Independent Component Analysis (ICA), Maximum likelihood estimation using EM	2,3	
	2.2	Predictive Modeling: Predictive modeling process, supervised and unsupervised learning, parametric and nonparametric models, business intelligence, challenges in using predictive analytics	2,4	
3	2.3	Introduction to time series analysis and time series mining, Introduction to spatio-temporal data, spatio-temporal model, fast dynamic time warping.	3,4,5	
	Evaluation and Methodology of Data Science			04



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	3.1	Experimental setups, training, tuning, test data, holdout method, cross-validation, bootstrap method	1,4	
	3.2	Measuring performance of a model: Accuracy, ROC curves, precision-recall curves, loss functions for regression	1,4	
	3.3	Interpretation of results: Confidence interval for accuracy, hypothesis tests for comparing models, algorithms.	1,4	
4	<b>Text Analytics and Machine Learning</b>			10
	4.1	Introducing text mining, text mining techniques, Understanding Text Mining Process, Sentiment Analysis	10	
	4.2	Machine Learning, Types of Machine Learning, Issues in Machine Learning, Application of Machine Learning, Steps in developing a Machine Learning Application	8,9	
	4.3	Learning with Classification: Classification: Rule based classification, classification by Bayesian Belief networks, Hidden Markov Models. Support Vector Machine: Maximum Margin Linear Separators, Quadratic Programming solution to finding maximum margin separators, Kernels for learning non-linear functions	8,9	
5	<b>Data Communication and Information Visualization</b>			08
	5.1	Data Communication: cost Function, how to Minimize cost function, coefficients of determination.	2,4,6,7	
	5.2	Information visualization: effective information visualization, visual encodings, perception of visual cues, data scales, visualizing time series data, data journalism, dashboards	2,4,6,7	
<b>Total</b>				<b>42</b>

## References:

- [1] Davy Cielen, Meysman, Mohamed Ali, "Introducing Data Science", Dreamtech Press
- [2] Kevin P. Murphy, "Machine Learning a Probabilistic Perspective", The MIT Press
- [3] Joel Grus, Data Science from Scratch: First Principles with Python, O'Reilly Media
- [4] Dean Abbott, "Applied Predictive Analytics: Principles and Techniques for the Professional Data Analyst", Wiley, 2014
- [5] Noel Cressie, Christopher K. Wikle, "Statistics for Spatio-Temporal Data, Wiley
- [6] Rachel Schutt and Cathy O'Neil, "Doing Data Science", O'Reilly Media
- [7] EMC Education Services, "Data Science and Big Data Analytics", Wiley
- [8] Peter Harrington "Machine Learning In Action", DreamTech Press
- [9] Ethem Alpaydin, "Introduction to Machine Learning", 3<sup>rd</sup> Edition, PHI





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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Fundamentals of Computational Intelligence

Course Code Old (2016-17): NA

Course Code New (Autonomy 2017-18): OE5

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: Open Elective Course

Change/Addition in the Syllabus: New Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Introduction to Computational Intelligence		
2	Basics of Artificial Neural Networks and Convolutional Neural Networks		
3	Fuzzy Controllers		
4	Basics of Natural Language Processing		
5	Statistics in Computational Intelligence	The course is an open elective meant for departments other than IT and Computers. It is a course offered by the computer engineering department for other departments.	100%

Name & Signature:

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## Theory Course Revision Report

### Theory Course Information

Course Name: Fundamentals of Data Structures and Algorithms

Course Code Old (2016-17): NA

Course Code New (Autonomy 2017-18): OE6

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: Open Elective Course

Change/Addition in the Syllabus: New Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	<b>Introduction to Data Structures</b> Introduction, Review of Stack, Queue and Linked List.	The course is an open elective meant for departments other than IT and Computers. It is a course offered by the computer engineering department for other departments.	100%
2	<b>Searching And sorting:</b> Searching: Linear Search, Binary Search. Sorting: Insertion sort, Merge sort.		
3	<b>Introduction to Algorithms</b> Algorithm development, Performance analysis, space and time complexity.		
4	<b>Growth of function</b> Big -Oh, Omega , Theta notation Analysis of insertion sort.		
5	<b>Divide and Conquer Approach</b> Analysis of Merge sort		
6	<b>Binary Trees</b> Representation, Binary Search Tree and its operations, Binary Tree Traversal, AVL Tree, B-tree		

Name & Signature:

(Dr. Sudhir Dhage)



*Sudhir*  
*Dr. Sudhir*



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**Department of Computer Engineering**

**Syllabus Revision Report**

**Undergraduate Program**

**2018-19**

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
<b>Computer Engineering</b>			
Embedded System & RTOS	CE54	2018-19	76
Embedded System & RTOS Lab	CEL54	2018-19	50
Enterprise Technology Lab	CEL55	2018-19	90
Minor Project-II	CEP66	2018-19	100





2018-19

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Computer Engineering Department

## Course Revision Report

### Project Information

Course Name: Minor Project - II

Course Code Old (2016-17): NA

Course Code New (Autonomy 2017-18): CEP66

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: TE Sem-VI

### Change/Addition in the Syllabus: New Course

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	Semester long research Project	Minor Project is based on small research project correlating scientific knowledge and day to day experience which encourages development of scientific attitude to solve real life problems among students. They may also continue minor project they had in semester V	100%

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## Lab Course Revision Report

### Lab Course Information

Course Name: Enterprise Technology Lab

Course Code Old (2016-17): CPL501

Course Code New (Autonomy 2017-18): CEL55

Class and Semester in Old Syllabus: SE Sem-IV

Class and Semesters in New Syllabus: TE Sem-V

#### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	<b>Title: Designing for User</b> 1.1 Understand User Interface Designing for Web Interfaces with Databases; Understand the core elements of User Experience Design [UXD] (five planes) Design a Map based UI (Web User) [Example: Transport applications like Ola,Uber etc. ] 3.2 Understand to select a device and define a prototype using wire frames and storyboarding; To Study of open source UX tools (Justinmind Prototype, Pidoco, Marvel Prototype) and create UX design for a given problem definition.	Learn to set UX goals, evaluate the prototype and test usability	9/10=90%
2	<b>Title: Understanding Database Concepts.</b> 2.1 Understanding No-Sql databases and use No- Sql databases such as Cassandra, HBase, Apache CouchDB, Couchbase, MongoDB etc. to perform CRUD and JOIN operations on No- Sql Databases. 3.3 Creating basic web app by using these framework which include database connectivity, user authentication.	Understanding real time databases such as Firebase, Rethink DB	
3	<b>Title: Understanding MVC Architecture and Prototype design</b> 3.1 Installation of MVC Architecture by using any one of the open source framework in Python – Django, Flask, Pyramid etc. or Java- Spring MVC, Struts 2, Hibernate etc.	Inculcating the MVC architecture.	
4	<b>Title: use of an open source server framework</b> 4.1 Understanding and use of Nodejs, Anuglarjs, Reactjs etc. 4.2 Perform operations by using this framework such as file management, database connectivity, email sending operations	Using and implementing server framework.	
5	<b>Title: Develop app for mobile device</b> 5.1 Create and map the database design in the five planes of UXD 5.2 Design App for any differently abled users.	Creating android apps.	

Name & Signature:

Aparna Malbe



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEL55	Enterprise Technology Lab	-	-	2	-	-	1	1
		Examination Scheme		ISE		MSE	ESE	Total
		40						40

**Pre-requisite Course Codes** CEL45 (Web Technology Lab)

At the End of the course students will be able to

Course Outcomes	CO1	Understand the user experience design principles.
	CO2	Understand No-Sql Concept and implement them for a specific user.
	CO3	Understand MVC Architecture and use it.
	CO4	Use of an open source server framework to enhance user experience[UX]
	CO5	Develop user-centric app for mobile device

Exp. No.	Experiment Details	Ref	Marks
1	<b>Title:</b> Designing for User 1.1 Understand User Interface Designing for Web Interfaces with Databases; Understand the core elements of User Experience Design [UXD] (five planes) Design a Map based UI (Web User) [Example: Transport applications like Ola, Uber etc.]	8.9, 10	05
2	<b>Title:</b> Understanding Database Concepts. 2.1 Understanding No-Sql databases and use No-Sql databases such as Cassandra, HBase, Apache CouchDB, Couchbase, MongoDB etc. to perform CRUD and JOIN operations on No-Sql Databases. 2.2 Understanding real time databases such as Firebase, RethinkDB etc.	1.6	05
3	<b>Title:</b> Understanding MVC Architecture and Prototype design 3.1 Installation of MVC Architecture by using any one of the open source framework in Python – Django, Flask, Pyramid etc. or Java- Spring MVC, Struts 2, Hibernate etc. 3.2 Understand to select a device and define a prototype using wireframes and storyboarding; To Study of open source UX tools (Justinmind Prototype, Pidoco, Marvel Prototype) and create UX design for a given problem definition. 3.3 Creating basic web app by using these framework which include database connectivity, user authentication,	2  9.1 0	05



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4	Title: use of an open source server framework 4.1 Understanding and use of Nodejs, Angularjs, Reactjs etc.	4.5 9.1 0	05
	4.2 Perform operations by using this framework such as file management, database connectivity, email sending operations.		05
5	Title: Develop app for mobile device 5.1 Create and map the database design in the five planes of UXD	6.7 9.1 0	05
	5.2 Design App for any differently abled users.		05
Total Marks			40

### References:

- (1) Adam Fowler ,NoSQL for Dummies Paperback by John Wiley & Sons.
- (2) GennadiyZlobin , Exploring Model View Controller , packt publications.
- (3) Bill Phillips ,Android Programming: The Big Nerd Ranch Guide , By Big Nerd Ranch
- (4) <https://nodejs.org/>
- (5) <https://angularjs.org>
- (6) <https://firebase.google.com/>
- (7) Nish Tahir ,Android Development with Kotlin , packt publications.
- (8) Wilbert O. Galitz, "The Essential Guide to User Interface Design", Wiley publication.
- (9) Rex Hartson and PardhaPyla, The UX Book, MK publications.
- (10) Russ Unger and Carolyn Chandler ,A Project Guide to UX Design, Peachpit Press

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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: Embedded System & RTOS Lab

Course Code Old (2016-17): CPE8032

Course Code New (Autonomy 2017-18): CEL54

Class and Semester in Old Syllabus: BE Sem-VII/VIII

Class and Semesters in New Syllabus: TE Sem-V

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	Write an Assembly program for ARM-7 LPC2148 processor and simulate various	To inculcate students with ARM-7 assembly coding. Most popular processor in handheld devices	5/10=50%
2	5 Write ADC and DAC program for ARM-7 LPC2148 processor and display the data on DSO, LCD.	To inculcate students with ARM-7 assembly coding. Most popular processor in handheld devices	
3	Write a program for Serial Communication using UART and display the data on PC serial terminal	To familiarize students with handling serial communications	
4	FreeRTOS implementation on LPC2148 and demonstrate various kernel objects utilization.	To understand working of kernel and freeRTOS	
5	Interface SDCARD and create a File and store the data from ADC	To provide interfacing knowledge using ADC and SDCARD	

Name & Signature:

(Dr. Y.S. Rao)

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEL54	Embedded System & RTOSLab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE	MSE	ESE	Total			
		40	-	-	40			

Pre-requisite Course Codes		--
At the End of the course students will be able to		
Course Outcomes	CEL54.1	Set-up simulation environment for programming microcontroller architectures.
	CEL54.2	Interface various peripherals with the microcontrollers.
	CEL54.3	Design and develop embedded system applications.
	CEL54.4	Test and debug embedded system applications.

Exp. No.	Experiment Details	Ref.	Marks
1	Write an Assembly program for ARM-7 LPC2148 processor and simulate various operating modes of the controller using compiler and debugger.	1-11	5
2	Interface LED matrix, Segment display to ARM-7 LPC2148 processor write a Embedded "C" program to display decimal numbers on the display	1-11	5
3	Interface 16x2 LCD Character display using ARM-7 LPC2148 processor and display data by using various modes.	1-11	5
4	Interface 4x4 Hex KBD to ARM-7 LPC2148 processor and display the scanned keyboard data on LCD	1-11	5
5	Write ADC and DAC program for ARM-7 LPC2148 processor and display the data on DSO, LCD.	1-11	5
6	Write a program for Serial Communication using UART and display the data on PC serial terminal	1-11	5
7	Interface a Stepper motor to ARM-7 LPC2148 and write a program to rotate the motor in forward and reverse direction with various speed modes.	1-11	5



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Date: 10/10/2012



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8	Interface Wi-Fi module to ARM-7 LPC2148 and implement Station mode and Access point for remote data (cloud/server) transfer of a Temperature sensor.	1-11	5
9	Free RTOS implementation on LPC2148 and demonstrate various kernel objects utilization.	1-11	**5
10	Interface SDCARD and create a File and store the data from ADC	1-11	**5
Total Marks			40

\*\*Note: Additional Two experiments are for fast learners.

**References:**

- [1] Jean J. Labrosse , "MicroC/OS-II: The Real Time Kernel"
- [2] Wayne Wolf, Computers as Components, Principles of Embedded Computing Systems Design, 2 nd Edition, Elsevier, 2008.
- [3] Andrew N Sloss, ARM system developer's guide
- [4] Rajkamal , Embedded Systems, TMH, Edition 2008.
- [5] Shibu K V, Introduction to Embedded Systems, Tata McGraw Hill, 2009
- [6] James K. Peckol, Embedded Systems, A contemporary Design Tool, Wiley India, 2008
- [7] Frank Vahid , Embedded Systems , Wiley India, Edition 2002
- [8] Steve Furber, ARM System-on-Chip Architecture Pearson Edition 2005
- [9] Tammy Neorgaard, Embedded Systems Architecture, Elsevier, 2005.
- [10] K.V.K Prasad, Embedded / Real-Time Systems: Concepts, Design and Programming Black Book
- [11] J R Gibson, ARM Assembly Language

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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Embedded System & RTOS  
Course Code Old (2016-17): CPE8032 (Embedded Systems)  
Course Code New (Autonomy 2017-18): CE54  
Class and Semester in Old Syllabus: BE Sem-VII/VIII  
Class and Semesters in New Syllabus: TE Sem-V

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	1.1 Brief history of Real Time Systems, A brief history of Embedded Systems. 1.2 Embedded Systems Philosophy, Embedded Design and Development Process, Comparison – General purpose CPU versus ASIC. 1.3 Embedded system components -Memory, Sensors (resistive, optical, position, thermal) and Actuators (solenoid valves, relay/switch, opto-couplers), Communication Interface, Embedded firmware (RTOSs, Drivers, Application programs), Power-supply, (Battery technology, Solar), PCB and Passive components	To introduce to give understanding of Embedded components.	32/42=76%
2	RTOS, POSIX standards, RTOS issues – selecting a Real Time Operating System, RTOS comparative study. 2.2 Free RTOS Scheduling and Task Management – Real-time scheduling, Task Creation, inter task Communication, Pipes, Semaphore, Message Queue, Signals, Sockets, Inter	To Real time and POSIX skills for better understanding of OS and its working.	
3	3.1 Introduction to ARM instruction set, addressing modes, operating modes with ARM core, ARMTDMI modes, ADC, Timers, Interrupt structure. Byte ordering (LE, BE), Thumb mode normal mode instructions changes, Pipeline utilization with all register	The new Ram processor are standard of handheld devices.	

*Bhavin Mehta* → 2018-2019  
(Dr. Y.S. Rao)  
  
*Dr. Y.S. Rao*

allocations. Compare with ARM7, ARM9, and ARM11 with new features additions. System design with ARM processor.

3.2 Case study-Embedded system such as vending machine, temperature Controller, automatic cruise control system, antilog braking system and traction control in vehicles

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Name & Signature:

(Dr. Y.S. Rao)



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CE54	Embedded System & RTOS	3	-	--	3	--	--	3
Examination Scheme								
		ISE		MSE	ESE		Total	
		20		20	60		100	

### Pre-requisite Course Codes

At end of successful completion of this course, student will be able to

Course Outcomes	CE54.1	Discuss the fundamentals of embedded systems.
	CE54.2	Choose hardware required for an embedded system.
	CE54.3	Design real time embedded systems using the concepts of RTOS.
	CE54.4	Create embedded systems software for given application.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Introduction:</b>	1,2,3	08
	1.1	Brief history of Real Time Systems, A brief history of Embedded Systems.		
	1.2	Embedded Systems Philosophy, Embedded Design and Development Process, Comparison – General purpose CPU versus ASIC.		
	1.3	Embedded system components -Memory, Sensors (resistive, optical, position, thermal) and Actuators (solenoid valves, relay/switch, opto-couplers), Communication Interface, Embedded firmware (RTOS, Drivers, Application programs), Power-supply (Battery technology, Solar), PCB and Passive components.		
2		<b>Real-Time Operating System</b>	1,2,3	14
2.1		Basics of RTOS: Real-time concepts, Hard Real time and Soft Real-time, differences between general purpose OS & RTOS, basic architecture of an RTOS, scheduling systems, inter-process communication, performance metric in scheduling models, interrupt management in RTOS environment, memory management, file systems, I/O systems, advantage and disadvantage of RTOS. POSIX standards, RTOS issues – selecting a Real Time Operating System, RTOS comparative study.		
	2.2	Free RTOS Scheduling and Task Management – Real-time		





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		scheduling, Task Creation, Inter task Communication, Pipes, Semaphore, Message Queue, Signals, Sockets, Interrupts.		
3		<b>CPU for Embedded System</b>	4,5,6, 7,8	14
	3.1	Introduction to ARM instruction set, addressing modes, operating modes with ARM core, ARM TDMI modes, ADC, Timers, Interrupt structure, Byte ordering (LE, BE), Thumb mode normal mode instructions changes, Pipeline utilization with all register allocations. Compare with ARM7, ARM9, and ARM11 with new features additions. System design with ARM processor.		
	3.2	Case study-Embedded system such as vending machine, temperature Controller, automatic cruise control system, antilog braking system and traction control in vehicles		
4		<b>Performance Analysis and Development Environment</b>	4,5,6, 7,8	06
	4.1	Efficiency Measures, Complexity Analysis, Analyzing code, Response Time, Time Loading, Memory Loading		
	4.2	Evaluating Performance, Performance Optimization, Hardware Accelerators		
	4.3	The Integrated Development Environment, Types of File generated on Cross Compilation, Dis-assembler /Decompiler, Simulators, Emulators, and Debugging, Target Hardware Debugging.		
				<b>Total 42</b>

### References:

- (1) Andrew N Sloss, ARM system developer's guide
- (2) Rajkamal , Embedded Systems, TMH, Edition 2008.R
- (3) Jean J. Labrosse , "MicroC/OS-II: The Real Time Kernel"
- (4) Wayne Wolf,Computers as Components, Principles of Embedded Computing Systems Design, 2 nd Edition, Elsevier, 2008.
- (5) Shibu K V, Introduction to Embedded Systems, Tata McGraw Hill, 2009
- (6) James K. Peckol, Embedded Systems, A contemporary Design Tool, Wiley India, 2008
- (7) Frank Vahid , Embedded Systems , Wiley India, Edition 2002
- (8) Steve Furber, ARM System-on-Chip Architecture Pearson Edition 2005
- (9) Tammy Neorgaard, Embedded Systems Architecture, Elsevier, 2005.
- (10) K.V.K Prasad, Embedded / Real-Time Systems: Concepts, Design and Programming Black Book
- (11) J R Gibson, ARM Assembly Language





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## Department of Computer Engineering

### Syllabus Revision Report

#### Undergraduate Program

2017-18

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
<b>Computer Engineering</b>			
Linux Lab	CEL35	2017-18	50
Advanced Data Structures Lab*	CEL31	2017-18	62.5
Digital Logic Design and Analysis Lab*	CEL32	2017-18	75
Foundation of Mathematics	BC	2017-18	100



## B.Tech. Second Year Computer Engineering

Course Code	Course Name	Percentage Change
SEM-III		
BS31	Applied Mathematics I*	19
CE31	Advanced Data Structures*	33.33
CE32	Digital Logic Design and Analysis*	34.42
CE33	Discrete Structures and Graph Theory	12
CE34	Object Oriented Programming*	21.42
CEL35	Linux Lab	100
CEL31	Advanced Data Structures Lab*	62.5
CEL32	Digital Logic Design and Analysis Lab*	75
CEL34	Object Oriented Programming Lab*	25
BS32	Human Health Systems Approach(Non-Credit)	-
SDX	SCOPE courses(Optional)	-
ABL1	Building Automation, Fire Safety and Electronic Security (Non-credit)	-
CEPI	Introduction to CEP (Optional)	-
BC	Fundamentals of Mathematics (Non-credit) (only for direct second year students)	-
SEM-IV		
BS41	Applied Mathematics II *	2.381
CE41	Design and Analysis of Algorithms*	23.8
CE42	Database Management Systems*	5
CE43	Operating Systems*	7.14
CE44	Computer Organization and Architecture*	9.52
CEL41	Design and Analysis of Algorithms Lab*	0
CEL42	Database Management Systems Lab*	25
CEL43	Operating Systems Lab*	12.25
CEL44	Computer Organization and Architecture Lab*	16.66
CEL45	Web Technology Lab	37.5
SDX	SCOPE courses(Optional)	-
ABL2	Liberal Arts (Non-credit) LA1: Yoga Vidya LA2: Music Appreciation LA3: Dramatics	-
CEP2	Introduction to CEP (Optional)	-
Average		27.47%



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Bharatiya Vidya Bhavan's  
**Sardar Patel Institute of Technology**  
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Computer Engineering Department

2017-18

## Theory Course Revision Report

### Theory Course Information

Course Name: Foundation of Mathematics

Course Code Old (2016-17): NA

Course Code New (Autonomy 2017-18): BC

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: SE Summer Sem-III

### Change/Addition in the Syllabus: New Course/Bridge Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Derivatives		
2	Integration		
3	Partial Differentiation		
4	Differential Equations of first & higher order		
5	Indeterminate forms		
6	Basics of Complex Numbers	The course is a bridge course for diploma (lateral) students who lacks expertise required for degrees education.	100%

Name & Signature: Meghana Naik  
*Meghana Naik*



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Applied Mathematics-I  
Course Code Old (2016-17): CSC301  
Course Code New (Autonomy 2017-18): BS31  
Class and Semester in Old Syllabus: SE SEM III  
Class and Semesters in New Syllabus: SE SEM III

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	<u>Mathematical Programming</u> Introduction to Linear Programming problems and its formulation. Graphical method to solve LPP in two variables, Simplex method to solve LPP, Artificial variables, Big -M method (method of penalty). Revised and two phase simplex methods Duality, Dual simplex method	Shifted to semester III from semester IV in old syllabus	19

Coordinators Name & Signature:

1) Meghana N.

*Meghana N.*  
23/2/18

2)

Experts Name & Signature:

1) Mr. C. R. Gajbhiye

*C. R. Gajbhiye*  
23/2/18

2)

3)



*EJ*

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

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Bharatiya Vidya Bhavan's  
**Sardar Patel Institute of Technology**  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Applied Mathematics-I

Course Code Old (2016-17): CSC301

Course Code New (Autonomy 2017-18): BS31

Class and Semester in Old Syllabus: SE SEM III

Class and Semesters in New Syllabus: SE SEM III

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Conformal Mapping, Linear, Bilinear transformations, Cross ratio, fixed points and standard transformation such as rotation and magnification, inversion, translation	<ul style="list-style-type: none"><li>Not relevant for Computer Engineering students as suggested by department faculties and members of Board of Studies.</li><li>Also, number of lectures for the course are reduced from 4 to 3 hours per week.</li></ul>
2	Unit step function, Heaviside function, Dirac-delta function, Periodic function and their Laplace transforms, Second shifting theorem.	
3	Fourier Integral Representation	
4	Vector Algebra and Calculus	Introduced gradient, divergence and curl in semester I as it is a prerequisite for first year physics course, suggested by physics faculties.

Coordinators Name & Signature:

1) Meghana N.

23/2/18

2)

Experts Name & Signature:

1) Mr. C. R. Gajbhiye

23/2/18

2)

3)

Dr. S. D. Patil

Dr. E. D. Patil



Bharatiya Vidya Bhavan's  
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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Advanced Data Structures  
 Course Code Old (2016-17): CSC303  
 Course Code New (Autonomy 2017-18): CE31  
 Class and Semester in Old Syllabus: S. E. Sem-III  
 Class and Semesters in New Syllabus: S. E. Sem-III

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	AVL Tree- Insertion, and Deletion Operations (02hrs)	To understand how searching can be done using AVL Tree	
2	Deleting a key from B-Trees (01hrs)	To understand how to search efficiently	(14/42)*100= 33.33%
3	Introduction to Multidimensional Trees, Segment trees, k-d trees, Point Quad trees (5hrs)	To understand the applicability of multidimensional trees in database	
4	Fibonacci heaps- Structure of Fibonacci heaps, Mergeable-heap, operations, Decreasing a key and deleting a node (Ghrs)	To understand the concept of Heap for arranging data	

Coordinators Name & Signature:

1) Prof. Nataasha Raul

Experts Name & Signature:

1) Prof. Nataasha Raul

2) Prof. Anand Godbole

3) Dr. Sudhir Dhage



\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Data Structures  
Course Code Old (2016-17): CSC303  
Course Code New (Autonomy 2017-18): CE31  
Class and Semester in Old Syllabus: S. E. Sem-III  
Class and Semesters in New Syllabus: S. E. Sem-III

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Arrays, Strings, Recursion, ADT (Abstract Data type), Concept of Files, Operations with files, types of files (05hrs)	Shifted to PMDS Subject Sem-II
2	Linked List Linked List as an ADT, Linked List Vs. Arrays, Memory Allocation & De-allocation for a Linked List, Linked List operations, (04hrs)	Shifted to PMDS Subject Sem-II
3	The Stack as an ADT, Stack operation, Array Representation of Stack, Link Representation of Stack, Application of stack – Recursion, Polish Notation (04 hrs)	Shifted to PMDS Subject Sem-II
4	The Queue as an ADT, Queue operation, Array Representation of Queue, Linked Representation of Queue, Circular Queue, Priority Queue, & De -queue, Application of Queues – Johnsons Algorithm, Simulation (05 hrs)	Shifted to PMDS Subject Sem-II
5	Threaded Binary Tree Huffman Algorithm (02 hrs)	Removed due to hour constraint Shifted to Design and Analysis of Algorithms (DAA) Subject Sem-IV
6	Sorting : Sort Concept, Shell Sort, Radix sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort Searching : List Search, Linear Index Search, Index Sequential Search and Hashed List Search, (06 hrs)	Not needed as Data Structures Shifted to Design and Analysis of Algorithms (DAA) Subject Sem-IV Not needed as Data Structures

Coordinators Name & Signature:

1) Prof. Nataasha Raul — NN Raul

Experts Name & Signature:

1) Prof. Nataasha Raul — NN Raul

2) Prof. Anand Godbole

3) Dr. Sudhir Dhage



*[Signature]*

*[Signature]*



Bharatiya Vidya Bhavan's  
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 Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: Advanced Data Structures  
 Course Code Old (2016-17): CSC303  
 Course Code New (Autonomy 2017-18): CEL31  
 Class and Semester in Old Syllabus: S.E. Sem-III  
 Class and Semesters in New Syllabus: S.E. Sem-III

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	Implement a given scenario using Linked List. (04hrs)	To understand the applicability of Linked list	(5/8)*100= 62.5%
2	Develop an application to explore the uses of an AVL tree (02hrs)	To understand how to search the data	
3	Develop Search application using B-Tree. (02hrs)	To understand how to search the data	
4	Demonstrate an application using B+ Tree (02hrs)	To understand how to search the data	
5	Traverse a Graph using Graph Traversal Technique (04hrs)	To know how to perform traversing	

Coordinators Name & Signature:

1. Prof. Nataasha Raul — NNRaul
2. Prof. Sunil Ghane — BG

Experts Name & Signature:

1. Prof. Nataasha Raul (Coordinator) — NNRaul
2. Prof. Anand Godbole — AG
3. Dr. Sudhir Dhage — SD



\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100

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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: Data Structures

Course Code Old (2016-17): CSC303

Course Code New (Autonomy 2017-18): CEL31

Class and Semester in Old Syllabus: SE Sem-III

Class and Semesters in New Syllabus: SE Sem-III

### Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
1	Implementation of Tower of Hanoi.	Topic not there in ADS Theory
2	Implementations of stack menu driven program.	Shifted to PMDS Subject Sem-II
3	Implementations of Infix to Postfix Transformation and its evaluation program.	Topic not there in ADS Theory
4	Implementations of double ended queue menu driven program.	Topic not there in ADS Theory
5	Implementation of Circular Queue Menu Driven program	Shifted to PMDS Subject Sem-II
6	Implementations of Shell sort, Radix sort and Insertion sort menu driven program	Topic not there in ADS Theory
7	Implementations of searching methods menu driven program.	Topic not there in ADS Theory
8	Implementation of different operations on linked list – copy, concatenate, split, reverse, count no. of nodes etc.	Topic not there in ADS Theory
9	Implementations of Binary Tree menu driven program	Removed
10	Implementation of various operations on tree like – copying tree, mirroring a tree, counting the number of nodes in the tree, counting only leaf nodes in the tree.	Topic not there in ADS Theory

Coordinators Name & Signature:

Prof. Nataasha Raul — NNRaul

Prof. Sunil Ghane — SG

Experts Name & Signature:

1. Prof. Nataasha Raul (Coordinator) — NNRaul

2. Prof. Anand Godbole — AnGodbole

3. Dr.Sudhir Dhage — SudhirDhage



SPIT  
Mumbai

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Subject Code	Subject Name	Credits
CSC303	Data Structures (DS)	5

## Course Objectives

1. To teach efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data structures.
3. To introduce various techniques for representation of the data in the real world.
4. To develop application using data structures.
5. To teach the concept of protection and management of data.
6. To improve the logical ability

## Course Outcomes

1. Student will be able to choose appropriate data structure as applied to specified problem definition.
2. Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
4. Students will be able to use linear and non-linear data structures like stacks , queues , linked list etc.

Module	Detailed content	Hours	
01	<b>Introduction to Data Structure</b> <i>shifted to sem - II (PmDS)</i> Types of Data Structure, Arrays, Strings, Recursion, ADT (Abstract Data type),Concept of Files,Operations with files, types of files	05	05
<b>Linear Data Structure</b>			
02	<b>Linked List</b> <i>shifted to sem - II (PmDS)</i> Linked List as an ADT, Linked List Vs. Arrays, Memory Allocation & De-allocation for a Linked List, Linked List operations, Types of Linked List, Implementation of Linked List, Application of Linked List-polynomial, sparse matrix.	10	05
03	<b>STACK</b> <i>Introduced in PmDS</i> The Stack as an ADT, Stack operation, Array Representation of Stack, Link Representation of Stack, Application of stack – Recursion, Polish Notation	04	04
04	<b>Queues</b> <i>Introduced in PmDS.</i> The Queue as an ADT, Queic operation, Array Representation of Queue, Linked Representation of Queue, Circular Queue, Priority Queue, & De-queue, Application of Queues – Johnsons Algorishm, Simulation	05	05



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## Theory Examination:

1. Question paper will comprise of total 6 questions, each of 20 Marks.
2. Only 4 questions need to be solved.
3. Question 1 will be compulsory and based on maximum part of the syllabus.
4. Remaining questions will be mixed in nature (for example suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)

In question paper, weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

## Suggested Experiments:

Note: Students are required to complete 12 experiments. The star (\*) marks experiments are mandatory.

Linked List
<ul style="list-style-type: none"><li>• Implementations of Linked Lists menu driven program.</li><li>• * Implementation of different operations on linked list – copy, concatenate, split, reverse, count no. of nodes etc</li><li>• Representation of Sparse matrix using multilinked structure. Implementation of sparse matrix multiplication.</li><li>• Implementation of polynomials operations ( addition, subtraction) using Linked List.</li><li>• Implementations of Linked Lists menu driven program (stack and queue)</li><li>• Implementations of Double ended queue using Linked Lists.</li><li>• Implementation of Priority queue program using Linked List</li></ul>
Stack
<ul style="list-style-type: none"><li>• Implementations of stack menu driven program</li><li>• Implementation of multistack in one array.</li><li>• * Implementations of Infix to Postfix Transformation and its evaluation program.</li><li>• Implementations of Infix to Prefix Transformation and its evaluation program.</li><li>• Simulation of recursion</li></ul>
Queue
<ul style="list-style-type: none"><li>• Implementations of circular queue menu driven program</li><li>• * Implementations of double ended queue menu driven program</li><li>• Implementations of queue menu driven program</li><li>• Implementation of Priority queue program using array.</li><li>• Implementation of Johnsons Algorithm</li><li>• Implementation of Simulation Problem</li></ul>
Tree





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CE31	Advanced Data Structures	3	--	--	3	--	--	3
		Examination Scheme						
		Theory Marks						
		ISE		MSE		ESE		
		10		30		100(60% Weightage)		

Pre-requisite Course Codes ES4 (Programming Methodology and Data Structures)

At the end of successful completion the course, students will be able to

Course Outcomes	CO1	Apply various operations like traversing, retrieving, storing data using linear and non-linear data structures.
	CO2	Demonstrate and apply concepts of Trees and Graphs to a given problem.
	CO3	Compare various Heap Structure
	CO4	Summarize hashing and collision resolution techniques

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Linear and Non-linear Data Structures</b> Introduction to Data Structures (Stack, Queue and Singly Linked List), Circular Linked List, Doubly Linked List, Application of Linked List.	1,2	05
2	2.1	<b>Trees</b> Binary Tree Terminology, Binary Search Tree and its operations, Binary Tree Traversal, Expression Tree	1,2	04
	2.2	AVL Trees- Properties of AVL trees, Rotations, Insertion, and Deletion — <u>Introduced / Added</u>	1,2	03
	2.3	B-Trees- Definition of B-trees, Basic operation of B-Trees, Deleting a key from B-Trees — <u>Introduced / Added</u>	1,2	04
	2.4	Introduction to B+ Trees	1,2	03
	2.4	Introduction to Multidimensional Trees, Segment trees, k-d trees, Point Quad trees — <u>Introduced / Added</u>	3	05
3	3.1	<b>Heap Structure</b> Introduction to Heap Structures, Min Heap, Max Heap, Construction of Heap	2	04

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**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEL31	Advanced Data Structures Lab	--	--	2	--	--	1	1
Examination Scheme								
Course Outcomes	ISE	ESE			Total		Total	
		Practical	Oral					
		40	10		10	60		

<b>Pre-requisite Course Codes</b>	ES4(Programming Methodology and Data Structures)
At the end of successful completion the course, students will be able to	
CO1	Experiment with Linked List Operations
CO2	Demonstrate the Operations of Trees and Graphs
CO3	Construct different Heap structures
CO4	Make use of different hashing and collision resolution techniques

Exp. No.	Experiment Details	Ref.	Marks
1	Implement a given scenario using Linked List. <i>Added</i>	1,2	5
2	Construct an expression tree using Binary Trees Concept	1,2	5
3	Develop an application to explore the uses of an AVL tree	1,2	5
4	Develop Search application using B-Tree. <i>Added</i>	1,2	5
5	Demonstrate an application using B+ Tree <i>Added</i>	1,2	5
6	Implement Operations of Heap Structures	2	5
7	Implement hash functions with different collision resolution techniques	1,2	5
8	Traverse a Graph using Graph Traversal Technique <i>Added</i>	1,2	5
Total Marks			40

**References:**

- [1] Thomas H.Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", MIT Press, Massachusetts, 2009.
- [2] Horowitz E, Sahni S and S.Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications, New Delhi, 2010

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SARDAR PATEL INSTITUTE OF TECHNOLOGY  
MUNSHI NAGAR, ANDHERI (WEST), MUMBAI - 400 058.

Subject: Advanced Data Structures (CE31)

Class: S.E. COMPUTERS

Semester: III

Experiment List

1. Problem Statement:

Find the first circular tour that visits all petrol pumps

[CO1]

Suppose there is a circle. There are n petrol pumps on that circle. You are given two sets of data.

i. The amount of petrol that every petrol pump has.

ii. Distance from that petrol pump to the next petrol pump.

*Questions:*

a. Which data structure will be used to represent the structure for solving the problem? Justify it.

b. Design and implement the given scenario using linked list

c. Find the first point from where a truck will be able to complete the circle (The truck will stop at each petrol pump and it has infinite capacity).

Assume for 1 litre petrol, the truck can go 1 unit of distance.

2. An airline company is interested in airline route among seven cities: Delhi, Mumbai, Jaipur, Pune, Bangalore, Ahmedabad and Goa. It flies on the following routes: [CO2]

a) Ahmedabad to Goa

b) Ahmedabad to Pune

c) Bangalore to Jaipur

d) Bangalore to Pune

e) Delhi to Jaipur

f) Delhi to Mumbai

g) Goa to Ahmedabad

h) Jaipur to Ahmedabad

i) Jaipur to Delhi

j) Jaipur to Goa

k) Mumbai to Pune

l) Pune to Bangalore

m) Pune to Mumbai

*Questions:*

a. Which data structure will be used to represent the structure for solving the problem?

Justify it.

b. Design, apply and implement a strategy to find the route (direct or indirect) from one city to another city.

c. Is there any route from Delhi to Goa? (Answer this by analyzing the graph).

3. a. Implement the hash concept by hashing the given 'n' keys using modulo division method and solve the collision using quadratic probing method. (Batch A,B and C)

b. Implement the hash concept by hashing the given 'n' keys using modulo division method and solve the collision using linear probing method. (Batch D and E) [CO4]

4. Construct an expression tree using postfix expression

[CO2]

*Questions:*

a. Convert an infix expression into postfix

b. Construct a tree for the above postfix expression



Academic Year 2017-18

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5. Implementation of an AVL tree Operations( Insert and Delete) [CO2]
- Questions:*
- a. For the given sequence of keys build an AVL tree.
  - b. At each stages show balance factors of all nodes and type of rotation used for balancing.
6. Construct B-Tree of order 3 for the given sequence of keys and perform search operation on it. [CO2]
7. Construct B+ Tree of order 5 for the given sequence of keys. [CO2]
8. Implementation of a Min-Max Heap Structures. [CO3]

**Subject Incharge**

Prof. Nataasha Raul



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*[Signature]*



Bharatiya Vidya Bhavan's  
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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Digital Logic Design and Analysis

Course Code Old (2016-17): CSC304

Course Code New (Autonomy 2017-18): CE32

Class and Semester in Old Syllabus: III S.E. Computer

Class and Semesters in New Syllabus: III S.E. Computer

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Timing Considerations and Metastability (2Hrs.)	Design Learning aspects in depth	(14 / 42 ) * 100 = 34.42%
2	Mealy and Moore Machines, Clocked synchronous state machine analysis, State reduction techniques and state assignment, Clocked synchronous state machine design. (4 Hrs.)	Learning Practical Design aspects in Depth	
3	MSI counters and applications.(3 Hrs.)	To learn Designing with MSI Devices	
4	Concepts of Programmable Array logic (PAL) and Programming Logic Array (PLA)(5 Hrs.)	To Learn Various Programmable Devices	
5			

Coordinators Name & Signature:

1) Prof. A. A. Godbole AAG Godbole

2)

Experts Name & Signature:

1) Prof. A. a. Godbole AAG Godbole

2) Prof. Jyoti Ramteke. Jyoti Ramteke

3) Prof. Prachi Gharpure P. Gharpure



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\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Digital Logic Design and Analysis

Course Code Old (2016-17): CSC304

Course Code New (Autonomy 2017-18): CE32

Class and Semester in Old Syllabus: III S.E. Computer

Class and Semesters in New Syllabus: III S.E. Computer

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Error Detection and Correction Codes.	Shifted to DCN T.E. computer in autonomous syllabus
2	Functional Simulation , Timing Simulation, Logic synthesis, Introduction to VHDL, Framework of VHDL program( Syntax and programming to be done only during Practicals)	Shifted to COA S.E. Computer subject in sem. IV in autonomous syllabus.
3		
4		
5		

### Coordinators Name & Signature:

1) Prof. A. A. Godbole

2)

### Experts Name & Signature:

1) Prof. A. a. Godbole

2) Prof. Jyoti Ramteke.

3) Prof. Prachi Gharpure





Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: Digital Logic Design Analysis

Course Code Old (2016-17): CSC304

Course Code New (Autonomy 2017-18): CEL32

Class and Semester in Old Syllabus: Sem. III S.E. COMP

Class and Semesters in New Syllabus: Sem. III S.E. COMP

\* Old syllabus was not having separate list for practical.

Term work should consist of at least 12 experiments out of which at least 2 to be VHDL based

#### Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
1	VHDL Experiments ( 2 numbers)	Shifted to COA subject in sem. IV in autonomous syllabus.
2		
3		
4		
5		

Coordinators Name & Signature:

1) Prof. A. A. Godbole

2)

Experts Name & Signature:

1) Prof. A. A. Godbole

2) Prof. Jyoti Ramteke

3) Prof. Prachi Gharpure.





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## Lab Course Revision Report

### Lab Course Information

Course Name: Digital Logic Design Analysis

Course Code Old (2016-17): CSC304

Course Code New (Autonomy 2017-18): CEL32

Class and Semester in Old Syllabus: Sem. III S.E. COMP

Class and Semesters in New Syllabus: Sem. III S.E. COMP

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	To implement 4-bit, 5-bit and 8 bit comparator using MSI-ICs .	To teach use of MSI devices in depth.	6 / 8 * 100 = 75.00%
2	To implement gate level multiplexers and MSI multiplexers.	To teach use of MSI devices in depth.	
3	To design and implement MSI circuits of flip-flops.	To teach use of MSI devices in depth.	
4	To design and implement mod 4 synchronous up/down counter using JK flip-flop.	To teach use of MSI devices in depth.	
5	To configure MSI devices as asynchronous counter, synchronous counter as synchronous counters and universal shift register.	To teach use of MSI devices in depth.	
6	Mini-Project: Design and implement an application using digital circuit concepts	To teach use of MSI devices and teach simulation of .	

Coordinators Name & Signature:

1) Prof. A. A. Godbole

2)

Experts Name & Signature:

1) Prof. A. A. Godbole

2) Prof. Jyoti Ramteke

3) Prof. Prachi Gharpure



\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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## Theory Course Revision Report

### Theory Course Information

Course Name: Discrete Structures and Graph Theory

Course Code Old (2016-17): Discrete Structures (Code -CSC 305)

Course Code New (Autonomy 2017-18): CE33

Class and Semester in Old Syllabus: S.E Semester - III

Class and Semesters in New Syllabus: S.E Semester -III

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Extended Pigeon Hole Principle	For in depth coverage of this topic	12 %
2	Function: Invertible	For in depth coverage of this topic	
3	Recurrence Relation: Homogeneous Solution, Particular Solution and Total Solution	Subtopics are mentioned explicitly in order to cover them in depth.	
4	Graph Theory : Bipartite Graphs	Seeing various research applications	
5	Transport Network, Max Flows, Matching Problems, Maximum Bipartite Matching	Seeing the practical applications of the topic eg: scheduling problem, Baseball elimination problem	

### Coordinators Name & Signature:

1) Prof. Kiran Gawande

*Gawande*  
23/02/18 [Ms. K. Gawande]

2) Prof. Deepshree Vibhandik

*D. Vibhandik*  
26/2/18

### Experts Name & Signature:

1) Prof. Kiran Gawande

*X*  
*Kiran*  
*Gawande*

2) Dr. Anant Nirmkar

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*Anant*  
*Nirmkar*

3) Prof. Soni Bhambhani

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*Bhambhani*



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\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Discrete Structures and Graph Theory

Course Code Old (2016-17): Discrete Structures (Code -CSC 305)

Course Code New (Autonomy 2017-18): CE33

Class and Semester in Old Syllabus: S.E Semester - III

Class and Semesters in New Syllabus: S.E Semester - III

### **Removal from Syllabus:**

Sr. No.	Topics Removed	Reason
1	Nil	
2		
3		
4		
5		

Coordinators Name & Signature:

1) K. Grawande

2)

Experts Name & Signature:

1) K. Grawande

2) Dr. Anant V. Nimbalkar -

3)





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## Theory Course Revision Report

### Theory Course Information

Course Name: Object Oriented Programming

Course Code Old (2016-17): CSC302

Course Code New (Autonomy 2017-18): CE34

Class and Semester in Old Syllabus: SE Computer Sem-3

Class and Semesters in New Syllabus: SE Computer Sem-3

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Object class & its methods	Parent of all classes is Object, so it is necessary to study its methods	
2	Nested class	To explore it	
3	Collection - HashMap, HashSet, Comparable & Comparator	To explore new Collection classes	
4	Input & Output	To have ideas of character & byte stream classes	
	Coordinators Name & Signature:		
1)	Prof. Soni Bhambar <u>Bhambar</u>		
2)	Prof. Natasha Paul <u>NN Paul</u>		
	Experts Name & Signature:		
1)	Reeta Koshy <u>Reeta</u>		
2)	Swapnali Kerkade <u>Swapnali</u>		
3)	<u>Seenu</u>		



\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Object Oriented Programming

Course Code Old (2016-17): CSC302

Course Code New (Autonomy 2017-18): CE34

Class and Semester in Old Syllabus: SE Computer Sem-3

Class and Semesters in New Syllabus: SE Computer Sem-3

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Module 1	Covered in Software Engg.
2	Module 2 → Coupling and cohesion,	
3	Sufficiency Completeness & Reusability	Covered in Software Engg.
4	Meta Class	Covered in Software Engg.
5	Vector	They are very old & are deprecated.
6	Applet Programming	Covered in Mini Project.

### Coordinators Name & Signature:

- 1) Prof. Loui Bhambar Loui Bhambar
- 2) Prof. Natasha Paul NN Paul

### Experts Name & Signature:

- 1) Reeta Koshy Reeta Koshy
- 2) Swapnali Kurhade Swapnali Kurhade
- 3)



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## Lab Course Revision Report

### Lab Course Information

Course Name: Object Oriented Programming Lab.

Course Code Old (2016-17):

Course Code New (Autonomy 2017-18): CEL 34

Class and Semester in Old Syllabus: SE Computer Sem -3

Class and Semesters in New Syllabus: SE Computer Sem -3

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	Miniproject	To apply the basic concepts & explore advance Java concepts	2/8 = 25%
2			
3			
4			
5			

### Coordinators Name & Signature:

- 1) Prof. Louie Bhambar Bhambar Jyoti Rantekar Jyotikar
- 2) Prof. Vishal Patil Vishal

### Experts Name & Signature:

- 1) Reeta Koshy Reeta
- 2) Swapnali kushade Swapnali
- 3)

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\*\* Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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## Lab Course Revision Report

### Lab Course Information

Course Name: Object Oriented Programming Lab

Course Code Old (2016-17):

Course Code New (Autonomy 2017-18): CEE34

Class and Semester in Old Syllabus: SE Semester -3

Class and Semesters in New Syllabus: SE Computer Semester -3

### Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
1	Nil	Nil
2		
3		
4		
5		

Coordinators Name & Signature:

- 1) Prof. Loni Bhamber Yotika Rantike
- 2) Prof. Vilas Patil

Experts Name & Signature:

- 1) Reeta Koshy Swapnali Kurhade
- 2)
- 3)





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## Lab Course Revision Report

### Lab Course Information

Course Name: **Linux Lab**

Course Code Old (2016-17): -----NA-----

Course Code New (Autonomy 2017-18): CEL35

Class and Semester in Old Syllabus: -----NA-----

Class and Semesters in New Syllabus: BTech(Computer Engineering) 2<sup>nd</sup> Year, Semester - III

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	Linux Installation and File System		
2	Managing Software (Binaries and Source)		
3	Linux Commands		
4	User Administration		
5	Shell Scripting		
6	Shell Function and Cron		
7	Text Processing and Manipulation		
8	Managing Disk and File System	Linux is used heavily in the entire BTech program. Further Linux OS is used by Final Year students for their projects. Thus, Linux Lab course is used for the use and administration of Linux by under-graduate students.	8/8*100=100%

### Coordinators Name & Signature:

1) Dr. Anant V. Nimkar

2) Prof. Abhijeet Salunke

### Experts Name & Signature:

1) Dr. Sudhir Dhage

2)

3)



\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100

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**Sardar Patel Institute of Technology**  
 Bhayani's Campus, Mundra Nagar, Andheri (West), Mumbai-400059, India  
 (Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)	Credits Assigned					
		L	T	P	L	T	P	Total
CE135	Linux Lab		-	-	2	-	-	1
			<u>Examination Scheme</u>					
			ISE	Practical		Oral	Total	
			40	10		10	60	

Pre-requisite Course Codes

At the end of successful completion the course, students will be able to demonstrate the knowledge of Linux file structure and installation process.

- (CO1) Select and apply appropriate Linux command and utility to get desired output/results.
- (CO2) Apply administrative skill for system and user management.
- (CO3) Manipulate and manage file system, disk and software.
- (CO4) Use Text processing Utilities.
- (CO5) Write Shell script and Shell Function.

Exp. No.	Experiment Details	Ref.	Marks
1.	<u>Linux Installation and File System</u> content: Introduction to OS (Linux, rpm, debian) Installation of Linux(Debian initialization) Linux File Structure	1, 2, 3, 4, 5	5
2.	<u>Manage Software (Binaries and Source)</u> content: User root user account Using Administrative Commands and Files Using Different run level Managing software using apt-get Getting a package using wget Zip, Tar, Gunzip, Bzip	1, 2, 3, 4	5
3.	<u>Linux Commands</u> content: File Management Commands (i.e. rm, cp, mv,	1, 2, 3, 4, 5	5

References:

File Management Commands (i.e. rm, cp, mv,

(m.)	<ul style="list-style-type: none"> <li>- Directories &amp; command (cd, pwd, rm/rm, rm/rm, mv/mv, rm/rm, mv/mv)</li> <li>- Pipes and files commands(pgrep, sort, more)</li> <li>- Process Management Commands(p, top, kill)</li> <li>- Linux Editors(vim, nano,gedit)</li> </ul>		
User Administration			
content:			
4.	<ul style="list-style-type: none"> <li>- Add and manage User</li> <li>- Add and manage Group</li> <li>- Setting Permission with ACL</li> <li>- Adding Directories for user to collaborate.</li> <li>- File Permission Managing Commands(chmod, chown, chmod)</li> </ul>	1, 2, 3, 4, 5	5
Shell Scripting			
content:			
5.	<ul style="list-style-type: none"> <li>- Shell scripting(Bashrc and C Shell, Shelling Command, Basic Shell and Extended Shell).</li> <li>- Using Variables, Special Variables, Arrays in Shell Script</li> <li>- Using these Operators in Shell Script</li> <li>- Using Decision making Statements, Loops and Loop Control in Shell Script</li> <li>- Shell Functions and Crcn</li> </ul>	1, 2, 3, 4, 5	5
Text Processing			
content:			
6.	<ul style="list-style-type: none"> <li>- Shell Functions</li> <li>- Using Substitution, Quoting mechanism, IO redirection in Shell Script</li> <li>- Crcn and Shell Script</li> </ul>	1, 2, 3, 4, 5	5
Management and Manipulation			
content:			
7.	<ul style="list-style-type: none"> <li>- SED</li> <li>- AWK</li> <li>- GAWK</li> </ul>	1, 2, 3, 4, 5	5
Managing Disk and File System			
content:			
8.	<ul style="list-style-type: none"> <li>- Partitioning Disk</li> <li>- Managing File system</li> <li>- Creating, creating and managing LVM(Logical Volume Manager)</li> </ul>	1, 2, 3, 4, 5	5
Total Marks	40		



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Applied Mathematics-II  
Course Code Old (2016-17): CSC401  
Course Code New (Autonomy 2017-18): BS41  
Class and Semester in Old Syllabus: SE SEM- IV  
Class and Semesters in New Syllabus: SE SEM- IV

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Application to finding Google Page Rank	Utilized by computers students to perform search optimization	2.381%

Coordinators Name & Signature:

1) Mr. C. R. Gajbhiye

Experts Name & Signature:

1) Mrs. Meghana Naik

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Applied Mathematics-II

Course Code Old (2016-17): CSC401

Course Code New (Autonomy 2017-18): BS41

Class and Semester in Old Syllabus: SE SEM- IV

Class and Semesters in New Syllabus: SE SEM- IV

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Complex Integration:- Line Integral, Cauchy's Integral theorem for simply connected regions, Cauchy's Integral formula (without proof), Taylor and Laurent's series (without proof), Zeros, poles of $f(z)$ , Residues, Cauchy's Residue theorem , Application of Residue theorem to evaluate integrals	<ul style="list-style-type: none"><li>Not relevant for Computer Engineering students as suggested by department faculties and members of board of studies.</li><li>Also number of lectures for the course are reduced from 4 to 3 hours per week.</li><li>Mathematical programming is shifted to Sem-III in Autonomy syllabus.</li></ul>
2	Mathematical Programming 6.1 Types of solution, Standard and Canonical form of LPP, Basic and feasible solutions, simplex method. 6.2 Artificial variables, Big -M method (method of penalty). 6.3 Duality, Dual simplex method. 6.4 Non Linear Programming:- Problems with equality constraints and inequality constraints (No formulation, No Graphical method)	

Coordinators Name & Signature:

1) Mr. C. R. Gajbhiye

Experts Name & Signature:

1) Mrs. Meghana Naik





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## Theory Course Revision Report

### Theory Course Information

Course Name: Design and Analysis of Algorithms

Course Code Old (2016-17): CSC402

Course Code New (Autonomy 2017-18): CE41

Class and Semester in Old Syllabus: S. E. Sem-IV

Class and Semesters in New Syllabus: S. E. Sem-IV

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Assembly-line scheduling, Huffman code Algorithm (02 hrs)	To have more exposure to Dynamic Programming and Greedy Approach	(10/42)*100 =23.8 %
2	Linear Programming: Standard and slack forms Formulating problems as linear problems The simplex algorithm Duality The initial basic feasible solution (08 hrs)	To teach principles of optimization using Dynamic Programming.	

Coordinators Name & Signature:

1) Prof. Nataasha Raul

Experts Name & Signature:

1. Dr. Sudhir Dhage

2. Prof. Anand Godbole

3. Prof. Sunil Ghane



\*\* Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



Bharatiya Vidya Bhavan's  
**Sardar Patel Institute of Technology**  
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Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Analysis of Algorithms

Course Code Old (2016-17): CSC402

Course Code New (Autonomy 2017-18): CE41

Class and Semester in Old Syllabus: S. E. Sem-IV

Class and Semesters in New Syllabus: S. E. Sem-IV

#### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Decision and analysis fundamentals, Randomized algorithms and Recursive algorithms	Number of teaching hour constraint due to which only few algorithms explaining the analysis was introduced and rest was removed
2	The problem of multiplying long integers, constructing Tennis tournament	only few algorithms explaining the divide and conquer approach was kept and rest was removed
3	Job sequencing with deadlines, Optimal storage on tapes	only few algorithms explaining the greedy approach was kept and rest was removed
4	Multistage graphs, All pair shortest path, single source shortest path, Optimal Binary Search Tree, Flow shop scheduling	only few algorithms explaining the dynamic programming approach was kept and others were removed

Coordinators Name & Signature:

1) Prof. Nataasha Raul

Experts Name & Signature:

1. Dr.Sudhir Dhage

2. Prof. Anand Godbole

3. Prof. Sunil Ghane





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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: Design and Analysis of Algorithms

Course Code Old (2016-17): CSC402

Course Code New (Autonomy 2017-18): CEL41

Class and Semester in Old Syllabus: S. E. Sem-IV

Class and Semesters in New Syllabus: S. E. Sem-IV

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
	No Change	All the experiment related to the module was included in experiment details	0 %

Coordinators Name & Signature:

Prof. Nataasha Raul

Experts Name & Signature:

1. Dr.Sudhir Dhage

2. Prof. Anand Godbole

3. Prof. Sunil Ghane

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100





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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: Analysis of Algorithms

Course Code Old (2016-17): CSC402

Course Code New (Autonomy 2017-18): CEL41

Class and Semester in Old Syllabus: S. E. Sem-IV

Class and Semesters in New Syllabus: S. E. Sem-IV

#### Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
	No Change	All the experiment related to the module was included in experiment details

Coordinators Name & Signature:

Prof. Nataasha Raul

Experts Name & Signature:

1. Dr. Sudhir Dhage

2. Prof. Anand Godbole

3. Prof. Sunil Ghane



Subject Code	Subject Name	Credits
CSC402	Analysis of Algorithm	5

**Prerequisites :** Students should be familiar with Data structure concepts , Discrete structures

### Course Objectives:

1. To teach various problem solving strategies..
2. To teach mathematical background for algorithm analysis and implementation of various strategies like divide and conquer, Greedy method, Dynamic programming , Backtracking , branch and bound
3. To teach different string matching algorithms.

### Course Outcomes:

1. Ability to select appropriate problem solving strategies.
2. Ability to calculate time complexity and space complexity of an algorithm.
3. Ability to analyze different divide and conquer problems.
4. Ability to analyze different greedy method problems.
5. Ability to analyze different dynamic programming problems.
6. Ability to analyze different backtracking problems.
7. Ability to analyze different string matching algorithms.

Module	Detailed Content	Hrs.
1	<b>Introduction to analysis of algorithm</b> <ul style="list-style-type: none"> <li>• Decision and analysis fundamentals <i>Removed</i></li> <li>• Performance analysis , space and time complexity</li> <li>• Growth of function – Big –Oh ,Omega , Theta notation</li> <li>• Mathematical background for algorithm analysis</li> <li>• Analysis of selection sort , insertion sort</li> <li>• Randomized algorithms</li> <li>• Recursive algorithms <i>3 Removed</i></li> <li>• The substitution method</li> <li>• Recursion tree method</li> <li>• - Master method</li> </ul>	11
2	<b>Divide and Conquer</b> <ul style="list-style-type: none"> <li>• General method</li> <li>• Binary search</li> <li>• Finding minimum and maximum</li> <li>• Merge sort analysis</li> <li>• Quick sort analysis</li> <li>• Strassen's matrix multiplication</li> <li>• The problem of multiplying long integers <i>Removed.</i></li> </ul>	07



	<ul style="list-style-type: none"> <li>- constructing Tennis tournament</li> </ul>	<i>Removed.</i>	
3	<b>Greedy Method</b> <ul style="list-style-type: none"> <li>General Method</li> <li>Knapsack problem</li> <li>Job sequencing with deadlines</li> <li>Minimum cost spanning trees-Kruskal and prim's algorithm</li> <li>Optimal storage on tapes</li> <li>- Single source shortest path</li> </ul>	<i>Removed.</i>	07
4	<b>Dynamic Programming</b> <ul style="list-style-type: none"> <li>General Method</li> <li>Multistage graphs</li> <li>all pair shortest path</li> <li>single source shortest path</li> <li>Optimal binary search tree</li> <li>0/1 knapsack</li> <li>Travelling salesman problem</li> <li>- Flow shop scheduling</li> </ul>	<i>Removed.</i>	08
5	<b>Backtracking</b> <ul style="list-style-type: none"> <li>General Method</li> <li>8 queen problem( N-queen problem)</li> <li>Sum of subsets</li> <li>- Graph coloring</li> </ul>		05
6	<b>String Matching Algorithms</b> <ul style="list-style-type: none"> <li>The naive string matching Algorithms</li> <li>The Rabin Karp algorithm</li> <li>String matching with finite automata</li> <li>The knuth-Morris-Pratt algorithm</li> <li>- Longest common subsequence algorithm</li> </ul>		06
7	<b>Branch and bound</b> <ul style="list-style-type: none"> <li>General method</li> <li>15 puzzle problem</li> <li>Travelling salesman problem</li> </ul>		04

### Text Books:

- Ellis horowitz , sartaj Sahni , s. Rajsekaran. "Fundamentals of computer algorithms" University Press.
- T.H.coreman , C.E. Leiserson,R.L. Rivest, and C. Stein, "Introduction to algorithms", 2<sup>nd</sup> edition , PHI publication 2005.
- Alfred v. Aho , John E. Hopcroft , Jeffrey D. Ullman , "Data structures and Algorithm" Pearson education , fourth impression 2009

### Reference books:

- Michael Goodrich & Roberto Tamassia, "Algorithm design foundation, analysis and internet examples". Second edition , wiley student edition.

## Suggested Practicals:

Implementations Programming Language must be in 'C' only.

Module no	Module name	Suggested Experiment list
1	Introduction to analysis of algorithm:	<ul style="list-style-type: none"> <li>-selection sort</li> <li>-insertion sort</li> <li>( for this experiment comparative analysis on the basis of comparison required to sort list is expected for large values of n )</li> </ul>
2	Divide and Conquer	<ul style="list-style-type: none"> <li>-binary search</li> <li>-finding minimum and maximum</li> <li>-Merge sort analysis*</li> <li>-Quick sort analysis*</li> <li>( the above two experiments marked as * should be considered as single experiment. For this experiment comparative analysis on the basis of comparisons required to sort list is expected for large values of n )</li> <li>-Strassen's matrix multiplication</li> <li>-The problem of multiplying long integers</li> <li>-constructing Tennis tournament*</li> </ul>
3	Greedy Method	<ul style="list-style-type: none"> <li>-Knapsack problem*</li> <li>-Job sequencing with deadlines</li> <li>-Minimum cost spanning trees-Kruskal and prim's algorithm*</li> <li>-Optimal storage on tapes</li> <li>-Single source shortest path</li> </ul>
4	Dynamic Programming	<ul style="list-style-type: none"> <li>-Multistage graphs</li> <li>-all pair shortest path</li> <li>-single source shortest path</li> <li>-Optimal binary search tree*</li> <li>-0/1 knapsack</li> <li>-Travelling salesman problem*</li> <li>-Flow shop scheduling</li> </ul>
5	Backtracking	<ul style="list-style-type: none"> <li>-8 queen problem( N-queen problem)*</li> <li>-Sum of subsets</li> <li>-Graph coloring</li> <li>-Knapsack problem</li> </ul>
6	String Matching Algorithms	<ul style="list-style-type: none"> <li>-The naïve string matching Algorithms</li> <li>-The Rabin Karp algorithm</li> <li>-String matching with finite automata</li> <li>-The knuth-Morris-Pratt algorithm</li> <li>-Longest common subsequence algorithm*</li> </ul>
7	Branch and bound	<ul style="list-style-type: none"> <li>-15 puzzle problem*</li> <li>-Travelling salesman problem</li> </ul>



*Sehgal*

## **Termwork:**

Total experiments to be performed are  $12 = (9 + 3)$       9 Experiments marked \* are mandatory.

For additional 3 experiments teacher can choose experiments from suggested list.

The final certification and acceptance of term work ensures that satisfactory performance of laboratory work and minimum passing marks in term work.

**Termwork:** 25 Marks (total marks) = 15 Marks Experiments + 05 Marks Assignment + 5 (Attendance (theory+practical))

Practical Exam will be based on above syllabus

## **Theory Examination:**

1. Question paper will comprise of total 6 questions, each of 20 Marks.
2. Only 4 questions need to be solved.
3. Question 1 will be compulsory and based on maximum part of the syllabus.
4. Remaining questions will be mixed in nature (for example suppose Q.2 has part (a) from module 3 then part (b) v be from any module other than module 3)

In question paper, weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
CE41	Design and Analysis of Algorithms	3	--	--	3	--	--	3	
		Examination Scheme							
		Theory Marks							
		ISE		MSE		ESE			
		10		30		100(60% weightage)			

Pre-requisite Course Codes		ES4 (Programming Methodology and Data structures) CE31 (Advanced Data Structures)						
At the end of successful completion of this course, student will be able to								
Course Outcomes	CO1	Analyze time and space complexity of an algorithm						
	CO2	Apply divide and conquer strategy to solve problems						
	CO3	Design an algorithm to illustrate the concept of dynamic programming						
	CO4	Apply the concept of greedy approach to solve problems						
	CO5	Describe the idea of backtracking, branch and bound strategy to solve problems.						
	CO6	Apply the concept of linear programming to optimize the solution						

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Introduction to analysis of algorithm Performance analysis , space and time complexity Growth of function – Big –Oh ,Omega , Theta notation Mathematical background for algorithm analysis, Analysis of selection sort, insertion sort.	1,2,3	10
	1.2	Recurrences: The substitution method Recursion tree method Master method	1	
	1.3	Divide and Conquer Approach: General method Analysis of Merge sort, Analysis of Quick sort, Analysis of Binary search, Finding minimum and maximum algorithm and analysis, Strassen's matrix multiplication.	1.5	
2	2.1	Dynamic Programming Approach: General Method Assembly-line scheduling 0/1 knapsack Travelling salesman problem	1,2,3	12



Added New



Shubhaji

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	Longest common subsequence		
2.2	<b>Greedy Method Approach:</b> General Method Single source shortest path Knapsack problem Minimum cost spanning trees-Kruskal and prim's algorithm Hashing code Algorithm <i>Added New</i> 01	1,2,3	
3	<b>Backtracking and Branch-and-bound:</b> General Method 8 queen problem( N-queen problem) Sum of subsets Graph coloring 15 puzzle problem, Travelling salesman problem.	1,4	06
4	<b>Linear Programming</b> Standard and slack forms Formulating problems as linear problems The simplex algorithm Duality The initial basic feasible solution	1	08
5	<b>String Matching Algorithms:</b> The naive string matching Algorithms The Rabin Karp algorithm String matching with finite automata The knuth-Morris-Pratt algorithm	1.5	06
Total			42

#### References:

1. T.H.Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, "Introduction to algorithms", 3<sup>rd</sup> edition, PHI publication 2009.
2. Ellis Horowitz, Sartaj Sahni, S. Rajasekaran, "computer algorithms" 2<sup>nd</sup> edition, Computer Science Press, 1997
3. Sanjoy Dasgupta, Christos H. Papadimitriou, Umesh Vazirani, "Algorithms", 1<sup>st</sup> edition, Tata McGraw- Hill, 2006.
4. Jon Kleinberg, Eva Tardos, "Algorithm Design", 1<sup>st</sup> edition, Pearson, 2006.
5. Michael T. Goodrich, Roberto Tamassia, "Algorithm Design and Application", 1<sup>st</sup> edition ,Wiley Publication, 2015.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEL41	Design and Analysis of Algorithms Lab	--	--	2	--	--	1	1
				Examination Scheme				
		ISE		ESE		Total		
				Practical	Oral			
		40		10	10	60		

Pre-requisite Course Codes	ES4 (Programming Methodology and Data structures) CE31 (Advanced Data Structures)
At end of successful completion of this course, student will be able to	
Course Outcomes	CO1 Compare time and space complexity of different sorting and searching techniques
	CO2 Solve various problems using dynamic programming approach
	CO3 Illustrate the concepts of greedy approach
	CO4 Demonstrate the applicability of backtracking, branch and bound strategies to solve problems in different domains
	CO5 Demonstrate various string matching algorithms

Exp. No.	Experiment Details (Implementation can be in C/C++ Language)	Ref.	Marks
1	Experiment on finding the running time of algorithm Selection sort Insertion sort	1,3	5
2	Experiment based on divide and conquer approach Merge sort Quick sort Binary search	2,3	5
3	Experiment on finding minimum and maximum numbers using divide and conquer approach	1	5
4	Experiment using dynamic programming approach <u>Multistage graphs</u> single source shortest path all pair shortest path 0/1 knapsack Travelling salesman problem Longest common subsequence	1,4	5

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5	Experiment based on greedy approach Single source shortest path Knapsack problem <u>Job sequencing with deadlines</u> <u>Optimal storage on tapes</u>	1,5	5
6	Experiment on minimum spanning tree using Greedy approach	1,2,5	5
7	Experiment using Backtracking strategy 8 queen problem ( N-queen problem) Sum of subsets Graph coloring. 15 puzzle problem Travelling salesman problem	2,3	5
8	Implement string matching algorithms The naive string matching Algorithm The Rabin Karp algorithm The knuth-Morris-Pratt algorithm	1	5
Total Marks			40

#### References:

1. T.H.Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, "Introduction to algorithms", 3<sup>rd</sup> edition, PHI publication 2009.
2. Ellis Horowitz, Sartaj Sahni , S. Rajasekaran. "computer algorithms" 2<sup>nd</sup> edition, Computer Science Press, 1997
3. Sanjoy Dasgupta, Christos H. Papadimitriou, Umesh Vazirani, "Algorithms", 1<sup>st</sup> edition, Tata McGraw-Hill, 2006.
4. Jon Kleinberg, Eva Tardos, "Algorithm Design", 1<sup>st</sup> edition, Pearson, 2006.
5. Michael T. Goodrich, Roberto Tamassia, "Algorithm Design and Application", 1<sup>st</sup> edition ,Wiley Publication, 2015.



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: DATABASE MANAGEMENT SYSTEM

Course Code Old (2016-17): Database Management System (Code -CEC 404)

Course Code New (Autonomy 2017-18): CE42

Class and Semester in Old Syllabus: S.E Semester - IV

Class and Semesters in New Syllabus: S.E Semester -IV

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	PL/SQL	To know about some enhanced capabilities of SQL	5%

Coordinators Name & Signature:

1) Prof. Pramod Bide

Pramod Bide

2) Prof. Kiran Gawande

Kiran Gawande (Subject IIC 2017-18)

3) Prof. Jyoti Ramteke

Jyoti Ramteke

Experts Name & Signature:

1) Jyoti Ramteke

Jyoti Ramteke

2) Rupali Sawant

Rupali Sawant

3)

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\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: DATABASE MANAGEMENT SYSTEM

Course Code Old (2016-17): Database Management System (Code -CEC 404)

Course Code New (Autonomy 2017-18): CE42

Class and Semester in Old Syllabus: S.E Semester - IV

Class and Semesters in New Syllabus: S.E Semester -IV

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Query Processing and optimization	1) Seeing the number of lectures allotted it was justifiable to skip this topic
2	Advantages of Relational Model	This topic is implicitly taught at every stage in DBMS so not mentioned explicitly, (specially during lab hours)
3		
4		
5		

Coordinators Name & Signature:

1) Prof. Pramod Bide (Coordinator)

2) Prof. Kiran Gawande

3) Prof. Jyoti Ramteke

Experts Name & Signature:

1) Jyoti Ramteke

2) Rupali Sawant

3)





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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: Database Management System

Course Code Old (2016-17): Database Management System (Code -CEC 404)

Course Code New (Autonomy 2017-18): CE42

Class and Semester in Old Syllabus: S.E Semester - IV

Class and Semesters in New Syllabus: S.E Semester -IV

**Change/Addition in the Syllabus:** Additions : Group of 3 students is formed. Each group is working on individual case study. Based on their case studies lab assignments are framed on different topics.

Here students will be able to work on real life applications.

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	Program using DCL	For having knowledge of security aspects in DBMS	25 %
2	Program using PL/SQL	As its added in the syllabus	
3			
4			
5			

Coordinators Name & Signature:

1) Prof. Pramod Bide (Coordinator)

2) Prof. Kiran Gawande

3) Prof. Jyoti Ramteke

Experts Name & Signature:

1) Jyoti Ramteke

2) Rupali Sawant



\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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## Lab Course Revision Report

### Lab Course Information

Course Name:

Course Code Old (2016-17):

Course Code New (Autonomy 2017-18):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
1	Nil	NIL
2		
3		
4		
5		

Coordinators Name & Signature:

1) Prof. Pramod Bide (Coordinator)

2) Prof. Kiran Gawande

3) Prof. Jyoti Ramteke

Experts Name & Signature:

1) Jyoti Ramteke

2)



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## Theory Course Revision Report

### Theory Course Information

Course Name: *Operating Systems*

Course Code Old (2016-17): CPC 502

Course Code New (Autonomy 2017-18): CE43

Class and Semester in Old Syllabus: TE Computer Sem-5

Class and Semesters in New Syllabus: SE Computer Sem-4

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Module - 7	To explore new OS	03/42
2			= 7.14%
3			
4			
5			

Coordinator's Name & Signature:

1) Loni Bhambari

2) Tyoti Routkate

Experts Name & Signature:

1) Shreerat Chaudhari

2) D. R. Icalbande

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\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## Theory Course Revision Report

### Theory Course Information

Course Name: Operating Systems

Course Code Old (2016-17): CPC502

Course Code New (Autonomy 2017-18): CE43

Class and Semester in Old Syllabus: TE Computer Sem-5

Class and Semesters in New Syllabus: SE Computer Sem-4

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Case study of Unix, Linux & Windows	Replacement with new OS topics → to give ideas about new OS.
2		
3		
4		
5		

Coordinators Name & Signature:

1) Loui Shembai Loui Shembai

2) Jyoti Rautake Jyoti

Experts Name & Signature:

1) Sheetal Chaudhari Sheetal

2) D - R. Icolbande D - R. Icolbande

3)

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## Lab Course Revision Report

### Lab Course Information

Course Name: Operating Systems Lab

Course Code Old (2016-17):

Course Code New (Autonomy 2017-18): CEL43

Class and Semester in Old Syllabus: TE Computer Sem -5

Class and Semesters in New Syllabus: SE Computer Sem -4

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Process System Calls	To give exposure to process system calls.	2/16 = 12.5%.
2			
3			
4			
5			

○ Coordinators Name & Signature:

1) Soni B. Bhambar Bhambar

2) Jyoti Rantake Jyoti

Experts Name & Signature:

1) Sheetal Chavhan Sheetal

2) D. R. Kalbande D. R. Kalbande

3)

Sheetal



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\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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## Lab Course Revision Report

### Lab Course Information

Course Name: *Operating Systems Lab*

Course Code Old (2016-17):

Course Code New (Autonomy 2017-18): CEL43

Class and Semester in Old Syllabus: TE Computer Sem-5

Class and Semesters in New Syllabus: SE Computer Sem-4

### Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
1	Basic commands in Unix	Covered in Linux Lab
2	Pattern matching utilities	Covered in Linux Lab
3	Explore boot process	Covered in Linux Lab
4		
5		

Coordinators Name & Signature:

1) Soni Bhambar *Bhambar*

2) Jyoti Ramteke *Jyoti*

Experts Name & Signature:

1) Sheetal Chavchari *SP*

2) D. R. Kalbande *SP*

3)

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## Lab Course Revision Report

### Lab Course Information

Course Name: Computer Organization and Architecture Lab

Course Code Old (2016-17): CSC403

Course Code New (Autonomy 2017-18): CEL44

Class and Semester in Old Syllabus: S.E. Semester-IV

Class and Semesters in New Syllabus: S.E. Semester- IV

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	To recognize the components of computer, dismantling and assembling of CPU	Visualize inside components before understanding in details	( 4 / 24 ) * 100 = 16.66%
2	Program that simulates a behavior of pipelined processor using open DLX simulator	To explore the internal working of processor for program execution.	

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Deepshree Vibhanik

Experts Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Prof. Reeta Koshy

3) Prof. Soni Bhambar

\*\*Percentage Change in Syllabus (Y) – (No. of experiments changed or added / Total No. of experiments) x 100





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## Lab Course Revision Report

### Lab Course Information

Course Name: Computer Organization and Architecture Lab

Course Code Old (2016-17): CSC403

Course Code New (Autonomy 2017-18): CEL44

Class and Semester in Old Syllabus: S.E. Semester-IV

Class and Semesters in New Syllabus: S.E. Semester- IV

Removal from Syllabus:

NIL

Sr. No.	Experiments Removed	Reason
1	NIL	
2		
3		
4		
5		

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

*Dr. D. R. Kalbande*

2) Deepshree Vibhandik

*Deepshree Vibhandik*

Experts Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

*Dr. D. R. Kalbande*

2) Prof. Reeta Koshy

*Reeta Koshy*

3) Prof. Soni Bhambhani

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## Theory Course Revision Report

### Theory Course Information

Course Name: Computer Organization and Architecture

Course Code Old (2016-17): CSC403

Course Code New (Autonomy 2017-18): CE44

Class and Semester in Old Syllabus: S.E. Semester-IV

Class and Semesters in New Syllabus: S.E. Semester- IV

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Overview of Computer Architecture and Organization: Harvard Mode, Embedded System ,ARM, Multicore, MICS, GPGPU,	To explore new trends in Architecture and organization	(4 / 42 ) * 100 = 9.52 %
2	Processor Organization and control unit : ISA Categories: CISC and RISC	To explore with new set of standards in architecture	

○ Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

*Dr. D. R. Kalbande*

2) Deepshree Vibhanik

*Deepshree Vibhanik*

Experts Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

*Dr. D. R. Kalbande*

2) Prof. Reeta Koshy

*Reeta Koshy*

3) Prof. Soni Bhambhani

*Soni Bhambhani*



*Dr. D. R. Kalbande*

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## Theory Course Revision Report

### Theory Course Information

Course Name: Computer Organization and Architecture

Course Code Old (2016-17): CSC403

Course Code New (Autonomy 2017-18): CE44

Class and Semester in Old Syllabus: S.E. Semester-IV

Class and Semesters in New Syllabus: S.E. Semester- IV

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Case study on 8085 microprocessor: Features, Architecture, Pin Configuration and Addressing modes	Not required as it covers while explaining overview
2		
3		
4		
5		

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Deepshree Vibhani

Experts Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Prof. Reeta Koshy

3) Prof. Soni Bhambar



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Subject Code	Subject Name	Credits
CSC403	Computer Organization and Architecture*	05

### Course Objectives:

1. To conceptualize the basics of organizational and architectural issues of a digital computer.
2. To analyze performance issues in processor and memory design of a digital computer.
3. To understand various data transfer techniques in digital computer.
4. To analyze processor performance improvement using instruction level parallelism

### Course Outcomes:

1. Ability to understand basic structure of computer.
2. Ability to perform computer arithmetic operations.
3. Ability to understand control unit operations.
4. Ability to design memory organization that uses banks for different word size operations.
5. Ability to understand the concept of cache mapping techniques.
6. Ability to understand the concept of I/O organization.
7. Ability to conceptualize instruction level parallelism.

Pre-requisites: Fundamentals of Computer, Digital Logic Circuits, Programming Languages (C, C++, Java)

Module	Detailed Contents	Hours
1	<b>Overview of Computer Architecture &amp; Organization:</b> <ul style="list-style-type: none"> <li>• Introduction of Computer Organization and Architecture.</li> <li>• Basic organization of computer and block level description of the functional units.</li> <li>• Evolution of Computers, Von Neumann model.</li> <li>• Performance measure of Computer Architecture.</li> <li>• Introduction to buses and connecting I/O devices to CPU and Memory, bus structure.</li> </ul>	04
2	<b>Data Representation and Arithmetic Algorithms:</b> <ul style="list-style-type: none"> <li>• Number representation: Binary Data representation, two's complement representation and Floating-point representation. IEEE 754 floating point number representation.</li> <li>• Integer Data computation: Addition, Subtraction, Multiplication: Signed multiplication, Booth's algorithm.</li> </ul>	10



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	<ul style="list-style-type: none"> <li>• Division of integers: Restoring and non-restoring division</li> <li>• Floating point arithmetic: Addition, subtraction</li> </ul>	
3	<b>Processor Organization and Architecture:</b> <ul style="list-style-type: none"> <li>• CPU Architecture, Register Organization , Instruction formats, basic instruction cycle, Instruction interpretation and sequencing.</li> <li>• Control Unit: Soft wired (Micro-programmed) and hardwired control unit design methods. Microinstruction sequencing and execution. Micro operations, concepts of nano programming.</li> <li>• Introduction to RISC and CISC architectures and design issues.</li> <li>• Case study on 8085 microprocessor: Features, architecture, pin configuration and addressing modes.</li> </ul>	12 Removed
4	<b>Memory Organization:</b> <ul style="list-style-type: none"> <li>• Introduction to Memory and Memory parameters. Classifications of primary and secondary memories. Types of RAM and ROM, Allocation policies, Memory hierarchy and characteristics.</li> <li>• Cache memory: Concept, architecture (L1, L2, L3), mapping techniques. Cache Coherency, Interleaved and Associative memory.</li> <li>• Virtual Memory: Concept, Segmentation and Paging , Page replacement policies.</li> </ul>	12
5	<b>I/O Organization and Peripherals:</b> <ul style="list-style-type: none"> <li>• Input/output systems, I/O modules and 8089 IO processor.</li> <li>• Types of data transfer techniques: Programmed I/O, Interrupt driven I/O and DMA.</li> <li>• Peripheral Devices: Introduction to peripheral devices, scanner, plotter, joysticks, touch pad.</li> </ul>	6
6	<b>Introduction to parallel processing systems:</b> <ul style="list-style-type: none"> <li>• Introduction to parallel processing concepts</li> <li>• Flynn's classifications</li> <li>• pipeline processing</li> <li>• instruction pipelining,</li> <li>• pipeline stages</li> <li>• pipeline hazards.</li> </ul>	4



### **Text Books:**

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw-Hill.
2. John P. Hayes, "Computer Architecture and Organization", Third Edition.
3. William Stallings, "Computer Organization and Architecture: Designing for Performance", Eighth Edition, Pearson.
4. B. Govindarajulu, "Computer Architecture and Organization: Design Principles and Applications", Second Edition, Tata McGraw-Hill.

### **Reference Books:**

1. Dr. M. Usha, T. S. Srikanth, "Computer System Architecture and Organization", First Edition, Wiley-India.
2. "Computer Organization" by ISRD Group, Tata McGraw-Hill.
3. Ramesh Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085", Fifth Edition, Pearson.

### **Termwork:**

Term work should consist of at least 08 experiments.

Journal must include at least 2 assignments.

The final certification and acceptance of term work ensures that satisfactory performance of laboratory work and minimum passing marks in term work.

**Term Work:** 25 Marks ( total marks ) = 15 Marks ( Experiment ) + 5 Marks ( Assignment ) + 5 (Attendance (theory+practical))

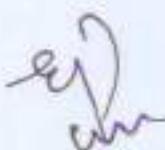
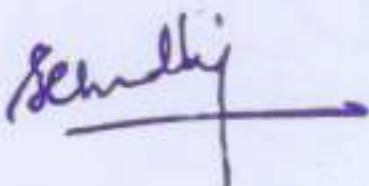
Oral exam will be based on the above syllabus.

### **Note:**

1. The faculty should conduct eight programming practical / experiments based on the above syllabus including two case studies on recent developments covering the above contents.  
All the programs should be implemented in C/C++/Java under Windows or Linux environment.  
Experiments can also be conducted using available open source tools.
2. **8085 microprocessor** should be included only as a sample case study to visualize the concepts. No questions in University Exams / Class Tests should be asked on 8085 microprocessor.

### **SUGGESTED LIST OF COA PRACTICAL / EXPERIMENTS**

1. To study Full Adder (7483).
2. To study ALU (74181).
3. To study MASM (Micro Assembler).
4. A program for hexadecimal addition and multiplication.

A handwritten signature in blue ink, likely belonging to the Vice-Chancellor or a senior official, is placed next to the university logo.A large, handwritten signature in blue ink, possibly belonging to the author or a professor, is located at the bottom left of the page.

5. A program for binary multiplication.
6. A program for Hamming code generation , detection and correction.
7. A program for Booth's multiplication
8. A program for LRU page replacement algorithm.
9. A program for FIFO page replacement algorithm.
10. A program to simulate the mapping techniques of Cache memory.
  - 10.1 Direct Mapped cache
  - 10.2 Associative Mapped cache
  - 10.3 Set Associative Mapped cache
11. A program to simulate memory allocation policies.
  - 11.1 First-fit algorithm
  - 11.2 Best-fit algorithm
12. A program to implement serial communication (PC - PC communication).
13. A program to implement parallel communication. (PC - Printer communication),
14. A program for printer simulation.
15. A program for keyboard simulation.

#### Theory Examination:

1. Question paper will comprise of total 6 questions, each of 20 Marks.
2. Only 4 questions need to be solved.
3. Question 1 will be compulsory and based on maximum part of the syllabus.
4. Remaining questions will be mixed in nature (for example suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)

In question paper, weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.



Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CE44	Computer Organization and Architecture	3	-	-	3	-	-	3
Examination Scheme								
Theory Marks								
ISE		MSE		ESE				
10		30		100 (60% Weight age)				

Pre-requisite Course Codes CE32 (Digital Logic Design and Applications)

At the end of successful completion of this course, student will be able to

Course Outcomes	CO1	To describe basic structure of computer
	CO2	To apply arithmetic algorithm for solving problems
	CO3	To demonstrate processor architectures with control signal generation.
	CO4	To describe the memory mapping techniques
	CO5	To apply I/O concept for simulating I/O device operations.
	CO6	To analyze different parallel processing and pipelining concepts

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Overview of Computer Architecture &amp; Organization:</b>		
	1.1	Introduction of Computer Organization and Architecture, Basic organization of computer and block level description of the functional units, Evolution of x86 Computers, Von Neumann model, <b>Harvard Model, Pipelined System, VLIW architecture</b>	1,4	4 Added
	1.2	Performance Issues: Designing for performance, <b>Multicore, Miss, GPU, FPU</b>	1,4	2 Added
2		<b>Data Representation and Arithmetic Algorithms:</b>		
	2.1	Number representation: Floating-point representation, Floating point arithmetic, IEEE 754 floating point number representation	5,7	2
	2.2	Integer Data computation: Addition, Subtraction, Multiplication: Signed multiplication, Booth's algorithm.	5,7	2
	2.3	Division of integers: Restoring and non-restoring division	5,7	2
3		<b>Processor Organization and Control Unit:</b>		
	3.1	CPU Architecture, Register Organization, <b>ISA categories</b> : Complex Instruction Set Computing ISA Features, Reduced Instruction Set Computing ISA Features, Instruction formats, basic instruction cycle, Instruction interpretation and sequencing.	2,4,6	4
	3.2	Control Unit :Soft wired (Micro-programmed) and hardwired	2,3	4

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		control unit design methods. Microinstruction sequencing and execution. Micro-operations, concepts of nano programming.		
	3.3	RISC and CISC: Introduction to RISC and CISC architectures and design issues.	3	1
4		<b>Memory Organization:</b>		
	4.1	Introduction to Memory and Memory parameters. Classifications of primary and secondary memories. Types of RAM and ROM, Allocation policies, Memory hierarchy and characteristics.	3	3
	4.2	Cache memory: Concept, architecture (L1, L2, L3), mapping techniques. Cache Coherency, Interleaved and Associative memory.	2,3	4
	4.3	Virtual Memory: Concept, Segmentation and Paging, Page replacement policies. LRU,FIFO	4,5	4
5		<b>I/O Organization and Introduction to Parallel Processing:</b>		
	5.1	Buses: Types of Buses ,Bus Arbitration, BUS standards	5,7	3
	5.2	I/O Interface, I/O channels, I/O modules and IO processor, Types of data transfer techniques: Programmed I/O, interrupt driven I/O and DMA.	2,5,7	4
	5.3	Introduction to parallel processing concepts ,Flynn's classifications ,pipeline processing ,Pipeline stages, Hazards	5	3
			<b>Total</b>	<b>42</b>

#### References:

- [1] Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw-Hill.
- [2] John P. Hayes, "Computer Architecture and Organization", Third Edition.
- [3] William Stallings, "Computer Organization and Architecture: Designing for Performance", Eighth Edition, Pearson.
- [4] B. Govindarajulu, "Computer Architecture and Organization: Design Principles and Applications", Second Edition, Tata McGraw-Hill.
- [5] Dr. M. Usha, T. S. Srikanth, "Computer System Architecture and Organization",First Edition, WileyIndia."Computer Organization" by ISRD Group, Tata McGraw-Hill.
- [6] Ramcs Sh Gaonkar , "Microprocessor architecture ,Programming and application with 8085",5<sup>th</sup> Edition, Penram
- [7] Nicholas P Carter Adapted by Raj Kamal" "Computer Architecture and Organization",Schaum's Outline ,2<sup>nd</sup> edition,Tata McGraw Hill.

*Sekharia*



*EJW*

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	
CEL44	Computer Organization and Architecture Lab	--	--	2	--	--	1	1
Examination Scheme								
		ISE		ESE		Total		
		Practical		Oral		60		
		40		10		10		

Pre-requisite Course Codes		CE32 (Digital Logic Design and Analysis)
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Identify the components of Computers and Assemble the computer system.
	CO2	Design ALU operations using LabView and VHDL tool.
	CO3	Apply data arithmetic algorithms for implementing arithmetic operations
	CO4	Apply various memory management technique for memory allocation and page replacement algorithms
	CO5	Demonstrate I/O operations
	CO6	Analyze the performance of the systems.

Exp. No.	Experiment Details	Ref.	Marks
1	To recognize the components of computer, dismantling and assembling of CPU	9	5
2	To demonstrate the working of Assembler using NASM	1	5
3	To simulate the ALU operations using LabView and VHDL.	1,2,3	5
4	To implement various algorithms like Booth's algorithm ,division by restoration and non-restoration for arithmetic operations	2,3,4 6,7	5
5	To implement page replacement and memory allocation algorithms.	2,3,4, 6,7	5
6	To implement the mapping techniques of Cache memory.	2,3,4, 6,7	5
7	To implement serial communication using RS232.	1	5
8	Write a program that simulates the behavior of a pipelined processor using openOJX simulator	5,6,8	5
Total Marks			40

Senthil  
→



EW

References:

- [1] Manual to use the simulator for computer organization and architecture. Developed by the Department of CSE, IIT kharagpur (<http://csel0-iitkgp.vl.labs.ac.in/>)
- [2] William Stallings, "Computer Organization and Architecture: Designing for Performance", Pearson Publication, 10<sup>th</sup> Edition, 2013
- [3] B. Govindarajulu, "Computer Architecture and Organization: Design Principles and Applications", Second Edition, McGraw-Hill (India).
- [4] Morris Mano, "Computer System Architecture" Pearson Publication, 3<sup>rd</sup> Edition, 2007
- [5] Kai Hwang, Fayé Alayé Briggs, "Computer architecture and parallel processing", McGraw-Hill
- [6] P. Pal Chaudhuri, "Computer Organization and Design" Prentice Hall India, 2004
- [7] Dr. M. Usha, T.S. Shrikant, "Computer System Architecture and Organization" Wiley India, 2014.
- [8] P. López. DLXide web page. <http://www.gup.upv.es/people/plopez/english.html>
- [9] <https://youtu.be/obSsX7-ZwWe>

*Sekharia*



*EJ*



**Bharatiya Vidya Bhavan's  
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Computer Engineering Department

Lab Course Revision Report

**Lab Course Information**

Course Name: **WEB TECHNOLOGY**

Course Code Old (2016-17):**CPL501**

Course Code New (Autonomy 2017-18):**CEL45**

Class and Semester in Old Syllabus: **T.E, SEM-V**

Class and Semesters in New Syllabus: **S.E SEM-IV**

**Change/Addition in the Syllabus:**

E. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	Implementation of client-side scripting using Jquery	InboxThe purpose of <b>jQuery</b> is to make it much easier to use JavaScript on your website. <b>jQuery</b> also simplifies a lot of the complicated things from JavaScript, like AJAX calls and DOM manipulation. The <b>jQuery</b> library contains the following features: HTML/DOM manipulation.	
2	Implementation of responsive website using Bootstrap	<b>Bootstrap</b> is a free and open-source front-end web framework for designing websites and web applications. It contains HTML- and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions.	37.5%
3	Design of webpage for 3-tier architecture & authentication of various users using <b>LARAVEL</b> framework	With <b>Laravel</b> , we can easily approach to routing. The route can be triggered in the application with good flexibility and control.	

Coordinators Name & Signature: 1) Prof. Vishal Patil

2) Prof. Babita Kubde

Experts Name & Signature:

1) Prof. Yogesh Jadhav

100



\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x



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## Lab Course Revision Report

### Lab Course Information

Course Name: **WEB TECHNOLOGY**

Course Code Old (2016-17): **CPL501**

Course Code New (Autonomy 2017-18): **CEL45**

Class and Semester in Old Syllabus: **T.E SEM-V**

Class and Semesters in New Syllabus: **S.E SEM-IV**

### **Removal from Syllabus:**

Sr. No.	Experiments Removed	Reason
1	Design webpage suing any web-tool	Does not provide 100% flexibility for web site development
2	Create an xml file & DTD to validate it.	XML is outdated nowadays .
3	Mini project	Module 7 & 8 covers mini project

Coordinators Name & Signature:

1) Prof. Vishal Patil-

2) Prof. Babita Kubde-

Experts Name & Signature:

1) Prof. Yogesh Jadhav-





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## Department of Computer Engineering

### Syllabus Revision Report

#### Postgraduate Program

#### 2017-18 to 2022-23 Revision

Years	Percentage Change*
2017-18	40.74%
2020-21	13.79%

\*Percentage Change = (Number of new courses / Number of Total courses) \* 100





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**Department of Computer Engineering**

**Syllabus Revision Report**

**Postgraduate Program**

**2020-21**

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
<b>Computer Engineering</b>			
Advance Programming Lab	CS504	2020-21	100
Program Elective-III: Explainable Artificial Intelligence	CS523	2020-21	100
Program Elective-III: Mobile Device and Cloud Forensics	CS533	2020-21	100
Enterprise Technology Lab	CS509	2020-21	100
Constitution of India	AS601	2020-21	100
Open Elective-I/II: Law for Engineers	OE3	2020-21	100
Research Internship Stage I	CS603	2020-21	100
Research Internship Stage II	CS605	2020-21	100





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## Course Revision Report

### Internship Information

Course Name: Research Internship Stage I

Course Code Old (2017-18): NA

Course Code New (Autonomy 2020-21): CS603

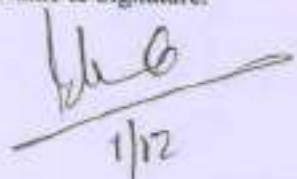
Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: M. Tech. Sem-~~III~~ III

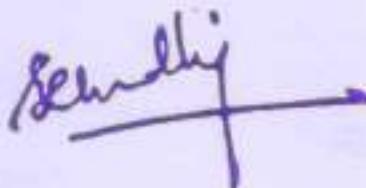
Change/Addition in the Syllabus: New Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
I	Students can take up research internship instead of Dissertation-1 and complete a research project in industry	The new course was introduced so that students will be able to solve real world research problems. And gain professional experience.	100%

Name & Signature:

  
1/12  
(M.C. Vinod Sikka)









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Computer Engineering Department

## Course Revision Report

### Internship Information

Course Name: Research Internship Stage II

Course Code Old (2017-18): NA

Course Code New (Autonomy 2020-21): CS605

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: M. Tech. Sem-~~III~~ IV

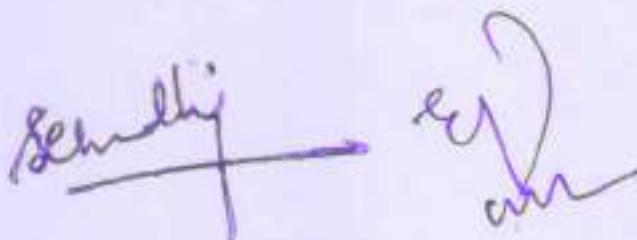
### Change/Addition in the Syllabus: New Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Students can take up research internship instead of Dissertation-2 and complete a research project in industry	The new course was introduced so that students will be able to solve real world research problems. And gain professional experience.	100%

Name & Signature:

  
Mr. Vinod Sikka







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Computer Engineering Department

## Theory Course Revision Report

### Course Information

Course Name: Advance Programming Lab  
Course Code Old (2017-18): NA  
Course Code New (Autonomy 2020-21): CS504  
Class and Semester in Old Syllabus: NA  
Class and Semesters in New Syllabus: M. Tech. Sem-II

### Change/Addition in the Syllabus: New Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Python Basics		
2	Derived Data Types		
3	Functions and Generators		
4	Python Modules and Packages		
5	OOP Concepts		
6	Python Modules for Data Science		
7	Python Multithreading		
8	Python networking		
9	Python database programming		
10	Regular Expressions	The new course was introduced so that students will be able to apply Python fundamentals and native data-types for problem solving. Develop Python programs using object oriented programming. Utilize regular expressions, multithreading, networking, database python modules for problem solving. Apply data visualization and manipulation with python libraries for data science	10/10=100%

Name & Signature:





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## Course Revision Report

### Lab Course Information

Course Name: Enterprise Technology Lab

Course Code Old (2017-18): NA

Course Code New (Autonomy 2020-21): CS509

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: M. Tech. Sem-II

Change/Addition in the Syllabus: New Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	AWS Fundamentals: Going Cloud Native		8/8-100%
2	DevOps: Using enterprise automation to deal with complexity	The new course was introduced so that students will be able to Build core skill sets required for designing and deploying dynamically scalable, highly available, fault-tolerant, and reliable server less applications on Public Cloud Infrastructure.	
3	Demonstrate skills in building and deploying serverless solutions on AWS Cloud platform using range of AWS services	Understand DevOps techniques and implement tools for enterprise automation to deal with complexity. Build a CI/CD pipeline using various DevOps tools and deploy an application on cloud platform.	
4	Mini Project		

Name & Signature:

Pravna Hals



Shubhaji

✓



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Cloud and Mobile Forensics

Course Code Old (2017-18): NA

Course Code New (Autonomy 2020-21): CS533

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: M. Tech Elective

### Change/Addition in the Syllabus: New Course

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Introduction to Mobile Forensics	The new course was introduced so that students will be able to differentiate between computer and mobile device forensics,	28/28-100%
2	Electronics Evidence	Analyze requirements of mobile device forensics and setup mobile device forensics laboratory various tool.	
3	The Android device model	Demonstrate techniques and tools used for mobile device forensics investigations with documents creation and maintain chain of custody.	
4	Introduction to Cloud Forensics	Select appropriate tools for cloud storage forensics. Prepare and present report on mobile device and cloud forensics as per security compliance	

Name & Signature:

*D. D. Amokwade*  
(Prof. D. D. Amokwade)



*Sekharia*

*Leena*



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Explainable AI

Course Code Old (2017-18): CEE92D

Course Code New (Autonomy 2020-21): CS523

Class and Semester in Old Syllabus: M. Tech Elective

Class and Semesters in New Syllabus: M. Tech Elective

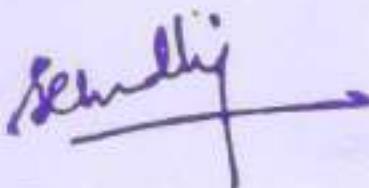
### Change/Addition in the Syllabus: New Course

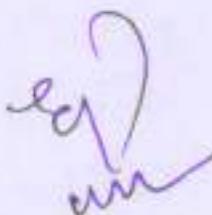
Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Method for interpreting AI systems	The new courses was added so that students can, Apply basic methods and algorithms from area of explainable artificial intelligence. Demonstrate ideas behind explainable AI and its usage. Formulate problems as	28/28=100%
2	Explaining the Decisions of AI Systems	explainable AI and its usage. Formulate problems as problems from area of artificial intelligence or improve existing code using learned methods. Evaluate applications and background algorithms used for their implementation through used cases	
3	Evaluating Interpretability and Explanations		
4	Applications of Explainable AI:		

Name & Signature:

  
(Dr. D.R. Kalbarde)









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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Law for Engineers

Course Code Old (2017-18): NA

Course Code New (Autonomy 2020-21): OE3

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: M. Tech Sem-III

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	General Principles of Contract under Indian Contract Act, 1872.		
2	Introduction to Human Rights.		
3	Right to Information Act, 2005		
4	Information Technology		
5	Labor Laws		
6	Apprentices Act,		
7	Employees' Provident Funds and [Miscellaneous Provisions] Act		
8	Law relating to Intellectual property		
9	Corporate Law		

Name & Signature:





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### Department of Computer Engineering

#### Syllabus Revision Report

#### Postgraduate Program

2017-18

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
Computer Engineering			
Big Data Analytics and Management	CE912	2017-18	100
Information and System Security	CE913	2017-18	100
PG Laboratory-II : Big Data Analytics and Management	CEI912	2017-18	100
Institute Elective-I : Entrepreneurship Development and Management	CEE925	2017-18	100
User Experience Design	CE923	2017-18	69.04
PG Laboratory-III : Network Analysis and Design	CEI921	2017-18	100
PG Laboratory-IV : High performance Computing	CEI922	2017-18	100
PG Laboratory-V : User Experience Design	CEI923	2017-18	100
Professional Elective-II: Machine Vision	ILE913	2017-18	100
Professional Elective-II: Machine Learning	ILE914	2017-18	100
Institute Elective-II : MOOC Courses	ILE921	2017-18	100



## M.Tech. First Year Computer Engineering

Course Code	Course Name	Percentage Change
<b>SEM-I</b>		
CE911	Advanced Algorithm and Complexity	15.38
CE912	Big Data Analytics and Management	100
CE913	Information and System Security	100
CEL911	PG Laboratory -I	75
CEL912	PG Laboratory -II	100
CES911	Seminar -I	-
CEE91X	Professional Elective-I Modern Operating System (19.04) Image analysis and Interpretation (11.90) Natural Language Processing (0) Advance Soft Computing (23.80)	13.69
ILE91X	Institute Elective-I Project Management (9.52) Management Information System (19.05) Entrepreneurship Development and Management(100)	42.86
<b>SEM-II</b>		
CE921	Network Analysis and Design	0
CE922	High Performance Computing	36.53
CE923	User Experience Design	69.04
CEL921	PG Laboratory -III	100
CEL922	PG Laboratory -IV	100
CEL923	PG Laboratory -V	100
CES921	Seminar -II	-
CEE92X	Professional Elective-II Internet of Things (35.71) ICT for Social Cause (0) Machine Learning(100) Machine Vision(100)	58.93
ILE92X	Institute Elective-II	-
<b>Average</b>		<b>65.10%</b>



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2020-21

Bharatiya Vidya Bhavan's

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Computer Engineering Department

PG

## Theory Course Revision Report

### Theory Course Information

Course Name: MOOC Courses

Course Code Old (2016-17): NA

Course Code New (Autonomy 2017-18): ILE921

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: M. Tech. Sem-III

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	The online course which are not less than 12 weeks should be opted from reputed platforms such as MPTEL, SWAYAM, Coursera, etc.	The students are global learners in turn. To inculcate this behavior, students are allowed to take 1 MOOC course which can be done. The course list will be suggested by department.	100%

Name &amp; Signature:





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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Algorithm and complexity ( Advanced Algorithm and complexity )

Course Code Old (2016-17): CSC101

Course Code New (Autonomy 2017-18): CE911

Class and Semester in Old Syllabus: M.E. COMP Sem. I

Class and Semesters in New Syllabus: M.E. COMP Sem. I

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Assembly-line Scheduling, (2 Hrs)	To get more exposure to dynamic programming and familiarity with practical applications of Algorithm	8 / 52 * 100 = 15.38%
2	RED - BLACK TREES (3 Hrs.)	To introduce advanced data structures for efficient searching	
3	Standard and Slack Forms, Formulation, Simplex algorithm, Duality ( 3 Hrs.)	To teach principles of optimization using Linear programming	
4			
5			

Coordinators Name & Signature:

1) Dr. Sudhir N. Dhage

2) Prof. A. A. Godbole

Experts Name & Signature:

1) Dr. Anant V. Nimkar

2) Dr. Prasenjit Bhavthankar

3)



\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Algorithm and complexity ( Advanced Algorithm and complexity )

Course Code Old (2016-17): CSC101

Course Code New (Autonomy 2017-18): CE911

Class and Semester in Old Syllabus: M.E. COMP Sem. I

Class and Semesters in New Syllabus: M.E. COMP Sem. I

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Line-segment properties, Determining whether any pair of segments intersects Finding the convex hull, Finding the closest pair of points	The constraint on number of hrs framed for syllabus
2		
3		
4		
5		

Coordinators Name & Signature:

1) Dr. Sudhir N. Dhage

2) Prof. A. A. Godbole

Experts Name & Signature:

1) Dr. Anant V. Nimkar

2) Dr. Prasenjit Bhavthankar





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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: DEC LAB – I / PG Laboratory –I (Advanced Algorithm and Complexity Laboratory)

Course Code Old (2016-17): CSL 102

Course Code New (Autonomy 2017-18): CEL911

Class and Semester in Old Syllabus: Sem. I M.E. COMP

Class and Semesters in New Syllabus: Sem. I M.E.COMP

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	Implementation of Red-Black trees and its various operations.	Newly introduced in Theory Syllabus	6 / 8 * 100 = 75.00%
2	Cutting rod example		
3	Implementation of Binomial Heaps and its various operations		
4	Implementation of Bellman ford , Johnson's algorithm for sparse graphs		
5	Implementation of Ford Fulkerson algorithm , push - relabel to front methods		
6	Implementation of Simplex algorithm		

Coordinators Name & Signature:

1) Dr. Sudhir N. Dhage

Experts Name & Signature:

1) Dr. Anant Nimkar

2) Dr. Prasenjiit Bhavthankar

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100





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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: DEC LAB – I / PG Laboratory – I (Advanced Algorithm and Complexity Laboratory)

Course Code Old (2016-17): CSL 102

Course Code New (Autonomy 2017-18): CEL911

Class and Semester in Old Syllabus: Sem. I M.E. COMP

Class and Semesters in New Syllabus: Sem. I M.E. COMP

\* Old syllabus was not having separate list for practical.

Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
1	No - change	
2		
3		
4		
5		

Coordinators Name & Signature:

1) Dr. Sudhir N. Dhage

Experts Name & Signature:

1) Dr. Anant Nimkar

2) Dr. Prasenjit Bhavthankar





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## Theory Course Revision Report

### Theory Course Information

Course Name: Big Data Analytics and Management (BDAM)

Course Code Old (2016-17): -

Course Code New (Autonomy 2017-18): CEG12

Class and Semester in Old Syllabus: -

Class and Semesters in New Syllabus: M.Tech. Sem - I

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	← NEL →	New subject introduced.
2		
3		
4		
5		

### Coordinators Name & Signature:

1) Prof. KIRAN GAWANDE

2)

### Experts Name & Signature:

1) Subhir Dhave

2) P. Bhawarshankar

3)





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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: **Big Data Analytics and Management (BDAM)**

Course Code Old (2016-17): -

Course Code New (Autonomy 2017-18): CEG12

Class and Semester in Old Syllabus: -

Class and Semesters in New Syllabus: M.Tech. Sem - I

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1			
2		New Subject Introduced	
3			
4			
5			

### Coordinators Name & Signature:

1) Prof. KIRAN GAWANDE

2)

### Experts Name & Signature:

1) DR. SUDHIR DHADE

2) P. BHARATHKAR

3)



\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CE912	Big Data Analytics and Management(BDAM)	4	--	--	4	--	--	4
Examination Scheme								
ISE			MSE			ESE		
10			30			100 (60% Weightage)		

Pre-requisite Course Codes	Core Java, awareness of RDBMS is desirable				
At the end of successful completion of the course, students will be able to					
Course Outcomes	CO1	Understand the basic concepts of Big Data and Hadoop as processing platforms for Big Data			
	CO2	Understand the need of Map Reduce and to develop Mapper, Reducer tasks			
	CO3	To understand Text Analytics, Recommendation System and Clustering approaches			
	CO4	Understand concept of data streams, Link Analysis, Social Mining Graphs and its real life applications			
	CO5	Learn about the different options for importing or loading data into HDFS data sources such as relational databases, data warehouses, web server logs			

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Introduction to Big Data and Hadoop	2	10
	1.1	Hadoop Ecosystem, Hadoop Architecture(Name Node, Job Tracker, Task Tracker, Data Node, Secondary Name Node), JobTracker functionality , Namenode Backup(SNN)		
	1.2	Apache Hadoop and Hadoop Ecosystem, HDFS Storage,	2	
	1.3	Hadoop File System APIs, Anatomy of a File Read, Anatomy of a File Write, Rack Awareness		
2		Developing Map Reduce	1,2	12
	2.1	Distributed Computing Concept (Map and Reduce), Anatomy of a MapReduce Job Run(MR1), Running on a cluster, Packaging, Launching a Job, The MapReduce Web UI , Retrieving the Results 167, Debugging a Job 169	2	
	2.2	Map Reduce Algorithms, Matrix-Vector Multiplication, Map Reduce and Relational Operators, Matrix Multiplication of Large Matrices, Shuffle and Sort,	1	
	2.3	Hadoop Logs, Remote Debugging, Advanced Map Reduce	2	





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		Concepts, Combiner, Partitioner, Distributed Cache(Map Side Join), Reduce Side join		
3		Clustering Approaches, Text Analytics and Recommendation System	1	10
	3.1	CURE Algorithm, Stream-Computing , A Stream-Clustering Algorithm, Initializing & Merging Buckets, Answering Queries		4
	3.2	Introducing text mining, text mining techniques, Understanding Text Mining Process, Sentiment Analysis		3
	3.3	Introduction to RS, content based RS, collaborative RS, hybrid RS. Issues and challenges RS, examples of real word RS, e.g., Amazon, mobile RS, etc.		3
4	4.1	Mining Data Streams : Introduction, The Stream Data Model Sampling Data in a Stream : Obtaining a Representative Sample , The General Sampling Problem, Filtering Streams: The Bloom Filter, Analysis., Counting Distinct Elements in a Stream, Counting Ones in a Window:		5
	4.2	Link Analysis : PageRank Definition, Structure of the web, dead ends, Using Page rank in a search engine, Efficient computation of Page Rank: PageRank, Topic sensitive Page Rank, link Spam, Hubs and Authorities.		3
	4.3	Mining Social Nework Graphs : Mining Social-Network Graphs 11.1 Social Networks as Graphs, Clustering of Social-Network Graphs, SimRank		2
5		Managing Big Data	2, 3	10
	5.1	Moving Data into Hadoop <ul style="list-style-type: none"> <li>• Load Scenarios               <ol style="list-style-type: none"> <li>1. Understand how to load data at rest, in motion</li> <li>2. Understand how to load data from common data sources e.g. RDBMS</li> </ol> </li> <li>• Using Sqoop               <ol style="list-style-type: none"> <li>1. Import data from a relational database table into HDFS</li> <li>2. Use Sqoop import and export command</li> </ol> </li> </ul>		
	5.2	<ul style="list-style-type: none"> <li>• Flume Overview               <ol style="list-style-type: none"> <li>1. Describe Flume and its uses</li> <li>2. How Flume works</li> </ol> </li> <li>• Using Flume               <ol style="list-style-type: none"> <li>1. List the Flume configuration components</li> <li>2. Describe how to start and configure a Flume agent</li> </ol> </li> </ul>		
	5.3	<ul style="list-style-type: none"> <li>• Introduction to Oozie Workflows               <ol style="list-style-type: none"> <li>1. Explain the use for Oozie workflows</li> <li>2. Describe a workflow</li> <li>3. List some of the workflow elements</li> </ol> </li> <li>• Oozie Coordinator</li> </ul>		

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**Sardar Patel Institute of Technology**  
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		<ol style="list-style-type: none"><li>1. Explain the use for the Oozie coordinator</li><li>2. List some of the coordinator elements</li><li>3. Describe how to submit a workflow job and a coordinator job</li></ol>		
			Total	52

**References:**

- [1] Jure Leskovec, Anand Rajaraman, Jeffrey Ullman, "Mining Massive Datasets", Cambridge University Press, 2nd Edition.
- [2] Tom White, "Hadoop, the Definitive Guide", O'Reilly, Yahoo Press, 3rd Edition.
- [3] Tanmay Deshpande, "Hadoop Real-World Solutions Cook Book", Packt Publishing, 2nd Edition.





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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: PG Laboratory - IT (Big Data Analytics & Management Laboratory)  
Course Code Old (2016-17): —  
Course Code New (Autonomy 2017-18): CEL 912  
Class and Semester in Old Syllabus: —  
Class and Semesters in New Syllabus: M.Tech. Sem - I

### Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
1	← HLL →	New Subject introduced
2		
3		
4		
5		

Coordinators Name & Signature:

1) Prof. KIRAN GAVANDE

2)

Experts Name & Signature:

- 1) DR. S. N. Dhave
- 2) P. Bharatbhanwar
- 3)





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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: PG Laboratory - II C Big Data Analytics & Management

Course Code Old (2016-17): -

Laboratory

Course Code New (Autonomy 2017-18): CEL 912

Class and Semester in Old Syllabus: -

Class and Semesters in New Syllabus: M.Tech. Sem 4

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	← HLL →	Two subject removed	100%.
2			
3			
4			
5			

### Coordinators Name & Signature:

1) Prof. KIRAN GAWANDE K

2)

### Experts Name & Signature:

1) Dr. Sudhir Dhave SD

2) P. Bhavatrankar P.B.

3)

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\*\* Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEL912	PG Laboratory-II (Big Data Analytics and Managements Laboratory)	--	--	2	--	--	1	1
		Examination Scheme						
		ISE	ESE			Total		60
			Practical	Oral				
		40	-	20				

Pre-requisite Course Codes	Data Structures, Analysis of Algorithms, CE912(Big Data Analytics and Managements)
At the end of successful completion of the course, students will be able to	
Course Outcomes	CO1 Describe big data and use cases from selected business domains.
	CO2 Install, configure, and run Hadoop and HDFS
	CO3 Perform map-reduce analytics using Hadoop
	CO4 Clarify NoSQL big data management
	CO5 Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics

Exp. No.	Experiment Details	Ref.	Marks
1	<b>HDFS:</b> Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system. You will use the hadoop fs command when interacting with HDFS. <ol style="list-style-type: none"> <li>Review the commands available for the Hadoop Distributed File System</li> <li>Copy file foo.txt from local disk to the user's directory in HDFS</li> <li>Get a directory listing of the user's home directory in HDFS</li> <li>Get a directory listing of the HDFS root directory</li> <li>Display the contents of the HDFS file user/fred/bar.txt</li> <li>Move that file to the local disk, named as baz.txt</li> <li>Create a directory called input under the user's home directory</li> <li>Delete the directory input old and all its contents</li> <li>Verify the copy by listing the directory contents in HDFS</li> </ol>	1,2	10
2	<b>MapReduce</b> <ol style="list-style-type: none"> <li>Create a JOB and submit to cluster</li> <li>Track the job information</li> <li>Terminate the job</li> <li>Counters in MR Jobs with example</li> <li>Map only Jobs and generic map examples</li> <li>Distributed cache example</li> <li>Combiners, Secondary sorting and Job chain examples</li> </ol>	1,2,3	10





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3	<b>MapReduce (Programs)</b> Using movie lens data 1. List all the movies and the number of ratings 2. List all the users and the number of ratings they have done for a movie 3. List all the Movie IDs which have been rated (Movie Id with at least one user rating it) 4. List all the Users who have rated the movies (Users who have rated at least one movie) 5. List of all the User with the max, min, average ratings they have given against any movie 6. List all the Movies with the max, min, average ratings given by any user	1,2,3	10
4	<b>Extract facts using Hive OR Extract sessions using Pig</b> Hive allows for the manipulation of data in HDFS using a variant of SQL. This makes it excellent for transforming and consolidating data for load into a relational database. In this exercise you will use HiveQL to filter and aggregate click data to build facts about user's movie preferences. The query results will be saved in a staging table used to populate the Oracle Database.	4,3	10
<b>Total Marks</b>			<b>40</b>

## References:

- [1] Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
- [2] Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
- [3] Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.
- [4] E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
- [5] Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
- [6] Alan Gates, "Programming Pig", O'Reilley, 2011.





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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Modern Operating System

Course Code Old (2016-17): CSC103

Course Code New (Autonomy 2017-18): CEE91A

Class and Semester in Old Syllabus: M.E Sem-I

Class and Semesters in New Syllabus: M.Tech Sem -I

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Real Time Systems: Basic Model of Real time systems ,Characteristics, Applications of Real time systems	Basics of RTOS is must and student should know its applications too	
2	Mobile operating systems: Micro kernel design, client server resource access, Processes and threads, Memory management, File systems.	Mobile OS are in demand now a days and study of such OS is required in order to know all details of Mobile OS	
3	CASE STUDIES: Linux system: Design Principles , Kernel modules , Process management scheduling . memory management , I/O management . file systems , inter process communication IOS and Android: Architecture and SDK frame work , Media layer ,Services layer , core os layer , file Systems	Android OS is highly in demand and students should know architecture of Android OS and different case studies	19.04%

Coordinators Name & Signature: 1) Pramod Bide

2) Sunil Ghane

Experts Name & Signature: 1) Dr. Anand V. Nimbalkar

2) A. A. Godbole

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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**Sardar Patel Institute of Technology**  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Modern Operating System

Course Code Old (2016-17): CSC103

Course Code New (Autonomy 2017-18): CEE91A

Class and Semester in Old Syllabus: M.E Sem-I

Class and Semesters in New Syllabus: M.Tech Sem -I

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Agreement Protocol: System Model, Classification, Solution to Byzantine Agreement Problem, Fault Recovery: Concepts, Classification of failures, Backward error recovery, Recovery in concurrent Systems, Consistent Check Points, Synchronous and Asynchronous check pointing and recovery. Fault tolerance: Issues, Atomic actions and committing, Commit Protocols, Non-blocking Commit protocols, Voting protocols and Dynamic Voting Protocols.	Seems more contents and in order to fit the required contents in the syllabus based on no. of lectures provided. And to introduce new mobile operating system.

Coordinators Name & Signature:

1) Pramod Bide

2) Sunil Ghane

Experts Name & Signature:

1) Dr. Anant Nimbalkar

2) Mr. A. Godbole

3)





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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Image Analysis & Interpretation

Course Code Old (2016-17): CSDLO1012

Course Code New (Autonomy 2017-18): CEE91B

Class and Semester in Old Syllabus: M.E. Computer Sem-I

Class and Semesters in New Syllabus: M.Tech. Computer Sem-I

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Examples of Fields that Use Digital Image Processing.	Need to know examples of fields/application areas that use Digital Image Processing.	11.90%
2	Light and the electromagnetic spectrum	Need to know the energy source for images.	
3	Median filter	Need to know Order-statistics filter, particularly effective in presence of salt-and-pepper noise.	
4	Discrete Cosine Transform	Most frequently used transformation for image compression.	
5	Walsh Transform	Useful in Transform coding	

Coordinators Name & Signature:

1) Prof. Surekha Dholay

Experts Name & Signature:

1) Dr.D.R.Kalbande

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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## Theory Course Revision Report

### Theory Course Information

Course Name: Image Analysis & Interpretation

Course Code Old (2016-17): CSDL01012

Course Code New (Autonomy 2017-18): CEE91B

Class and Semester in Old Syllabus: M.E. Computer Sem-I

Class and Semesters in New Syllabus: M.Tech. Computer Sem-I

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Statistical decision making: Bayesian theorem Multiple features Conditionally independent features Decision boundaries Unequal cost of error Estimation of error rates Vector Quantization.	Seems more contents, in order to fit the required contents in the syllabus based on no. of lectures provided.

Coordinators Name & Signature:

1) Prof. Surekha Dholay

Experts Name & Signature:

1) Dr.D R.Kalbande





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## Theory Course Revision Report

### Theory Course Information

Course Name: Image Analysis & Interpretation

Course Code Old (2016-17): CSDLO1012

Course Code New (Autonomy 2017-18): CEE91B

Class and Semester in Old Syllabus: M.E. Computer Sem-I

Class and Semesters in New Syllabus: M.Tech. Computer Sem-I

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Examples of Fields that Use Digital Image Processing.	Need to know examples of fields/application areas that use Digital Image Processing.	11.90%
2	Light and the electromagnetic spectrum	Need to know the energy source for images.	
3	Median filter	Need to know Order-statistics filter, particularly effective in presence of salt-and-pepper noise	
4	Discrete Cosine Transform	Most frequently used transformation for image compression.	
5	Walsh Transform	Useful in Transform coding	

Coordinators Name & Signature:

1) Prof. Surekha Dholay

Experts Name & Signature:

1) Dr.D.R.Kalbande

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Image Analysis & Interpretation

Course Code Old (2016-17): CSDLO1012

Course Code New (Autonomy 2017-18): CEE91B

Class and Semester in Old Syllabus: M.E. Computer Sem-I

Class and Semesters in New Syllabus: M.Tech. Computer Sem-I

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Statistical decision making: Bayesian theorem Multiple features Conditionally independent features Decision boundaries Unequal cost of error Estimation of error rates Vector Quantization.	Seems more contents, in order to fit the required contents in the syllabus based on no. of lectures provided.

Coordinators Name & Signature:

1) Prof. Surekha Dholay

Experts Name & Signature:

1) Dr.D.R.Kalbande





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## Theory Course Revision Report

### Theory Course Information

Course Name: Advanced soft computing  
 Course Code Old (2016-17): CSD L02023  
 Course Code New (Autonomy 2017-18): CEE 91D  
 Class and Semester in Old Syllabus: Sem II (University)  
 Class and Semesters in New Syllabus: Sem I (Autonomous)

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Associative Memory Network	Exposure for designing Associative Memory Neural Network with examples.	<del>23.80%</del>
2			
3			
4			
5			

Coordinators Name & Signature:

- 1) D. R. Kalbande

Experts Name & Signature:

- 1) D. R. Kalbande   
 2) Sunetra Sholay   
 3)



$$X = \left(\frac{18}{42}\right) \times 100 = \cancel{45} \quad 23.80\%$$

\*\* Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

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## Theory Course Revision Report

### Theory Course Information

Course Name: Advanced Soft Computing

Course Code Old (2016-17): CSD LD 2023

Course Code New (Autonomy 2017-18): CEE 91D

Class and Semester in Old Syllabus: Sem II (University)

Class and Semesters in New Syllabus: Sem I (Autonomous).

Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Introduction to Deep Learning	Should be part of Machine learning course rather than Artificial Learning.
2		
3		
4		
5		

Coordinators Name & Signature:

1) D. R. Kalbande

2)

Experts Name & Signature:

1) D. R. Kalbande

2) Surekha Sholay

3)



Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
CSDLO2023	Advanced Soft Computing	04	--	--	04	--	--	04
		Examination Scheme						
		Theory Examination			End Sem Exam	Term Work	Pract	Oral
		Internal Assessment						
		Test 1	Test 2	Avg	80	--	--	--
		20	20	20				

**Course Objectives:**

1. To familiarize various soft computing techniques.
2. To relate various soft computing techniques in practical scenario.
3. To understand hybrid approach for application development.

**Course Outcomes:** At the end of the course, the learner will be able to-

- To demonstrate various soft computing techniques.
- To apply and analyze different soft computing techniques for solving practical applications.
- To design an intelligent system for social and technical problems.

**Pre-requisite:** Basic mathematics, soft computing, Computational intelligence

Sr. No.	Module	Detailed content	Hours
1	Introduction	Differentiate Hard and Soft Computing, Soft Computing Constituents, Neuro Fuzzy and Soft Computing Characteristics	2
2	Fuzzy Logic & Rough Set Theory	Fuzzy Relations and Fuzzy Rules, Generalized Modens Ponens, Defuzzification and its Types Fuzzy Inference Systems, Design of Fuzzy Controller, Introduction to Rough Sets	12
3	Supervised Network	Error Back Propagation Training Algorithm, Radial Basis Function	10
4	Unsupervised Network	Kohenon Self Organizing Maps, Basic Learning Vector Quantization, Basic Adaptive Resonance Theory	12

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5	<b>Hybrid Systems and introduction to Deep Learning</b>	Fuzzy-Neural Systems, Neuro-Genetic Systems Fuzzy-Genetic Systems, Deep Learning: Definition & background, historical context of deep learning, Three classes of deep learning network.	8
6	<b>Applications and Case Study</b>	Automobile Fuel Efficiency using ANFIS Color Recipe prediction using CANFIS	4

#### Text Books

1. J.S.R.Jang "Neuro-Fuzzy and Soft Computing" PHI 2003.
2. S. Rajasekaran and G.A. Vijaylakshmi Pai, Neural Networks  
Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.
3. Satish Kumar "Neural Networks A Classroom Approach" Tata McGrawHill.
4. S.N.Sivanandam, S.N.Deepa "Principles of Soft Computing" Second Edition, Wiley  
Publication.
5. Samir Roy, Udit Chakraborty "Introduction to Soft Computing" Pearson Education India.
6. Jacek.M.Zurada "Introduction to Artificial Neural Systems" Jaico Publishing House.
7. Timothy J.Ross "Fuzzy Logic With Engineering Applications" Wiley.

#### Reference Books:

1. Fakhreddine O. Karry, Clarence De Silva, " Soft Computing and Intelligent systems Design Theory, Tools and Applications" Pearson 2009.
2. Li Deng and Dong Yu , 'Deep Learning Methods and Applications'.

**Internal Assessment:** Assessment consists of two tests out of which; one should be compulsory class test (on minimum 02 Modules) and the other is either a class test or assignment on live problems or course project.

#### Theory Examination:

5. Question paper will comprise of total six question
6. All question carry equal marks
7. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
8. Only Four question need to be solved.

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEE91D	Advanced Soft Computing(ASC)	3	--	--	3	--	--	3
Examination Scheme								
ISE			MSE			ESE		
10			30			100 (60% Weightage)		

Pre-requisite Course Codes	Fundamental of AI and Soft Computing
At the end of successful completion of the course, students will be able to	
Course Outcomes	CO1 Identify the various characteristics of soft computing techniques.
	CO2 Apply & design fuzzy controller system.
	CO3 Apply the supervised and unsupervised learning algorithm for real world applications.
	CO4 Solve the problem using associative memory networks
	CO5 Design hybrid system applications

Module No.	Unit No.	Topics	Ref.	Hrs.
		<b>Introduction</b>		
1	1.1	Differentiate Hard and Soft Computing	1,5	2
	1.2	Soft Computing Constituents		
	1.3	Neuro Fuzzy and Soft Computing Characteristics		
2	2.1	Fuzzy Logic & Rough Set Theory		
	2.1	Fuzzy Relations and Fuzzy Rules, Generalized Modens Ponens, Defuzzification and its Types	1,2,5,7	10
	2.2	Fuzzy Inference Systems, Design of Fuzzy Controller, Introduction to Rough Sets		
3	3.1	Supervised and Unsupervised Network		
	3.1	Supervised Network: Error Back Propagation Training Algorithm, Radial Basis Function	1,2,3,8,9	12
	3.2	Unsupervised Network: Kohonen Self Organizing Maps, Basic Learning Vector Quantization, Basic Adaptive Resonance Theory		
4	4.1	Associative Memory Networks		
	4.1	Introduction, Hebb Rule, Outer Product Rule	4	10
	4.2	Types of associative Memory Networks: Auto-associative and Hetero-associative memory networks,		
	4.3	BAAM network, Hopfield Network		



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5	Hybrid Systems			
5.1	Fuzzy-Neural Systems, Neuro-Genetic Systems, Fuzzy-Genetic Systems	2,9	4	
6	Applications and Case Study			
6.1	Automobile Fuel Efficiency using ANFIS	1	4	
	6.2 Color Recipe prediction using CANFIS			
		Total	42	

### References:

- [1] J.S.R.Jang "Neuro-Fuzzy and Soft Computing" PHI 2003.
- [2] S. Rajasekaran and G.A.Vijaylakshmi Pai., Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.
- [3] Satish Kumar "Neural Networks A Classroom Approach" Tata McGrawHill.
- [4] S.N.Sivanandam, S.N.Deepa "Principles of Soft Computing" Second Edition, Wiley Publication.
- [5] Samir Roy, Udit Chakraborty " Introduction to Soft Computing" Pearson Education India
- [6] Fakhreddine O. Karry, Clarence De Silva, " Soft Computing and Intelligent systems Design Theory, Tools and Applications" Pearson 2009.
- [7] Timothy J.Ross "Fuzzy Logic with Engineering Applications" Wiley.
- [8] Jacek M.Zurada "Introduction to Artificial Neural Systems" Jaico Publishing House,
- [9] Li Deng and Dong Yu "Deep LearningMethods and Applications".



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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Information and communication technologies (ICT) for Social Cause.

Course Code Old (2016-17): CSDLO2025

Course Code New (Autonomy 2017-18): CEE925

Class and Semester in Old Syllabus: M.E. Semester-II Dept.Level Elective

Class and Semesters in New Syllabus: M.Tech Semester- II-Elective

Change/Addition in the Syllabus: NIL.

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	No change in the contents	It was introduced first time in the University of Mumbai. In choice based Credit system syllabus	0 %
2			

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

Experts Name & Signature:

1) Dr. D. R. Kalbande

2) Dr. Radha Shankarmani



\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Information and communication technologies (ICT) for Social Cause.

Course Code Old (2016-17): CSDLO2025

Course Code New (Autonomy 2017-18): CEE925

Class and Semester in Old Syllabus: M.E. Semester-II Dept.Level Elective

Class and Semesters in New Syllabus: M.Tech Semester- II-Elective

Removal from Syllabus: NIL

Sr. No.	Topics Removed	Reason
1	NIL	
2		
3		
4		
5		

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

Experts Name & Signature:

1) Dr. D. R. Kalbande

2) Dr. Radha Shankarmani



# M Tech Sem 2 /Elective



## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEE92B	Information and Communication Technologies (ICT) for Social Cause	3	--	--	3	--	--	3
		Examination Scheme						
		ISE			MSE		ESE	
		10			30		100 (60% Weightage)	

### Pre-requisite Course Codes

At the end of successful completion of the course, students will be able to

Course Outcomes	CO1	To understand technologies used in ICT.
	CO2	To design and implement ICT application for societal benefits
	CO3	To demonstrate use of emerging technology for social applications
	CO4	To apply Knowledge based ICT tool for social cause
	CO5	To develop an ICT tool as an expert system for different domains

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Basics of ICT :</b>		
	1.1	Introduction to ICT, Challenges and opportunities in using technology for a social cause, Understanding the social and cultural influences that affect users. Creating an ICT – handling text, data and media	1	4
2		<b>Communication Techniques in ICT</b>		
	2.1	Mobile Techniques – CDMA, Mobile wireless WiMAX, Advanced wireless technologies, Bluetooth Satellite Techniques – architecture AND working principles GPS/GPRS	1,2,3,4	8
	2.2	Cloud computing – Introduction, cloud services, Cloud service providers		
	2.3	GIS– Working principle and architecture for ICT		
3		<b>Data acquisition in ICT</b>		
	3.1	Recognition systems RFID, OMR Data acquisition process for MEMS devices Sensors – Programming, communication with cloud.	6	8
	3.2	Formation of social groups and interaction analysis Facebook, Twitter, Blogs, Forums, mailing lists etc		
4		<b>Data Management in ICT</b>		
	4.1	Data management, Data storage structures	6	6
5		<b>Knowledge management in ICT</b>		
	5.1	Knowledge elicitation, Knowledge Engineering Methodology, Knowledge representation and visualization techniques Automatic discovery programs	6	8



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	5.2	Data visualization, Auditing knowledge management, Linking knowledge management to business performance		
6		<b>ICT applications and Social Audit</b>		
	6.1	Study of ICT applications in various domains such as Agriculture, Healthcare, Education, SCM, Finance, Law.	1,7,8	8
	6.2	Social Audit: The Social Audit Tool (SAT), Social Audit Tool , Social Auditing, Characteristics of the SAT, Uses of the SAT , Benefits of the SAT, The SAT Methodology , Purposes, Method, and Approach of the SAT, Implementing the SAT, The Social Auditor		
Total				42

### References:

- [1] Paul Warren , Jhon Davies, David Brown , Wiley Publication ,ICT Futures :Delivering Pervasive Realtime And Secure Services, Wiley Publication
- [2] Jochen Schiller, "Mobile communications", Addison wisely, Pearson Education
- [3] Dr.K.Elangovan, GIS Fundamentals, Applications and Implementation, New India Publications.
- [4] Anthony T. Velte , Cloud Computing : A practical Approach, Tata McGraw-Hill
- [5] NadimMaluf , An Introduction to Microelectromechanical systems Engineering , Artech House
- [6] Jessica Keycs , Knowledge management business intelligence , and content management : The IT practitioner's Guide by
- [7] S.R. Verma , ICTs for transfer of technology tools and techniques , New India
- [8] USAID, Social Audit Tool Handbook, Using the Social Audit to Assess the Social Performance of Microfinance Institutions, 2008.



Dept. level  
ME. Sem 2 / Elective

Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
CSDLO2025	Information and Communication Technologies (ICT) for Social Cause	04	--	--	04	--	--	04
		Examination Scheme						
		Theory Examination		Internal Assessment		End Sem Exam	Term Work	Pract Oral
		Test 1	Test 2	Avg	80	--	--	--
		20	20	20				

**Course Objectives:**

1. To understand use of ICT techniques in various applications.
2. To Recognize, Represent and Design the ICT systems for social cause.

**Outcome:** Learner will able

- To understand technologies used in ICT.
- To design and implement ICT application for societal benefits
- To demonstrate use of emerging technology for social applications.

Sr. No.	Module	Detailed content	Hours
1	Basics of ICT	<ul style="list-style-type: none"> <li>• Introduction to ICT</li> <li>• Challenges and opportunities in using technology for a social cause.</li> <li>• Understanding the social and cultural influences that affect users.</li> <li>• Creating an ICT - handling text, data and media</li> </ul>	4
2	Communication Techniques in ICT	<ul style="list-style-type: none"> <li>• Mobile Techniques – CDMA, Mobile wireless WiMAX, Advanced wireless technologies, Bluetooth</li> <li>• Satellite Techniques – architecture AND working principles GPS/GPRS</li> <li>• Cloud computing – Introduction, cloud services, Cloud service providers,</li> <li>• GIS– Working principle and architecture for ICT</li> </ul>	12
3	Data acquisition in ICT	<ul style="list-style-type: none"> <li>• Recognition systems RFID, OMR</li> <li>• Data acquisition process for MEMS devices</li> <li>• Sensors – Programming, communication with cloud.</li> <li>• Formation of social groups and interaction analysis Facebook, Twitter, Blogs, Forums, mailing lists etc</li> </ul>	8
4	Data Management in ICT	<ul style="list-style-type: none"> <li>• Data management</li> <li>• Data storage structures</li> </ul>	8

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5	knowledge management in ICT	<ul style="list-style-type: none"> <li>▪ Knowledge elicitation</li> <li>▪ Knowledge Engineering Methodology</li> <li>▪ Knowledge representation and visualization techniques</li> <li>▪ Automatic discovery programs</li> <li>▪ Data visualization</li> <li>▪ Auditing knowledge management</li> <li>▪ Linking knowledge management to business performance</li> </ul>	8
6	ICT applications and Social Audit	<ul style="list-style-type: none"> <li>▪ Study of ICT applications in various domains such as Agriculture, Healthcare, Education, SCM, Finance, Law.</li> <li>▪ Social Audit: The Social Audit Tool (SAT), Social Auditing, Characteristics of the SAT, Uses of the SAT , Benefits of the SAT, The SAT Methodology . Purposes, Method, and Approach of the SAT, Implementing the SAT, The Social Auditor</li> </ul>	10

**References Books:**

1. ICT Futures : Delivering Pervasive Realtime And Secure Services Edited By Paul Warren, Jhon Davies, David Brown , Wiley Publication
2. Jochen Schiller, "Mobile communications" , Addison wisely, Pearson Education.
3. GIS Fundamentals, Applications and Implementation, Dr.K.Elangovan, New India Publications.
4. Cloud Computing : A practical Approach: By Anthony T. Veltz : Tata McGraw-Hill
5. An Introduction to Microelectromechanical systems Engineering, NadimMaluf , Artech House.
6. Knowledge management business intelligence , and content management : The IT practitioner's Guide by Jessica Keyes
7. ICTs for transfer of technology tools and techniques , S.R. Verma , New India
8. USAID, Social Audit Tool Handbook, Using the Social Audit to Assess the Social Performance of Microfinance Institutions,2008



*Schultz*

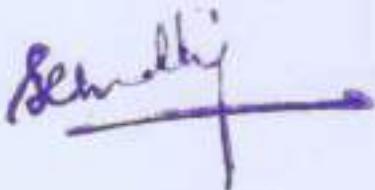
*[Signature]*

Internal Assessment: Assessment consists of two tests out of which; one should be compulsory class test (on minimum 02 Modules) and the other is either a class test or assignment on live problems or course project.

Theory Examination:

1. Question paper will comprise of total six question
2. All question carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four question need to be solved.

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.









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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Network Analysis & Design.

Course Code Old (2016-17): CSC 102

Course Code New (Autonomy 2017-18): CE 921

Class and Semester in Old Syllabus: M.Tech. Sem - I

Class and Semesters in New Syllabus: M.Tech. Sem - II

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	NO Change	—
2		
3		
4		
5		

Coordinators Name & Signature:

1) P. B. Bharathankar

2)

Experts Name & Signature:

1) D.Y. S. N. Dhage

2)

3)





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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Network Analysis & Design

Course Code Old (2016-17): CSC 102

Course Code New (Autonomy 2017-18): CE 921

Class and Semester in Old Syllabus: M.E. Sem-I

Class and Semesters in New Syllabus: M.Tech Sem-II

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	no change	—	0 %.
2			
3			
4			
5			

Coordinators Name & Signature:

1) P. B. Bhavatkar

2)

Experts Name & Signature:

1) Dr. S. N. Dhang

2)

3)



\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CE921	Network Analysis and Design (NDA)	4	--	--	4	--	--	4
Examination Scheme								
			ISE		MSE		ESE	
			10		30		100 (60% Weightage)	

Pre-requisite Course Codes	Computer Networks			
At the end of successful completion of the course, students will be able to				
Course Outcomes	CO1	Understand the theoretical issues in protocol design and apply it to Quality of service in networks		
	CO2	Understand issues in the design of network processors and apply them to design network systems		
	CO3	Simulate working of wired and wireless networks to understand networking concepts		
	CO4	Develop solutions by applying knowledge of mathematics, probability, and statistics to network design problems.		
	CO5	Understand the basics of software defined networking and explore research problems in that area.		

Module No.	Unit No.	Topics	Ref.	Hrs.
Internetworking	1.1	Congestion control and Resource allocation: Issues of Resource Allocation, Queuing Disciplines: FIFO, Fair Queueing, TCP Congestion Control: Additive Increase/Multiplicative Decrease, Slow Start, Fast Retransmit and Fast Recovery.	1.2	05
	1.2	Congestion-Avoidance Mechanisms: DECbit, Random Early Detection (RED), Source-Based Congestion Avoidance, Quality of Service: Application Requirements, Integrated Services (RSVP), Differentiated Services (EF, AF)	1.2	05
Routing	2.1	IPv4 Routing Principles, Routing Information Protocol (RIP), IGRP and EIGRP, OSPF for IPv4 and IPv6, Border Gateway Protocol (BGP), EIGRP, High Availability Routing	2.3	08
IPv6	3.1	IPv4 deficiencies, patching work done with IPv4, IPv6 addressing, multicast, Anycast, ICMPv6, Neighbour Discovery, Routing, Resource Reservation, IPv6 protocols		08
Network Design	4.1	Designing the network topology and solutions-Top down Approach: PPDIOO – Network Design Layers - Access Layer, Distribution Layer, Core/Backbone Layer, Access Layer Design,	1.2	14





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		Backbone Network Design, Enterprise LAN Design: Ethernet Design Rules and Campus Design best practices, Virtualization and Data Center Design, Wireless LAN Design, WAN Design: Traditional WAN Technologies, VPN Design.		
Ad Hoc Wireless Networks	5.1	MAC Protocols for Ad Hoc Wireless Networks: MACA/W, MACA-BI, DPRMA, MACA/PR. Routing Protocols for Ad Hoc Wireless Networks: DSDV, DSR, AODV, ZRP. Transport Layer: ATCP.	4,5	08
Software Defined Networking and OpenFlow	5.2	Introduction to Software Defined Networking, Control and Data Planes, SDN Controllers, Introduction to Openflow Protocol, Network Function Virtualization-Concepts.	5,6	04
<b>Total</b>				<b>52</b>

**In-Semester Examination (ISE):** The assessment includes the submission of a term paper by each student on the contemporary work related to Network Analysis and Design.

**References:**

- [1] Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, Elsevier, Fourth Edition.
  - [2] Philip M. Miller, TCP / IP: The Ultimate Protocol Guide Applications, Access and Data Security - Vol 2, Wiley.
  - [3] Pete Loshin, IPv6: Theory, Protocols and Practice, Morgan Kaufmann, 2nd Edition, 2004.
  - [4] C. Siva Ram Murthy, B.S. Manoj, Ad Hoc Wireless Networks: Architectures and, Prentice Hall, 2004.
  - [5] Thomas D Nadeau and Ken Grey, Software Defined Networking, O'Reilly, 2013.
- William Stallings, High-Speed Networks and Internets, Pearson Education, 2nd Edition, 2002.



Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
CSC102	Advanced Computer Networking and Design	04	--	--	04	--	--	04
		Examination Scheme						
		Theory Examination						
		Internal Assessment			End Sem Exam	Term Work	Pract	Oral
		Test 1	Test 2	Avg				
		20	20	20	80	--	--	--

**Course Objectives:**

1. To study the problem of congestion control and service integration in TCP/IP networks focusing on protocol design, implementation and performance issues.
2. To understand the principles of network design and enable students to setup, configure and interconnect an IP network.
3. To debate the current trends and leading research in the computer networking area.

**Course Outcomes:** Learner will able to

- Understand the theoretical issues in protocol design and apply it to Quality of service in networks.
- Understand issues in the design of network processors and apply them to design network systems
- Simulate working of wired and wireless networks to understand networking concepts.
- Develop solutions by applying knowledge of mathematics, probability, and statistics to network design problems.
- Understand the basics of software defined networking and explore research problems in that area.

Sr. No.	Module	Detailed content	Hours
1	Internetworking	<b>Congestion control and Resource allocation:</b> Issues of Resource Allocation, Queuing Disciplines: FIFO, Fair Queueing, TCP Congestion Control: Additive Increase/Multiplicative Decrease, Slow Start, Fast Retransmit and Fast Recovery. <b>Congestion-Avoidance Mechanisms:</b> DECbit, Random Early Detection (RED), Source-Based Congestion Avoidance, Quality of Service: Application Requirements, Integrated Services (RSVP), Differentiated Services (EF, AF).	10



2	<b>Routing:</b>	IPv4 Routing Principles, Routing Information Protocol (RIP), IGRP and EIGRP, OSPF for IPv4 and IPv6, Border Gateway Protocol (BGP), EIGRP, High Availability Routing.	08
3	<b>IPv6</b>	IPv4 deficiencies, patching work done with IPv4, IPv6 addressing, multicast, Anycast, ICMPv6, Neighbour Discovery, Routing, Resource Reservation, IPv6 protocols.	06
4	<b>Network Design:</b>	Designing the network topology and solutions-Top down Approach: PPDIOO – Network Design Layers - Access Layer, Distribution Layer, Core/Backbone Layer, Access Layer Design, Backbone Network Design, Enterprise LAN Design: Ethernet Design Rules and Campus Design best practices, Virtualisation and Data Center Design, Wireless LAN Design, WAN Design: Traditional WAN Technologies, VPN Design.	14
5	<b>Ad Hoc Wireless Networks</b>	MAC Protocols for Ad Hoc Wireless Networks: MACA/W, MACA-BI, DPRMA, MACA/PR. Routing Protocols for Ad Hoc Wireless Networks: DSDV, DSR, AODV, ZRP. Transport Layer: ATCP.	06
6	<b>Software Defined Networking and OpenFlow</b>	Introduction to Software Defined Networking, Control and Data Planes, SDN Controllers, Introduction to Openflow Protocol, Network Function Virtualization-Concepts.	04

#### Text Books:

1. Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, Elsevier, Fourth Edition.
2. Philip M. Miller, *TCP / IP: The Ultimate Protocol Guide Applications, Access and Data Security - Vol 2*, Wiley
3. Pete Loshin, IPv6: Theory, Protocols and Practice, Morgan Kaufmann, 2nd Edition, 2004
4. Anthony Bruno, Steve Jordan, Official Cert Guide: CCDA, Cisco Press,
5. C. Siva Ram Murthy, B.S. Manoj, Ad Hoc Wireless Networks: Architectures and, Prentice Hall, 2004.
6. Thomas D Nadeau and Ken Grey, Software Defined Networking, O'Reilly, 2013



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**Reference Books:**

1. William Stallings, High-Speed Networks and Internets, Pearson Education, 2nd Edition, 2002.
2. James F. Kurose, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Third Edition, Addison Wesley, 2004.
3. Pujolle, Software Networks: Virtualisation, SDN, 5G, Security, Wiley,

**Internal Assessment:** Assessment consists of two tests out of which; one should be compulsory class test (on minimum 02 Modules) and the other is either a class test or assignment on live problems or course project.

**Theory Examination:**

1. Question paper will comprise of total six question
2. All question carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four question need to be solved.

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.



A handwritten signature in black ink, appearing to read "Dr. S. S. Patil".

A handwritten signature in black ink, appearing to read "Dr. S. S. Patil".



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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Information and System Security

Course Code Old (2016-17): ----NA----

Course Code New (Autonomy 2017-18): CE913

Class and Semester in Old Syllabus: ----NA----

Class and Semesters in New Syllabus: MTech (Computer Engineering) 1<sup>st</sup> Year, Semester - I

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Information and System Foundation Results		
2	Confidentiality Policies, Integrity Policies, Hybrid Policies		
3	Noninterference and Policy Composition, Cryptography, Key Management	A new subject is introduced with the content towards theoretical research at PG level	
4	Cipher Techniques, Authentication , Security Systems		
5	Access Control Mechanisms, Information Flow, Confinement Problem		52/52=100%

Coordinators Name & Signature:

- 1) Dr. Anant V. Nimkar

Experts Name & Signature:

- 1) Dr. Sudhir N. Dhage

- 2)



\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Introduction - Basic Components, Threats, Policy and Mechanism, Assumptions and Threat, Assurance, Operational and Human Issues, Access Control Matrix, Protection State, Access Control Matrix Model, Protection State Transitions, Copying, Owning, and the Alteration of Privilege		1.2
1	1.2	Foundation Results - The General Question of Security, Take-Glass Protection Model, Exposure Point and the Models Central, Policy Languages		4
2	2.1	Confidentiality Policies - Goals of Confidentiality Policies, The Bell-LaPadula Model, Transparency, The Controversy over the Bell-LaPadula Model		1.2
2	2.2	Integrity Policies - Goals, Bitacora Integrity Model, Lipner's Integrity Model		4
2	2.3	Hybrid Policies - Chinese Wall Model, Clinical Information Systems Security Policy, Operator Controlled Access Control, Role-Based Access Control		4
3	3.1	Noninterference and Policy Composition - The Problem, Deterministic Noninterference, Non-deduplicability, Generalized Noninterference, Response		5

	3.2	Cryptography - Classical Cryptosystems, Public Key Cryptosystems, Cryptographic Cocktails	1.2	2
	3.3	Key Management - Session and Intermediate Keys, Key Exchange, Resolving Keys, Digital Signatures	1.2	4
	4.1	Cipher Techniques - Block Ciphers, Stream and Block Ciphers, Networks and Cryptography, Ensemble Protocols	1.2	3
	4.2	Authentication - Hosts, Passwords, Challenge-Response, Biometric, Random, Multiple Methods	1.2	3
	4.3	Security Systems - Design Principles, Identity - File and Object, User, Groups and Roles, Running and Certificate, Identity on the Web	1.2	3
	5.1	Access Control Mechanisms - Access Control Lists, Capabilities, Locks and Keys, Ring-Based Access Control, Programmed Access Control Lists	1.2	3
	5.2	Information Flow - Basics and Background, Computer-Based Mechanisms, Example, Commit, Commit	1.2	4
	5.3	Containment Problem - The Containment Problem, Definition, Cover, Channel, Assurance - Introduction to Assurance, Assume and Test, Building Secure and Trusted Systems	1.2	3
		Total	52	

In-Semester Examination (ISE): The assessment includes the submission of a term paper by each student on the contemporary work related to Information and System Security.  
 References:  
 [1] Matt Bishop, "Computer Security: Art and Science", Addison Wesley Professional, FIRST Edition, 2002  
 [2] Matt Bishop, "Introduction to Computer Security", Addison Wesley Professional, FIRST Edition, 2003



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: User Experience Design  
Course Code Old (2016-17): CSDLO1015  
Course Code New (Autonomy 2017-18): CE923  
Class and Semester in Old Syllabus: Sem I  
Class and Semesters in New Syllabus: Sem-II

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Introduction : User interface Design Goals	To understand the pre-requisite of HCI.	(29 / 42 ) * 100 = 69.04 %
2	<b>The Wheel : The UX design lifecycle Template:</b> Introduction, A UX process lifecycle template, Choosing a process instance for your project, The system complexity space, Meet the user interface team, Scope of UX presence within the team, More about UX lifecycles.	Design process life cycle helps the students to know the iterative steps in UX application design.	
3	<b>The UX design Process:Contextual Inquiry:</b> <b>Eliciting Work Activity Data:</b> Introduction, The system concept statement, User work activity gathering, Look for emotional aspects of work practice, Abridged contextual inquiry process, Data-driven vs. model-driven inquiry, Contextual Analysis, Extracting Interaction Design Requirements, Constructing Design-Information Models.	To explore roots of usability with contextual inquiry and contextual analysis. And also as per the need of the today's industry , students should be able to construct the user-driven design -information model	
4	<b>UX goals, metrics and targets:</b> UX goals, UX target tables, UX metrics. <b>UX Evaluation Techniques:</b> Formative Vs Summative evaluation and its types, types of evaluation data, some data collection techniques, variations in formative evaluation results.  <b>Analysis and Reporting:</b> Quantitative and qualitative data analysis and reporting.  <b>UX Design guidelines:</b> UX design guidelines and	Various evaluation techniques required to be conceptualize as per the industry standards and practice with various UX tools available.	



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Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Prof. Anand Godbole

Experts Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Prof. Radha Shankarmani

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: User Experience Design  
Course Code Old (2016-17): CSDLO1015  
Course Code New (Autonomy 2017-18): CE923  
Class and Semester in Old Syllabus: Sem I  
Class and Semesters in New Syllabus: Sem-II

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	To understand users conceptual cognition, <b>Elements of UX Design :</b> Core Elements of User Experience , How these elements work together	Not required as per today's industry standards
2	<b>UX Design Process: Iterate/ Improve and Deliver:</b> Understanding the Usability Test findings Applying the Usability Test feedback in improving the design Communication with implementation team, UX Deliverables to be given to implementation team	Theoretical aspect of Usability testing will not help students to explore UX design standards.

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Prof. Anand Godbole

Experts Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Dr. Radha Shankarmani





Bharatiya Vidya Bhavan's  
**Sardar Patel Institute of Technology**  
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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: User Experience Design  
Course Code Old (2016-17): CSDL01015  
Course Code New (Autonomy 2017-18): CE923  
Class and Semester in Old Syllabus: Sem I  
Class and Semesters in New Syllabus: Sem-II

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	To Study of open source UX tools (Justinmind Prototype, Pidoco, Marvel Prototype) and create UX design for a given problem definition.	The new lab is introduced with respect industry requirements. It is necessary to explore practical applications of User experience design with various UX tools.	( 8 / 8 ) * 100 = 100%
2	Design a Map based UI(Mobile User) for Transport applications like Ola, Uber etc.		
3	Design a Map based UI(Web User) for Mumbai Dabbawalas with localization feature.		
4	Pick a website/app that you use on a daily basis (eg. facebook, gmail, whatsapp, zomato, etc). Evaluate the product based on user experience principles and give suggestions for improvement. Explain usability testing process for the same.		
5	Museum of London : Visit the application on <a href="http://www.webcredible.com/case-studies/non-profit/museum-london/">http://www.webcredible.com/case-studies/non-profit/museum-london/</a> . Study and identify the challenges in design and evaluate UX principles applied for helping visitors to engage with the past, present and future. Suggest any such App design in Indian scenario for any one Museum in India. Explain usability testing for the same. Localization framework for designing the localizable UI.		
6	Design UI for kinder garden student to teach mathematics.		



*S. Chaturvedi* *Chairman*

7	Design UI for any differently abled users.
8	Design UI for analysis of number of children suffering from juvenile diabetic children in India. The design aims at providing solutions for improving quality treatment and making the treatment affordable.

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Prof. Anand Godbole

Experts Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Prof. Radha Shankarmani

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100





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## Lab Course Revision Report

### Lab Course Information

Course Name: User Experience Design

Course Code Old (2016-17): CSDLO1015

Course Code New (Autonomy 2017-18): CE923

Class and Semester in Old Syllabus: Sem I

Class and Semesters in New Syllabus: Sem-II

**Removal from Syllabus:**

Sr. No.	Experiments Removed	Reason
1	NIL	There was lab course in old syllabus
2		
3		
4		
5		

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Prof. Anand Godbole

Experts Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

2) Prof. Radha Shankarmuni





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CE923	User Experience Design(UXD)	3	--	--	3	--	--	3
					Examination Scheme			
		ISE		MSE		ESE		
			10	30		100 (60% Weightage)		

Pre-requisite Course Codes		Mobile and Web Technologies Software Engineering
At the end of successful completion of the course, students will be able to		
Course Outcomes	CO1	Differentiate between UI and UX.
	CO2	Design life cycle template to enhance User Experience design
	CO3	Analyze UX design process for users
	CO4	Apply design thinking to model the prototype
	CO5	Evaluate and analyze user experiences using different UX evaluation techniques
	CO6	Analyze UX design guidelines to build innovative and user friendly application

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Introduction to UI and UX design</b>		
	1.1	History of User interface designing, User interface Design Goals	1,5,6,7	4
	1.2	What is UX, Ubiquitous interaction, Emerging desire for usability, From usability to user experience	01	
	1.3	Emotional impact as part of the user experience, User experience needs a business case, Roots of usability.		
2		<b>The Wheel: The UX design lifecycle Template</b>		
	2.1	Introduction, A UX process lifecycle template, Choosing a process instance for your project, The system complexity space	1	6
	2.2	Select the user interface team, Scope of UX presence within the team, More about UX lifecycles		
3		<b>The UX design Process</b>		
	3.1	Contextual Inquiry: Eliciting Work Activity Data	1,2,3	10
	3.2	Introduction, The system concept statement, User work activity gathering, Look for emotional aspects of work practice, Abridged contextual inquiry process, Data-driven vs. model-driven inquiry		



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4	The UX design Process: Information Architecture, Interaction design and prototyping		10	
	4.1 Design Thinking, Ideation, and Sketching: Introduction, Design paradigms, Design thinking, Design perspectives, User personas, Ideation, Sketching, More about phenomenology			
	4.2 Mental Models and Conceptual Design: Mental Models, Conceptual design, Storyboards, designing influencing user behavior, design for embodied interaction.			
	4.3 Wireframes and Prototyping: wireframes, depth and breadth of a prototype, Fidelity of prototypes, interactivity of prototypes, software tools in prototypes			
5	UX Evaluation, Analysis and Reporting		10	
	5.1 UX goals, metrics and targets: UX goals, UX target tables, UX metrics			
	5.2 UX Evaluation Techniques: Formative Vs Summative evaluation and its types, types of evaluation data, some data collection techniques, variations in formative evaluation results			
6	5.3 Analysis and Reporting: Quantitative and qualitative data analysis and reporting		2	
	6.1 UX design guidelines			
Total		1	42	

References:

- [1] Rex Hartson and Pardha Pyla, The UX Book, MK publications.
- [2] Jesmond Allen and James Chudley , Smashing UX Design ,John Wiley and sons
- [3] steve krug, Don't make me think
- [4] Russ Unger and Carolyn Chandler ,A Project Guide to UX Design, Peachpit Press
- [5] Jesse James Garrett, The Elements of User Experience, AIGA, New Riders
- [6] Donald A. Norman, "The design of everyday things", Basic books.
- [7] Wilbert Galitz, The Essential Guide to User Interface Design, Second Edition, Wiley Publications



# University syllabus

Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract	Tut	Theory	Pract	Tut	Total	
CSDLO1015	User Experience Design	04	--	--	04	--	--	04	
		Examination Scheme							
		Theory Examination							
		Internal Assessment			End Sem Examn	Term Work	Pract	Oral	
		Test 1	Test 2	Avg					
		20	20	20	80	--	--	--	

**Course Objectives:**

1. To study and understand importance of user experience design principles
2. To understand elements of user experience design
3. To encourage students to participate in designing futuristic applications

**Course Outcomes:** Learner will be able to:

- To Apply principles of user experience
- To apply emerging and established technologies to enhance User Experience design
- To create interface for international standards with ethics
- To evaluate user experience.

**Pre-requisites:** Web Technologies; Software Engineering; Experience in designing interfaces for applications and web sites. Basic knowledge of designing tools and languages like HTML, Java, etc. User experience design is concerned with all the elements that together make up user interface, including layout, visual design, text, brand, sound, and interaction. User Experience Design works to coordinate these elements to allow for the best possible interaction by users.

Sr. No.	Module	Detailed Contents	Hours
1	Introduction	Introduction to interface design, Understanding and conceptualizing Interface, Understanding user's perceptual cognition, Elements of User Experience, Working of UX	04
2	Elements of UX Design		04
3	The UX Design Process - Understanding Users	Defining the UX, Design Process and Methodology, Understanding user requirements and goals, Understanding the Business Requirements/Goals, User research, mental models, wireframes, prototyping, usability testing.	08
4	The UX Design Process- The Structure: Information Architecture and Interaction Design	Visual Design Principles ,Information Design and Data Visualization Interaction Design ,Information Architecture , Wire framing & Storyboarding, UI Elements and Widgets, Screen Design and Layouts	08



5	UX Design Process: Prototype and Test	Testing your Design, Usability Testing, Types of Usability Testing ,Usability Testing Process, Preparing and planning for the Usability Tests, Prototype your Design to Test, Introduction of prototyping tools,conducting Usability Test, communicating Usability Test Results	08
6	UX Design Process: Iterate/ Improve and Deliver	Understanding the Usability Test findings, Applying the Usability Test feedback in improving the design Communication with implementation team, UX Deliverables to be given to implementation team	04

#### Text Books

1. Interaction Design, Beyond Human Computer Interaction, Rogers, Sharp, Preece Wiley India Pvt Ltd.
2. The essentials of Interaction Design, Alan Cooper, Robert Reimann, David Cronin
3. Designing The user Interface by Shneiderman, Plaisant,Cohen,Jacobs Pearson

#### Reference Books:

1. The Elements of User Experience by Jesse James Garrett
2. Don't make me think, by Steve Krug
3. Observing the User Experience: A Practitioner's Guide to User Research by Mike Kuniavsky

**Internal Assessment:** Assessment consists of two tests out of which; one should be compulsory class test (on minimum 02 Modules) and the other is either a class test or assignment on live problems or course project.

#### Theory Examination:

1. Question paper will comprise of total six question
2. All question carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four question need to be solved.

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.



Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract	Tut	Theory	Pract	Tut	Total	
CSL202	DEC Laboratory-II	--	--	--	---	02	--	01	
		Examination Scheme							
		Theory Examination				Term Work		Pract / Oral	
		Internal Assessment			End Sem Exam				
		Test 1	Test 2	Avg	---			25	25
		---	---	---	---				

Design and implementation of any case study/ applications based on departmental electives using modern tools.

**End Semester Examination:** Practical/Oral examination is to be conducted by pair of internal and external examiners appointed by the University of Mumbai.





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEL923	PG Laboratory V: UXD lab	-	-	2	-	-	1	1
		Examination Scheme						
		ISE	ESE			Total		
			Practical	Oral				
		40	-		20		60	

Pre-requisite Course Codes	Mobile and web technologies, software Engineering
Course Outcomes	CO1 Demonstrate the use of UX tools.
	CO2 Create real life application with end-to-end understanding of User experience practices.
	CO3 Develop map based UI for social and technical task.
	CO4 Evaluate the design of the application using User Experience principles.

Exp. No.	Experiment Details	Ref.	Marks
1	To Study of open source UX tools (Justinmind Prototype, Pidoco, Marvel Prototype) and create UX design for a given problem definition.	1,2	5
2	Design a Map based UI(Mobile User) for Transport applications like Ola, Uber etc.	1,2	5
3	Design a Map based UI(Web User) for Mumbai Dabbawalas with localization feature.	1,2	5
4	Pick a website/app that you use on a daily basis (eg. facebook, gmail, whatsapp, zomato, etc). Evaluate the product based on user experience principles and give suggestions for improvement. Explain usability testing process for the same.	1,2	5
5	Museum of London: Visit the application on <a href="http://www.webcredible.com/case-studies/non-profit/museum-london/">http://www.webcredible.com/case-studies/non-profit/museum-london/</a> Study and identify the challenges in design and evaluate UX principles applied for helping visitors to engage with the past, present and future. Suggest any such App design in Indian scenario for any one Museum in India. Explain usability testing for the same. Localization framework for designing the localizable UI.	1,2	5
6	Design UI for kinder garden student to teach mathematics.	1,2	5
7	Design UI for any differently abled users..	1,2	5
8	Design UI for analysis of number of children suffering from juvenile diabetic children in India. The design aims at providing solutions for improving quality treatment and making the treatment affordable.	1,2	5
Total			40



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Note: Students should study and review the literature for the above mentioned case studies. They should prepare and submit the report including the conceptual design, site map, screen design layout, wireframes, gray scale design of the interface, final sketch of the design, ordering screen before implementing the design for the assigned task. They should study the UX principles, draw the information architecture if necessary and finally test it usability. The Final design should be deliverable to the user.

### Reference:

- [1] Rex Hartson and PardhaPyla, The UX Book, MK publications.
- [2] Russ Unger and Carolyn Chandler ,A Project Guide to UX Design, Peachpit Press

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Computer Engineering Department

### Lab Course Revision Report

#### Lab Course Information

Course Name: PG Laboratory - III (Network Analysis & Design Laboratory)  
Course Code Old (2016-17): -  
Course Code New (Autonomy 2017-18): CEL 921  
Class and Semester in Old Syllabus: -  
Class and Semesters in New Syllabus: M.Tech. Sem - II

#### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	— NEL —	New Subject Introduced	100 %
2			
3			
4			
5			

#### Coordinator's Name & Signature:

1) P. B. Bhavatanekar

2)

#### Expert's Name & Signature:

1) Dr. S. N. Phage

2)

3)



\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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## Lab Course Revision Report

### Lab Course Information

Course Name: PG Laboratory - II (Network Analysis & Design Laboratory)  
Course Code Old (2016-17): -  
Course Code New (Autonomy 2017-18): CEL921  
Class and Semester in Old Syllabus: -  
Class and Semesters in New Syllabus: M.Tech. Sem II.

### Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
1	→ HIL	New subject introduced
2		
3		
4		
5		

Coordinators Name & Signature:

- 1) P. B. Bharavathankar
- 2)

Experts Name & Signature:

- 1) Dr. S.N. Dhave

2)

3)





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
CEL921	PG Laboratory -III (Network Analysis and Design Laboratory)	-		2	-		1	1	
		Examination Scheme							
		ISE	ESE			Total		60	
			Practical		Oral				
		40		-		20			

Pre-requisite Course Codes		Computer Networks, CE921(Network Analysis and Design)
At the end of successful completion of the course, students will be able to		
Course Outcomes	CO1	Classify network services, protocols and architectures, explain why they are layered.
	CO2	Choose key Internet applications and their protocols, and apply to develop their own applications using the sockets API.
	CO3	Clarify develop effective communication mechanisms using techniques like connection establishment, queuing theory, recovery Etc.
	CO4	Clarify various congestion control techniques.

Exp. No.	Experiment Details	Ref.	Marks
1	<b>PART A:</b> Implement the following using C/C++: 1. Write a program to transfer the contents of a requested file from server to the client using TCP/IP Sockets (using TCP/IP Socket programming). 2. Write a program to archive Traffic management at Flow level by implementing Closed Loop Control technique. (Leaky Bucket Algorithm) 3. Write a program to implement dynamic routing strategy in finding optimal path for data transmission. (Bellman ford algorithm). 4. Write a program to implement Link State Routing (Dijkstra Algorithm). 5. Write a program for implementing the error detection technique while data transfer in unreliable network code using CRC (16-bits) Technique. 6. Write a program for providing security for transfer of data in the network. (RSA Algorithm) 7. Write a program for encrypting 64 bit playing text using DES algorithm.	1,2	20





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2	<p><b>PART B:</b> Simulation Programs using OPNET /NS2 or any other equivalent software</p> <ol style="list-style-type: none"><li>Simulate a 3 node point to point network with duplex links between them. Set the Queue size and vary the bandwidth and find the number of packets dropped.</li><li>Simulate a four-node point-to-point network, and connect the links as follows: n0-&gt;n2, n1-&gt;n2 and n2-&gt;n3. Apply TCP agent changing the parameters and determine the number of packets sent/received by TCP/UDP</li><li>Simulate the different types of internet traffic such as FTP and TELNET over network and analyze the throughput.</li></ol>	1,2,3	20
<b>Total Marks</b>			<b>40</b>

## References:

- [1] Douglas E Comer, "Internetworking with TCP/IP, Principles, Protocols and Architecture" 6th Edition, PHI - 2014
- [2] Uyless Black "Computer Networks, Protocols , Standards and Interfaces" 2nd Edition - PHI
- [3] Behrouz A Forouzan "TCP/IP Protocol Suite" 4th Edition – Tata McGraw-Hill
- [4] Larry Peterson and Bruce S Davis "Computer Networks :A System Approach" 5th Edition, Elsevier -2014



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Machine Learning

Course Code Old (2016-17): ----

Course Code New (Autonomy 2017-18): CEE92D

Class and Semester in Old Syllabus:----

Class and Semesters in New Syllabus: M.Tech Sem -II

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	M.Tech Computer Sem- II Newly added course in New Syllabus	Machine Learning is driving todays industry through automation. So, by introducing this subjects students will get deep knowledge of how Machine Learning is useful to learned Machines by using different algorithms.	100%

Coordinators Name & Signature:

1) Dr. Sudhir Dhage

2) Pramod Bide

Experts Name & Signature: 1) Dr. Sudhir Dhage

2) Amant V. Nimbalkar

3)

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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## Theory Course Revision Report

### Theory Course Information

Course Name: Machine Learning

Course Code Old (2016-17): ----

Course Code New (Autonomy 2017-18): CEE92D

Class and Semester in Old Syllabus:----

Class and Semesters in New Syllabus: M.Tech Sem -II

#### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	NIL	No Course in the old Syllabus

Coordinators Name & Signature:

1) Dr. Sudhir Dhage

2) Pramod Bide

Experts Name & Signature:

1) Dr. Sudhir Dhage Anant Nimbark

2)

3)





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## Theory Course Revision Report

### Theory Course Information

Course Name: Machine Vision (MV)

Course Code Old (2016-17): —

Course Code New (Autonomy 2017-18): CEE92C

Class and Semester in Old Syllabus: —

Class and Semesters in New Syllabus: M.Tech, Computer Sem-II

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	M.Tech. Computer Sem-II Newly Introduced Course in New syllabus	In the link of Image Analysis and Interpretation Course of M.Tech. Computer Sem-I, in the domain of Image Analysis and Machine Vision.	100%

Coordinators Name & Signature:

1) Prof. Surekha Dholay

Experts Name & Signature:

1) Dr.D.R.Kalbande



\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Machine Vision (MV)

Course Code Old (2016-17): —

Course Code New (Autonomy 2017-18): CEE92C

Class and Semester in Old Syllabus: —

Class and Semesters in New Syllabus: M.Tech. Computer Sem-II

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	NIL	No Course in the old syllabus.

Coordinators Name & Signature:

1) Prof. Surekha Dholay

Experts Name & Signature:

1) Dr.D.R.Kalbande





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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: High Performance Computing

Course Code Old (2016-17): CSC201

Course Code New (Autonomy 2017-18): CE922

Class and Semester in Old Syllabus: ME (Computer Engineering) 1<sup>st</sup> Year, Semester - I

Class and Semesters in New Syllabus: MTech (Computer Engineering) 1<sup>st</sup> Year, Semester - I

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Parallel Processing Approaches	The concept is removed to reorganize in the new syllabus of High Performance Computing
2	GPGPU Parallel Programming	This part moved the PG Lab II
3	HPC enabled Technology	This part moved the PG Lab II

Coordinators Name & Signature:

2) Dr. Anant V. Nimkar

Experts Name & Signature:

2) Dr. Sudhir N. Dhage





## Sardar Patel Institute of Technology

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## Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (Hours/week)	Credits Assigned		
		L	T	P	Total
CE922	High Performance Computing (HPC)	4	—	4	4
			Examination Scheme		
		ISE	MSE	ESE	
		19	39	109 (66% Weightage)	

Prerequisite Course Codes: CEA4, CEA5, CEG5

- At the end of successful completion of the course, students will be able to:
- (CO1) Understand the different parallel computing approaches and platforms to achieve High Performance Computing.
  - (CO2) Determine the communication pattern and network technology for High Performance Computing.
  - (CO3) Design High Performance Computing Systems using MPI and OpenMP.
  - (CO4) Perform heterogeneous Computing using GPU and OpenCL.

Module No.	Unit No.	Topics	Ref. Hrs.	Ref.
1	1.1	Parallel Computing Models – Computing Hierarchy, Multiprocessor and Multicomputer, Multi-vector and SIMD Computers, PRAM and VLSI Models, Architectural Developmental Trends	1	3
1	1.2	Program and Network Properties – Conditions and Partitioning, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architectures	1	3
1.3	1.3	Principle of Scalable Performance – Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws, Scalability Analysis and Approaches	1	3
2	2.1	Communication Operations – One-to-All Broadcast and All-to-One Reductions, All-to-All Broadcast and Reducers, All-to-All and Prefix-Sum Operations, Scan, and Gather, All-to-All Personalized Communication, Circular Shift, Improving the Speed of Some Communication Operations	2	3
2	2.2	High Speed Networks – Evolution, Design Issues, Fast Ethernet, High Performance Parallel Interface (HPIPI), Asynchronous and Synchronous Transfer Mode (ATM), Scalable Coherent Interface (SCI), ServerNet, Memory, Message Channel, Symmetry	3	5
2.3	2.3	Lightweight Messaging Systems - Latency-Bandwidth Evaluation, Traditional Communication Mechanisms, Kernel-Level Mechanisms	3	4

In Semester Examination (ISE): The assessment includes the submission of a term paper by each student on the contemporary work related to High Performance Computing

### References:

- [1] Kai Hwang, Naveen Joosani, "Advanced Computer Architecture: Parallelism, Scalability, Programmability", McGraw-Hill Education, SECOND Edition, 2008.
- [2] Ananth Grama, "Introduction to Parallel Computing", Addison Wesley, SECOND Edition, 2003.
- [3] Rajkumar Buyya, "High Performance Cluster Computing: Architecture and System Programming", Prentice Hall PTR, FIRST Edition, 1997.
- [4] Michael J. Quinn, "Parallel Programming in C with MPI and OpenMP", McGraw Hill, FIRST Edition, 2003.
- [5] Barbara Gelernt, Lee Hewitt, David R. Kaeli, Pervez Mirza, Dina Schon, "Heterogeneous Computing with OpenCL", Morgan Kaufmann, FIRST Edition, 2011



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Festivals and Social Movements

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1. Question 10: The model is robust (for example, implement OLS for each of four models).  
 One point is given if there are any models other than the model '5'.  
 4. Only one question need to be solved.

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## Lab Course Revision Report

### Lab Course Information

Course Name: High Performance Computing (Laboratory Section)

Course Code Old (2016-17): CSC201

Course Code New (Autonomy 2017-18): CEL922

Class and Semester in Old Syllabus: ME (Computer Engineering) 1<sup>st</sup> Year, Semester - II

Class and Semesters in New Syllabus: MTech (Computer Engineering) 1<sup>st</sup> Year, Semester - II

### Change/Addition in the Syllabus:

Sr. No.	Experiments Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (Y)
1	OpenMP Program		
2	High Performance computation of Pi	Introduce Real-world problems through High Performance Computing using OpenMP and MPI	
3	MPI cluster Program		
4	Project II – OpenMP and MPI consideration	Project approach for OpenMP and MPI can be useful in the implementation of real-world applications.	8/8*100=100%

Coordinators Name & Signature:

1) Dr. Anant V. Nimkar

Experts Name & Signature:

1) Dr. Sudhir Dhage

2)

3)



\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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Computer Engineering Department

## Lab Course Revision Report

### Lab Course Information

Course Name: High Performance Computing (Laboratory Section)

Course Code Old (2016-17): CSC201

Course Code New (Autonomy 2017-18): CEL922

Class and Semester in Old Syllabus: ME (Computer Engineering) 1<sup>st</sup> Year, Semester - II

Class and Semesters in New Syllabus: MTech (Computer Engineering) 1<sup>st</sup> Year, Semester - II

#### Removal from Syllabus:

Sr. No.	Experiments Removed	Reason
1	Sorting – Bitonic/Shell/sort/Quick sort/Bucket/Radix	Basic concepts and it is used indirectly in various programs of new Syllabus

Coordinators Name & Signature:

2) Dr. Anant V. Nimkar

Experts Name & Signature:

4) Dr. Sudhir Dhage

5)



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**Sardar Patel Institute of Technology**  
Bharat's Campus, Murlis Nagar, Andheri (West), Mumbai-400059, India  
Autonomous Institute Affiliated to University of Mumbai

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Course Code:	Course Name:	Teaching Scheme (Hrs/week)	Credits Assigned
CE8.02	PG Laboratory -IV (High Performance Computing Laboratory)	T-L-T-P 2--1--1	Total 05
		Evaluation Scheme ESI Practical Oral	Total 10

Pre-requisite Course Codes		At the end of successful completion of the course, students will be able to					
		CO1 Understand the different parallel computing approaches and platforms to achieve High Performance Computing.					
		CO2 Determine the communication pattern and network technology for High Performance Computing					
		CO3 Design High Performance Computing System using MPI and OpenMP.					
		CO4 Perform heterogeneous Computing using GPU and OpenCL.					

Expt. No.	Experiment Details	Ref.	Marks
1	<b>First OpenMP program:</b> The aim of this lab is to develop our first OpenMP program and write some non-trivial OpenMP programs. We will use a few OpenMP constructs and functions that are in fact very useful for parallelizing most C programs. Although we will use further constructs in the future labs and also in the projects. You can compile OpenMP programs by using the compiler flag <code>-fopenmp</code> i.e., <code>-fopenmp</code> .	Ref. [1]	05
2	<b>High performance computation of PI</b>	Ref. [2]	05
3	<b>How to access the cluster:</b> We have set up a HPC cluster for this unit and you need to do the programming projects on the cluster. You can also write your lab code on the cluster. The cluster should be accessible both on and off campus.	Ref. [3]	05
4	<b>Project 1: Parallelization of data matrix-matrix collisions</b> M is a data matrix of n rows and k columns where, Mi represents ith row-vector and Mi represents jth column-vector as the figure below. Each row-vector is of size k and each column-vector is of size n. Mij generates a data element from row i and column j. The value of each data element Mij lies between 0 and 1. Assume that there is no limiting value in this n x k matrix M.	Ref. [4]	10

References:

- [1] Kit Wong, Narayan Jeswani, "Advanced Computer Architecture: Parallelism, Scalability, Programmability", McGraw-Hill Education, SECOND Edition, 2008.
- [2] Anand Gram, "Introduction to Parallel Computing", Addison Wesley, SECOND Edition, 2003.
- [3] Rakesh Rajya, "High Performance Cluster Computing: Architectures and Systems", Prentice Hall PTR, FIGURE EDITION, 1993.
- [4] Michael J. Quinn, "Parallel Programming in C with MPI and OpenMP", McGraw Hill, FIRST Edition, 2003.
- [5] Benedict Ganter, Lee Howes, David R. Fuchs, Prithvi Misra, Dara Sofuo, "Heterogeneous Computing with OpenCL", Morgan Kaufmann, FIRST Edition, 2011.



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Subject Code	Subject Name	Evaluation Scheme (Class Test)			Credit Allocated			
		Max.	Min.	%	Max.	Min.	%	
		100	40	10	100	40	10	
Course Objectives								
<ol style="list-style-type: none"> <li>To introduce parallel processes as a form of high-performance computing.</li> <li>To design, develop and analyze parallel programs in high performance computing using parallel programming paradigms.</li> </ol>								
Course Outcome:								
<ul style="list-style-type: none"> <li>Understand different parallel processing approaches and platforms involved in achieving High Performance Computing.</li> <li>Understand basic tools and resources in Parallel Computing.</li> <li>Ability to program using various paradigm using OpenMP, MPI, OpenCL, CUDA, OpenCL and OpenMP performance parameters.</li> <li>Understand HPC related Advanced Technologies.</li> </ul>								

Sl.no	Module	Described Content	Hours
1	Parallel Processing Approaches	<p><b>Introduction to Parallel Processing:</b> Levels of Parallelism (Instruction, Task, Thread, Process and Function), Models (IMD, MM2, SIMD, SIMD, Data Flow Model, Data-and-Device Communication via: Load-locked and Store-locked, SIMD).</p> <p><b>HPC Platforms:</b> Non-blocking message (MPI), Non-blocking shared local OpenMP programs, shared MPI/OpenMP programs, Grid Computing, Cloud Computing, Matrix Computations, acceleration, GPU/CUDA</p>	16
2	Design, Tools and Languages in Parallel Computing	<p><b>Parallel Architecture:</b> Hierarchical memory, processor, memory, Multicore Processor Design, Parallel algorithm, Partitioning, Communication, Mapping, Main components.</p>	10

Reference Books:

- Edward Hartke and Arun Sarode, "CUDA in Example - An Introduction to General Purpose GPU Programming", Addison-Wesley Professional, 2012.
- Roscoe B. Gitter, Lee Rausch, David R. Rethans, Shirley M. Shabot, "Heterogeneous Computing with OpenCL", Elsevier, Second Edition, 2011.

#### Reference Books:

- Henry H. C. Huang, "Introduction to High Performance Computing for Scientists and Engineers", Chapman & Hall / CRC Computational Science series, 2011.
- Michael J. Massari, "Parallel Programming in C with MPI and OpenMP", McGraw-Hill International Editions, Computer Science Series, 2008.
- Kai Hwang, Dong X. Sze, "Scalable Parallel Computing: Technology, Architectures, Programming", McGraw-Hill, 1998.
- Lawrence T. Yang, Michael "High-Performance Computing: Paradigm and Infrastructure", Wiley, 2006.

#### List of Experiments to be included in Computational Lab-B

1. Write given problem using OpenMP/MPI/OpenCL, and compare data performance in CPU and GPU/GPU.

- Matrix-Matrix multiplication – simple version of DMS algorithm
- Knapsack – Branch Bound with Quantum Fourier Transform
- 8 Queen's problem – Depth First Search/David's algorithm

**Internal Assessment:** Assessment consists of 100 marks out of which one should be computer lab (intra term 12 Module) and the other is either a class test or assignment or live problems in course project.

#### Thesis/Evaluation:

- Given an open soft copy of total six question
- All questions are equal marks
- Options will be given to answer like example (Suppose Q.1 has part (a), part (b), part (c), part (d) and (e) will have one mark each other don't include it)
- Only Four answers need to be selected

No question paper will be provided at each module will be proportional to marks of respective lecture hours to students to do so paper.

Signature of Student: \_\_\_\_\_

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		<b>Object:</b> Application, Scheduling, Job Allocation, job Processing, Dependency Analysis, Mapping, Task Algorithmic and Parallel Techniques <b>Limitation:</b> Synchronization, Load Balancing, Latency, Waiting/Waiting, Deadlocks and race conditions.	
1	Programming using Message Passing Interface	Message, Inlining, Modulo, MPI, Overlapped communication and computation, efficient communication, spinlocks, Cache-coherency issues, OpenMP Threading, Building Block, An Overview of Memory Allocation, Parallel programming model, analyzing MPI and OpenMP, Shared access programming	10
2	Parallel Programming using OpenMP	An Overview of OpenMP, An Overview of OpenMP Features, An Overview of OpenMP Nested Parallelism, Nested Parallelism with OpenCL, An Overview of OpenCL, API, Heterogeneous Programming in OpenCL	12
3	Performance Metrics	Performance measures (speedup, efficiency and overhead). Analysis: performance metrics (work, critical path, Amdahl's Law, Gustavson's Law), cache memory, performance bottleneck (processor and memory), data race avoidance (available token, starvation, deadlock detection), deadlock avoidance, shared vs no performance (granularity, methods).	10
4	HPC related Advanced Technologies	Heterogeneous and co-processor in high performance computing, Peer-to-peer processing techniques in high performance computing, Case studies in high performance computing	10

Text Books:

- AmithGuru, Ashish Gupta, George Karypis, Vipin Kumar, "Introduction to Parallel Computing", Pearson Education, Second Edition, 2011.
- Kai Hwang, Michael J. Massari, "High-parallel Computer Architectures: Parallelism, Scalability, Programmability", McGraw-Hill, Second Edition, 2010.

Reference Books:



Signature of Student: \_\_\_\_\_



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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Internet of Things

Course Code Old (2016-17): CSDLO2022

Course Code New (Autonomy 2017-18): CEE92A

Class and Semester in Old Syllabus: ME (Computer Engineering) 1<sup>st</sup> Year, Semester - II

Class and Semesters in New Syllabus: MTech (Computer Engineering) 1<sup>st</sup> Year, Semester - II

### Change/Addition in the Syllabus:

Sr. No.	Topics Introduced	Changed/Newly	Reason	Overall Percentage Change in syllabus (X)
1	IoT Systems Logical Design			
2	IoT Physical Servers		Logical system design through Python Programming is IoT application	
3	Arduino Programming Building Blocks		Application for data collection can be implemented through Arduino Programming.	
4	IoT Patterns			15/42=35.71%

Coordinator's Name & Signature:

1) Dr. Anant V. Nimkar

Experts Name & Signature:

1) Dr. Sudhir N. Dhage

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Internet of Things

Course Code Old (2016-17): CSDLO2022

Course Code New (Autonomy 2017-18): CEE92A

Class and Semester in Old Syllabus: ME (Computer Engineering) 1<sup>st</sup> Year, Semester - II

Class and Semesters in New Syllabus: MTech (Computer Engineering) 1<sup>st</sup> Year, Semester - II

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Application and Use Cases	The concept is removed so that syllabus should be obstacle to explore more use cases by PG students.

Coordinators Name & Signature:

2) Dr. Anant V. Nimskar

Experts Name & Signature:

2) Dr. Sudhir N. Dhage



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Course Code	Course Name	Teaching Scheme (Framework)	Credits Assigned					
		L	T	P	I	T	F	Total
CEE92A	Internet of Things(IoT)	ISE	3	-	3	-	3	3
		MSE						
		10		30		100 (60% Weightage)		

Prerequisite Course Codes	CEL235	CE455	CE52
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(At the end of successful completion of the course, students will be able to

Course Outcomes	CO1 Define Internet of Things and its consequences.
	CO2 Perform IoT Systems management
	CO3 Design IoT Systems through Python, Physical Sensors and Cloud Services.
	CO4 Analyze the system through Data Analytics tools.

Module No.	Unit No.	Topics	Ref.	Ref.
1	1.1	Introduction to IoT – Definition, Characteristics, Physical and Logical Design, IoT Protocols, IoT Communications: Models and API, IoT Enabling Technologies, IoT Levels and Deployment Templates, IoT Examples, M2M	1	3
	1.2	RFID Technology – Working of RFID, Components of an RFID system, RFID Transponder (tag), classes, Standards, System architecture, Localization and Handover Management, Technology considerations, Performance Evaluation, Applications	2	4
2	2.1	Wireless Sensor Networks – History, Sensor Nodes, Connecting Nodes, Networking Nodes, Secure Communication	2	2
	2.2	IoT System Management – SNMP, Network, Operators Requirements,	1	1
3	3.1	IoT Platform Management – NETCOINE YARN	1	2
	3.2	Domain Model, Service, IoT Level, Function, Operational view, Device and Component Integration, Application Development	1	2
	3.3	IoT System Logical Design – Python, Data Types, Type conversion, Control Flow, Handling Classes, Python Packages for IoT Physical Servers – Cloud Storage Models, Communication API-WAMP, Xively Cloud, Django	1	3

In-Semester Examination (ISE): The assessment includes the submission of a term paper by each student on the contemporary work related to Internet of Things.
References:
[1] Anupesh Balaji, Vijay Malhotra, "Internet of Things: A Handbook Approach", University Press, FIRST Edition, 2015.
[2] Hikima Chauem, "The Internet of Things: Connecting Objects", Wiley-IEEE, FIRST Edition, 2010
[3] Adel Ismail, "Building Iototic Projects for the Internet of Things: Experiment with Real-World Applications", Agam, FIRST Edition, 2016.



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Subject Code	Subject Name	Teaching Scheme		Credits Assigned		Total
		Theory	Psets	Tu	Theory	
CSPII-02022	Internet of Things	04	—	04	—	04
		Examination Scheme				
		Theory Examination				
		Internal Assessment				
		Test 1	Test 2	Avg	Term	
		26	20	20	Week	Prac
					Exams	Oral
						—
						—
						—

**Course Objectives:**

- Provide an overview of concepts, main trends and challenges of Internet of Things.
- Develop the ability to use Internet of Things related software and hardware technologies
- Provide the knowledge of data management business processes and analytics of IoT objects.
- Develop skills to relate the IoT technologies for practical IoT applications such as smart objects.

**Course Outcomes:** Learner will able to :

- Explain and interpret the Internet of Things concepts and challenges
- Experiment with the software and hardware IoT Technologies
- Understand data management and business processes and analytics of IoT
- Design and develop small to T applications to create smart objects

Se. No.	Module	Detailed Content	Hours
1	Introduction to Internet of Things	IoT Platform and Architecture - State of the Art, IoT Protocols, IoT Communication Models, IoT in Global Context, Cloud Computing, Big Data Analytics, Concepts of Web of Things, Concept of Cloud of Things with emphasis on Mobile Cloud Computing, Smart Objects	8
2	Open - Source Platforms for IoT	Basic Arduino Programming, Extended Arduino Libraries, Arduino - Based Internet Communication, Raspberry Pi Sensors and Interfacing	8
3	IoT Technologies	RFID + NFC, Wireless Networks + WSN, RTLS + GPS, Agents + Multi - Agent Systems, Composition Models for the Web of Things and resources on the Web, Discovery, Search, IoT Mashups and Others	8

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In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus

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4	Wireless Sensor Networks	History and Context, The Node, Connecting Nodes, Networking Nodes, Secured Communication for IoT
4	Data Management	Data Management, Business Processes in IoT, IoT Analytics, Creative Thinking Techniques, Modification, Considerations Scenarios, Decentralized and Interoperable Approaches, Objects, Information Distribution Architecture, Object Naming Service (DNS), Service Oriented Architecture, Networks of Information, Etc.
3	Business Process and Analytics	Business Process and Analytics
6	Application and Use Cases	Concrete Applications and Use - Cases of Web Enabled Things, Energy Management and Smart Homes, Ambient Assisted Living, Intelligent Transport, Etc., M2M Industrial IoT Applications

**Text Books:**

1. The Internet of Things (MIT Press) by Samuel Greenard
  2. The Internet of Things (Connecting objects in the world) by Hiromi Ono et al. (Wiley Publication)
  3. Internet of Things (A Hands-on-approach) by Arshdeep Brarji and Vignesh Venkatesan and Pavan Reddy
- Reference Books:**
1. The Internet of Things: Key Applications and Protocols, 2<sup>nd</sup> Edition (Wiley Publication)
  2. IoT - From Research and Innovations to Market Development, River Publications by Ovidiu
  3. Building Internet of Things with Arduino by Charles Petzold
- Internal Assessment:** Assessment consists of two assignments out of which, one should be compulsory class test (on minimum (2 Modules) and the other is either a class test or assignment on live problems or course project.

**Theory Examinations:**

1. Question paper will consist of total six questions
2. All questions carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus

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## Theory Course Revision Report

### Theory Course Information

Course Name: Natural Language Processing (NLP)

Course Code Old (2016-17): CSDLO1013

Course Code New (Autonomy 2017-18): CEE91C

Class and Semester in Old Syllabus: M.E. Semester-I Dept.Level Elective

Class and Semesters in New Syllabus: M.Tech Semester- I-Elective

Change/Addition in the Syllabus: NIL

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	No change in the contents	It was introduced first time in the University of Mumbai in choice based credit system syllabus	0 %
2			

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

Experts Name & Signature:

2) Dr.S.N.Dhage

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Natural Language Processing (NLP)

Course Code Old (2016-17): CSDLO1013

Course Code New (Autonomy 2017-18): CEE91C

Class and Semester in Old Syllabus: M.E. Semester-I Dept.Level Elective

Class and Semesters in New Syllabus: M.Tech Semester- I-Elective

Removal from Syllabus: NIL

Sr. No.	Topics Removed	Reason
1	NIL	—
2		
3		
4		
5		

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

Experts Name & Signature:

2) Dr.S.N.Dhage





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CEE91C	Natural Language Processing(NLP)	3	-	-	3	--	--	3
Examination Scheme								
ISE			MSE			ESE		
10			30			100 (60% Weightage)		

Pre-requisite Course Codes	Programming Methodology & Data Structure Probability & Statistics Theory of Computer Science		
At the end of successful completion of the course, students will be able to			
Course Outcomes	CO1	To model linguistic phenomena with formal grammars.	
	CO2	To design, implement, and analyze NLP algorithms.	
	CO3	Apply NLP techniques to design real world NLP applications.	
	CO4	Implement proper experimental methodology for training and evaluating empirical NLP systems.	

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1	Introduction	1,4	3
	1.1	History of NLP, Generic NLP system, levels of NLP , Knowledge in language processing .		
	1.2	Ambiguity in Natural language , stages in NLP, challenges of NLP , Applications of NLP- Machine translation,		
	1.3	question answering system, Information retrieval, Text categorization , text summarization & Sentiment Analysis		
2	2	Word Level Analysis	1,3,4	7
	2.1	Morphology analysis –survey of English Morphology, Inflectional morphology & Derivational morphology;		
	2.2	Regular expression, finite automata, finite state transducers ( FST ) ,Morphological parsing with FST ,		
	2.3	Lexicon free FST - Porter stemmer, N -Grams- N-gram language model, Ngram for spelling correction.		
3	3	Syntax analysis	1,3	8
	3.1	Part-Of-Speech tagging( POS)- Tag set for English ( Penn Treebank ), Rule based POS tagging,		
	3.2	Stochastic POS tagging, Issues –Multiple tags & words, Unknown words, class based n -grams.		
	3.3	Context Free Grammar – Constituency , Context free rules & trees, Sentence level construction , Noun Phrase coordination,		

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	agreement, the verb phrase & sub categorization		
4	Semantic Analysis		8
4.1	Attachment for fragment of English- sentences, noun phrases, Verb phrases, prepositional phrases,	1,2,3	
	Relations among lexemes & their senses -Homonymy, Polysemy, Synonymy, Hyponymy, Wordnet,		
	Selectional restriction based disambiguation & limitations , Robust WSD – machine learning approach and dictionary based approach		
5	Pragmatics	1,2,3	8
	Discourse –reference resolution, reference phenomenon , syntactic & semantic constraints on co reference,		
	preferences in pronoun interpretation , algorithm for pronoun resolution .Text coherence, discourse structure		
6	Applications ( preferably for Indian regional languages)	1,2,3,4,5	8
	Machine translation, Information retrieval.		
	Question answers system, categorization, summarization, sentiment analysis		
			Total 42

### References:

- [1] Daniel Jurafsky, James H. Martin "Speech and Language Processing" Second Edition, Prentice Hall, 2008.
- [2] Christopher D.Manning and Hinrich Schutze, "Foundations of Statistical Natural Language Processing ", MIT Press, 1999.
- [3] Siddiqui and Tiwary U.S., Natural Language Processing and Information Retrieval, Oxford University Press (2008)
- [4] Daniel M Bikol and Imed Zitouni " Multilingual natural language processing applications" Pearson, 2013
- [5] Alexander Clark (Editor), Chris Fox (Editor), Shalom Lappin (Editor) " The Handbook of Computational Linguistics and Natural Language Processing " ISBN: 978-1-118-



# M.E. Sem I | Elective

Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory 04	Pract --	Tut --	Theory 04	Pract --	Tut --	Total 04	
CSDLO1013		Examination Scheme							
Natural Language Processing		Theory Examination			Internal Assessment			End Sem Exam	
		Test 1	Test 2	Avg	20	20	20		
		80			--	--	--	Oral	

## Course Objectives:

1. To formulate the problems and solutions of NLP and establish their relation to linguistics and statistics.
2. To implement various language Models.
3. To design systems that uses NLP techniques
4. To train and evaluate empirical NLP systems.

**Course Outcomes:** At the end of the course student should be able to

- Model linguistic phenomena with formal grammars.
- Design, implement, and analyze NLP algorithms
- Apply NLP techniques to design real world NLP applications, such as machine translation, text categorization, text summarization, information extraction...etc.
- Implement proper experimental methodology for training and evaluating empirical NLP systems.

**Prerequisite:** Data structure & Algorithms, Theory of computer science, Probability Theory

## DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
1	Introduction	History of NLP, Generic NLP system, levels of NLP , Knowledge in language processing , Ambiguity in Natural language , stages in NLP, challenges of NLP ,Applications of NLP- Machine translation, question answering system, Information retrieval, Text categorization , text summarization & Sentiment Analysis	3
2	Word Level Analysis	Morphology analysis -survey of English Morphology, Inflectional morphology & Derivational morphology, Regular expression, finite automata, finite state transducers ( FST ) ,Morphological parsing with FST , Lexicon free FST - Porter stemmer. N -Grams- N-gram language model , N-gram for spelling correction .	9

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3	Syntax analysis	Part-Of-Speech tagging( POS)- Tag set for English ( Penn Treebank ) . Rule based POS tagging, Stochastic POS tagging. Issues -Multiple tags & words, Unknown words, class based n -grams .Context Free Grammar - Constituency , Context free rules & trees, Sentence level construction . Noun Phrase, coordination, agreement, the verb phrase & sub categorization	10
4	Semantic Analysis	Attachment for fragment of English- sentences, noun phrases, Verb phrases, prepositional phrases, Relations among lexemes & their senses -Homonymy, Polysemy, Synonymy, Hyponymy, Wordnet, Selectional restriction based disambiguation & limitations , Robust WSD - machine learning approach and dictionary based approach	10
5	Pragmatics	Discourse -reference resolution, reference phenomenon , syntactic & semantic constraints on co reference, preferences in pronoun interpretation , algorithm for pronoun resolution .Text coherence, discourse structure	8
6	Applications ( preferably for Indian regional languages)	Machine translation, Information retrieval, Question answers system, categorization, summarization, sentiment analysis.	8

#### Text Books:

1. Daniel Jurafsky, James H. Martin "Speech and Language Processing" Second Edition, Prentice Hall, 2008.
2. Christopher D.Manning and Hinrich Schutze, " Foundations of Statistical Natural Language Processing ", MIT Press, 1999.

#### Reference Books :

1. Siddiqui and Tiwary U.S., Natural Language Processing and Information Retrieval, Oxford University Press (2008).
2. Daniel M Bikel and imed Zitouni " Multilingual natural language processing applications" Pearson, 2013
3. Alexander Clark (Editor), Chris Fox (Editor), Shalom Lappin (Editor) " The Handbook of Computational Linguistics and Natural Language Processing " ISBN: 978-1-118-

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### **Case study/Experiments:**

The objective of Natural Language Processing lab is to introduce the students with the basics of NLP which will empower them for developing advanced NLP tools and solving practical problems in this field.

Reference for Experiments: <http://cse24-liith.virtual-labs.ac.in/#>

### **Sample Case study/Experiments:**

Note: Although it is not mandatory, the experiments can be conducted with reference to any Indian regional language.

1. Word Analysis
2. Word generation
3. Stop word removal
4. Stemming
5. Morphology
6. POS Tagging
7. Chunking
8. N-gram language model

**Internal Assessment:** Assessment consists of two tests out of which; one should be compulsory class test (on minimum 02 Modules) and the other is either a class test or assignment on live problems or course project.

### **Theory Examination:**

1. Question paper will comprise of total six question
2. All question carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four question need to be solved.

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.

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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Entrepreneurship Development and Management

Course Code Old (2016-17): ILO2023

Course Code New (Autonomy 2017-18): CEE91C

Class and Semester in Old Syllabus: M.E. Semester-II Institute Level Elective

Class and Semesters in New Syllabus: M.Tech Semester-I-Elective

**Change/Addition in the Syllabus: NIL**

Sr. No	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	<b>Entrepreneurship</b>	To explore Entrepreneurship among students and focus on understanding set up of small business enterprise.	(42/42)* 100- 100 %
	Importance Of Entrepreneurship, concept of Entrepreneurship, characteristics of successful Entrepreneur, classification of Entrepreneur	To know about corporate governance and use of IT for entrepreneurship innovation.	
	Myths of Entrepreneurship, Entrepreneurial development models, problems faced by Entrepreneurs and capacity building for Entrepreneurship, profile of successful Entrepreneurship	Drivers for green strategy for enhancing sustainable techno entrepreneurship in emerging economics	
2	<b>Setting up a small business enterprise</b>		
	Identifying the business opportunity, Business opportunities in various sector		
	Formalities for setting up of a small business enterprise, Environment pollution related clearance		



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3	<b>Strategic management in small business</b>
	Organic life cycle
	Strategic management, The essence of business ethics
4	<b>Corporate governance</b>
	Introduction, role for board of directors, size and composition of board of directors, board structure, agency theory, board committee, two tier boards, effectiveness of BoD role of CEO role top management skill required corporate values style of strategic management
5	<b>Selecting international business opportunities</b>
	Foreign in market selection model, Developing foreign market indicators, Primary Vs secondary foreign market data
	Sources of country market data, Competitive positioning International competitive information
6	<b>IT for entrepreneurship innovation</b>
	Enlisting online communication in web 2.0
	Role of websites and E-commerce in the development of global start-ups, E- entrepreneurship the principle of funding electronics venture, The relationship between internet entrepreneurs idea generation and porter's generic strategies e-learning the cornerstone to transferring entrepreneurship knowledge
7	<b>The knowledge base of technology entrepreneurship</b>
	Capitalization of science and technology knowledge practices trends and impact on techno entrepreneurship
	Drivers for green strategy for enhancing sustainable



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Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

Experts Name & Signature:

1) Dr.S.N.Dhage

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





Bharatiya Vidya Bhavan's  
**Sardar Patel Institute of Technology**  
(Autonomous College Affiliated to University of Mumbai)  
Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Entrepreneurship Development and Management

Course Code Old (2016-17): ILO2023

Course Code New (Autonomy 2017-18): CEE91C

Class and Semester in Old Syllabus: M.E. Semester-II Institute Level Elective

Class and Semesters in New Syllabus: M.Tech Semester- I-Elective

**Removal from Syllabus: NIL**

Sr. No.	Topics Removed	Reason
1)	ALL	Not in depth and not relevant to Entrepreneurship Development
2)		
3)		
4)		
5)		

Coordinators Name & Signature:

1) Dr. D. R. Kalbande(Coordinator)

Experts Name & Signature:

1) Dr.S.N.Dhage





## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ILE915	Entrepreneurship Development and Management(EDM)	3	-	-	3	-	-	3
		Examination Scheme						
		ISE			MSE		ESE	
		10			30		100 (60% Weightage)	

### Pre-requisite Course Codes

At the end of successful completion of the course, students will be able to

Course Outcomes	CO1	Understand the concept of entrepreneurship with strategic planning
	CO2	Analyze the international market for entrepreneurship
	CO3	Study of e-governance in Entrepreneurship
	CO4	Acquaint with entrepreneurship and management of business with IT
	CO5	Understand data science for Entrepreneurship and generate knowledge base of technology entrepreneurship

Module No.	Unit No.	Topics	Ref.	Hrs.
1	<b>Entrepreneurship</b>			1
	1.1	Importance Of Entrepreneurship, concept of Entrepreneurship, characteristics of successful Entrepreneur, classification of Entrepreneur		
	1.2	Myths of Entrepreneurship, Entrepreneurial development models, problems faced by Entrepreneurs and capacity building for Entrepreneurship, profile of successful Entrepreneurship		
2	<b>Setting up a small business enterprise</b>			1
	2.1	Identifying the business opportunity, Business opportunities in various sector		
	2.2	Formalities for setting up of a small business enterprise, Environment pollution related clearance		
3	<b>Strategic management in small business</b>			1
	3.1	Organic life cycle		
	3.2	Strategic management, The essence of business ethics		
4	<b>Corporate governance</b>			2
	4.1	Introduction, role for board of directors, size and composition of board of directors, board structure, agency theory, board committee, two tier boards, effectiveness of BoD role of CEO role top management skill required corporate values style of strategic management		

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	4.2	Factors affecting Entrepreneurship growth. Factors affecting Entrepreneurship: economic factors, non-economic factors, Government action	3	
5	5.1	Selecting international business opportunities	7	6
	5.4	Foreign in market selection model, Developing foreign market indicators, Primary Vs secondary foreign market data		
	5.4	Sources of country market data, Competitive positioning International competitive information		
6	6.1	IT for entrepreneurship innovation	4	6
	6.2	Enlisting online communication in web 2.0		
	6.2	Role of websites and E-commerce in the development of global start-ups, E-entrepreneurship the principle of funding electronics venture, The relationship between internet entrepreneurs idea generation and porter's generic strategies c- learning the cornerstone to transferring entrepreneurship knowledge		
7	7.1	The knowledge base of technology entrepreneurship	6	6
	7.1	Capitalization of science and technology knowledge practices trends and impact on techno entrepreneurship		
	7.2	Drivers for green strategy for enhancing sustainable techno entrepreneurship in emerging economies		
			Total	42

### References:

- [1] Poornima Charantimath, "Entrepreneurship development and Small Business Enterprise", Pearson
- [2] R. Srinivasan "Strategic Management: The Indian Context"
- [3] S S Khanka "Entrepreneurial Development"
- [4] Tobias Kollmann, Andreas Kuckertz "E-entrepreneurship and ICT Ventures: Strategy... (Hardcover)"
- [5] Zhao, Fang "Information Technology Entrepreneurship and Innovation"
- [6] François Thérin "Handbook of Research on Techno-Entrepreneurship", Second Edition
- [7] Robert D. (Dale) Hisrich "International Entrepreneurship: Starting, Dev" (Paperback)
- [8] Robert D Hisrich, Michael P Peters, A Shapero, "Entrepreneurship", latest edition, The McGrawHill Company
- [9] Vasant Desai, "Entrepreneurial development and management", Himalaya Publishing House



Institute  
ME Sem 2 / Elective

Course Code	Course Name	Credits
IL02023	Entrepreneurship Development and Management	03

**Objectives:**

1. To acquaint with entrepreneurship and management of business
2. Understand Indian environment for entrepreneurship
3. Idea of EDP, MSME

**Outcomes:** Learner will be able to...

1. Understand the concept of business plan and ownerships
2. Interpret key regulations and legal aspects of entrepreneurship in India
3. Understand government policies for entrepreneurs

Module	Detailed Contents	Hrs
01	<b>Overview Of Entrepreneurship:</b> Definitions, Roles and Functions/Values of Entrepreneurship, History of Entrepreneurship Development, Role of Entrepreneurship in the National Economy, Functions of an Entrepreneur, Entrepreneurship and Forms of Business Ownership <b>Role of Money and Capital Markets in Entrepreneurial Development:</b> Contribution of Government Agencies in Sourcing information for Entrepreneurship	04
02	<b>Business Plans And Importance Of Capital To Entrepreneurship:</b> Preliminary and Marketing Plans, Management and Personnel, Start-up Costs and Financing as well as Projected Financial Statements, Legal Section, Insurance, Suppliers and Risks, Assumptions and Conclusion, Capital and its importance to the Entrepreneur <b>Entrepreneurship And Business Development:</b> Starting a New Business, Buying an Existing Business, New Product Development, Business Growth and the Entrepreneur Law and its Relevance to Business Operations	09
03	<b>Women's Entrepreneurship Development:</b> Social entrepreneurship-role and need, EDP cell, role of sustainability and sustainable development for SMEs, case studies, exercises	05
04	<b>Indian Environment for Entrepreneurship:</b> key regulations and legal aspects , MSMED Act 2006 and its implications, schemes and policies of the Ministry of MSME, role and responsibilities of various government organisations, departments, banks etc., Role of State governments in terms of infrastructure developments and support etc., Public private partnerships, National Skill development Mission, Credit Guarantee Fund, PMEGP, discussions, group exercises etc	08
05	<b>Effective Management of Business:</b> Issues and problems faced by micro and small enterprises and effective management of M and S enterprises (risk management, credit availability, technology innovation, supply chain management, linkage with large industries), exercises, e-Marketing	08
06	<b>Achieving Success In The Small Business:</b> Stages of the small business life cycle, four types of firm-level growth strategies, Options – harvesting or closing small business Critical Success factors of small business	05



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## Assessment:

### **Internal:**

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

### **End Semester Theory Examination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.

1. Question paper will comprise of total six question
2. All question carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four question need to be solved.

## **REFERENCES:**

1. Poornima Charantimath, Entrepreneurship development- Small Business Enterprise, Pearson
2. Education Robert D Hisrich, Michael P Peters, Dean A Shapero, Entrepreneurship, latest edition, The McGrawHill Company
3. Dr TN Chhabra, Entrepreneurship Development, Sun India Publications, New Delhi
4. Dr CN Prasad, Small and Medium Enterprises in Global Perspective, New century Publications, New Delhi
5. Vasant Desai, Entrepreneurial development and management, Himalaya Publishing House
6. Maddhuima Lall, Shikha Sahai, Entrepreneurship, Excel Books
7. Rashmi Bansal, STAY hungry STAY foolish, CIIE, IIM Ahmedabad
8. Law and Practice relating to Micro, Small and Medium enterprises, Taxmann Publication Ltd.
9. Kurakto, Entrepreneurship- Principles and Practices, Thomson Publication
10. Laghu Udyog Samachar
11. [www.msme.gov.in](http://www.msme.gov.in)
12. [www.dcmesme.gov.in](http://www.dcmesme.gov.in)
13. [www.msmetraining.gov.in](http://www.msmetraining.gov.in)





Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Project Management

Course Code Old (2016-17): ILO 2021

Course Code New (Autonomy 2017-18): ILE 911

Class and Semester in Old Syllabus: M.E

Class and Semesters in New Syllabus: M.TECH

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	R ACT MATRIX	Roles & Responsibilities	
2	Constrained Resource Scheduling	Considering special skill constraint in scheduling.	4/42 = 9.52%
3			
4			
5			

### Coordinators Name & Signature:

1) Dr. Radha Shomkar, mnm

2)

### Experts Name & Signature:

1) Reeta Koshy

2)

3)



\*\* Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Project Management

Course Code Old (2016-17): ILO 202 1

Course Code New (Autonomy 2017-18): ILE 914

Class and Semester in Old Syllabus: M.E

Class and Semesters in New Syllabus: M.TECH.

### Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Stages of team development & Growth	Most Project move from traditional
2	Interface Co-ordination & Concurrent Engg.	To agile
3		
4		
5		

Coordinators Name & Signature:

1) Dr. Radha Shantakumari

2)

Experts Name & Signature:

1) Reeta Koshy

2)

3)





## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ILE911	Project Management	3	--	--	3	--	--	3
<b>Examination Scheme</b>								
ISE		MSE		ESE				
10		30		100 (60% Weightage)				

Pre-requisite Course Codes		At the end of successful completion of the course, students will be able to	
Course Outcomes	CO1	Manage the selection and initiation of individual projects in the enterprise.	
	CO2	Conduct project planning activities that accurately forecast project costs, timelines, and quality.	
	CO3	Implement processes for successful resource, communication, and risk and change management	
	CO4	Demonstrate effective project execution and control techniques that result in successful projects	
	CO5	Conduct project closure activities and obtain formal project acceptance	
	CO6	Demonstrate Team work and team spirit and how to overcome the conflicts	

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Project Life cycle		
	1.2	Project selection criteria, Risk considerations in selection	1	8
	1.3	Project bid, RFP	1	
	1.4	Managing conflicts and the Art of negotiation	1, 3	
2	2.1	Project plan -WBS	1, 2	8
	2.2	Project activity and risk planning	1, 2	
	2.3	BACI Matrix and Agile projects	1	2
	2.4	Budgeting , Estimating cost and Risk	1	
3	3.1	Scheduling- Network Diagrams	1, 2	
	3.2	CPM- crashing a project	1, 2	10
	3.3	Resource loading and leveling	1, 2	
	3.4	Constrained resource scheduling	1, 2	
4	4.1	Monitoring and controlling cycle	1, 2	2
	4.2	Burned value analysis ✓	1, 3	10
	4.3	Control of Change and scope creep	1, 3	2
5	5.1	Project procurement management, outsourcing	1, 3	
	5.2	Project Auditing	3	6
	5.3	Project termination process	1	



Course Code	Course Name	Credits
ILO 2021	Project Management	03

**Objectives:**

1. To familiarize the students with the use of a structured methodology/approach for each and every unique project undertaken, including utilizing project management concepts, tools and techniques.
2. To appraise the students with the project management life cycle and make them knowledgeable about the various phases from project initiation through closure.

**Outcomes: Learner will be able to...**

1. Apply selection criteria and select an appropriate project from different options.
2. Write work break down structure for a project and develop a schedule based on it.
3. Identify opportunities and threats to the project and decide an approach to deal with them strategically.
4. Use Earned value technique and determine & predict status of the project.
5. Capture lessons learned during project phases and document them for future reference

Module	Detailed Contents	Hrs
01	<b>Project Management Foundations:</b> Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical & atypical) Project phases and stage gate process. Role of project manager. Negotiations and resolving conflicts. Project management in various organization structures. PM knowledge areas as per Project Management Institute (PMI).	5
02	<b>Initiating Projects:</b> How to get a project started, Selecting project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating charter; Project proposal. Effective project team, <u>Stages of team development &amp; growth (forming, storming, norming &amp; performing)</u> , team dynamics.	6
03	<b>Project Planning and Scheduling:</b> Work Breakdown structure (WBS) and linear responsibility chart, <u>Interface Co-ordination and concurrent engineering</u> , Project cost estimation and budgeting, Top down and bottoms up budgeting, Networking and Scheduling techniques. PERT, CPM, GANTT chart. Introduction to Project Management Information System (PMIS).	8
04	<b>Planning Projects:</b> Crashing project time, Resource loading and leveling, Goldratt's critical chain, Project Stakeholders and Communication plan. Risk Management in projects: Risk management planning, Risk identification and risk register. Qualitative and quantitative risk assessment, Probability and impact matrix. Risk response strategies for positive and negative risks	6
05	<b>5.1 Executing Projects:</b> Planning monitoring and controlling cycle. Information needs and reporting, engaging with all stakeholders of the projects.	8





Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Management Information System

Course Code Old (2016-17): ILO 1013

Course Code New (Autonomy 2017-18): ILE 912

Class and Semester in Old Syllabus: M.E

Class and Semesters in New Syllabus: M.TECH.

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus
1	Parker's Value chain Model	Model based learning	8/42
2	Melon Six Stage Model		= 19.0%
3	Simon model of decision making		
4	E-Governance, e-commerce delivery model	Mandatory for Enterprises	
5	Securing Information System	Data Protection	

Coordinators Name & Signature:

1) Dr. Radha Shankarmani Al.

2)

Experts Name & Signature:

1) D. R. Kalbande DRK

2)

3)

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DRK



Bharatiya Vidya Bhavan's  
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Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Management Information System

Course Code Old (2016-17): ILO 1013

Course Code New (Autonomy 2017-18): ILE 912

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Removal from Syllabus:

Sr. No.	Topics Removed	Reason
1	Computer Networks	
2	Wired & wireless technology	{ Not relevant to MIS
3	Pervasive Computing	
4	Cloud computing model	
5		

Coordinators Name & Signature:

1) Dr. Radha Shantaram

2)

Experts Name & Signature:

1) D. R. Kulkarni

2)

3)





## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ILE912	Management Information System(MIS)	3	--	--	3	--	--	3
		Examination Scheme						
		ISE	MSE		ESE			
		10	30		100 (60% Weightage)			

Pre-requisite Course Codes	
At the end of successful completion of the course, students will be able to	
Course Outcomes	CO1 Identify key factors of the business problem. Clearly define a business problem using key facts
	CO2 Critically analyze defined business problem using widely used analytical techniques and models
	CO3 Propose potential alternative solution, evaluate them and recommend an appropriate solution
	CO4 Identify Information Requirements from external Systems in order to integrate different aspects of business
	CO5 Apply MIS concepts in e-Business
	CO6 Explain ethical, social and security issues in MIS

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Introduction: Level of management activities, Types of MIS	1	6
	1.2	Role of MIS in global business	1,4	
	1.3	Strategic information System, Porter's value-chain Model	1	
2	2.1	Information system planning: Creating an IS plan	2	8
	2.2	IS growth model-Nolan six stage model	2	
	2.3	Three stages of planning process	2	
3	3.1	Decision Support System: Simon's model of Decision-Making	1,2	8
	3.2	Methods for Decision Making, Decision support techniques	1,2	
	3.3	Components of DSS, BI and Knowledge management system	1	
4	4.1	Enterprise systems: Enterprise Resource Planning (ERP) systems	5	8
	4.2	Customer Relationship Management (CRM)	5	
	4.3	Supply Chain Management System (SCM)	5	
5	5.1	E-Business Systems	3	8
	5.2	E-commerce: Digital Markets, Digital Goods	6,4	
	5.3	E-Governance- objectives and delivery models	1	
6	6.1	Ethical and Social Issues in Information Systems	4	4
	6.2	Securing Information Systems	4	
Total				42

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Course Code	Course Name	Credits
ILO 1013	Management Information System	03

**Objectives:**

1. The course is blend of Management and Technical field.
2. Discuss the roles played by information technology in today's business and define various technology architectures on which information systems are built
3. Define and analyze typical functional information systems and identify how they meet the needs of the firm to deliver efficiency and competitive advantage
4. Identify the basic steps in systems development

**Outcomes:** Learner will be able to...

1. Explain how information systems Transform Business
2. Identify the impact information systems have on an organization
3. Describe IT infrastructure and its components and its current trends
4. Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making
5. Identify the types of systems used for enterprise-wide knowledge management and how they provide value for businesses

Module	Detailed Contents	Hrs
01	Introduction To Information Systems (IS): Computer Based Information Systems, Impact of IT on organizations, Importance of IS to Society, Organizational Strategy, Competitive Advantages and IS.	4
02	Data and Knowledge Management: Database Approach, Big Data, Data warehouse and Data Marts, Knowledge Management. Business intelligence (BI): Managers and Decision Making, BI for Data analysis and Presenting Results	7
03	Ethical issues and Privacy: Information Security, Threat to IS, and Security Controls	7
04	Social Computing (SC): Web 2.0 and 3.0, SC in business-shopping, Marketing, Operational and Analytic CRM, E-business and E-commerce – B2B B2C, Mobile commerce.	7
05	Computer Networks: Wired and Wireless technology, Pervasive computing, Cloud computing model	6
06	Information System within Organization: Transaction Processing Systems, Functional Area Information System, ERP and ERP support of Business Process. Acquiring Information Systems and Applications: Various System development life cycle models.	8



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAE 35 E	Service Oriented Architecture	3	-	--	3	-	-	3
Examination Scheme								
ISE			MSE			ESE		
10			30			100 (60% Weightage)		

Pre-requisite Course Codes	Course Outcomes		
	CO1	An ability to comprehend the abilities of middleware and understand its suitability to application.	
	CO2	An ability to develop Service Life cycle with real time example as well as identifying its semantics.	
	CO3	An ability to analyze business architecture for Service Oriented Enterprise Application based on case study	
	CO4	An ability to understand Strategic Architecture in SOA Governance	

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Introduction to Middleware</b>	1,3	3
	1.1	Generic Middleware, Service Specific Middleware, Working of CORBA.		
	1.2	Client/Server Building, RPC, Java RMI		
	1.3	Promises and Challenges of SOA, Service Oriented Architecture, Business driven SOA		
2		<b>Introduction to Service oriented architecture</b>	1,2	4
	2.1	Service orientation in daily life, Drivers for		
	2.2	Dimensions of SOA, Key components of SOA, Services		
	2.3	Enterprise Service Bus, Orchestration, Prospective of SOA		
	2.4	SOA Perspectives of Standard Bodies, Future Trends		
3		<b>Getting started with SOA</b>	1,2	11
	3.1	Overview of SOA implementation Methodology, SOA Reference Architecture,		
	3.2	Business Architecture, Business Processes, Information Design		
	3.3	Service Identification, Service Specification, Service Expectations,		
	3.4	Interaction Model, Service Constraints, Service Location, Services Realization, Buying Services, Outsourcing Services,		
	3.5	Building Services, Summary of Service Identification and Realization Concerns, Service Life Cycle,		
	3.6	The Service Design Process, Top-Down Approaches-Enterprise System Analysis - Business Process Model,		

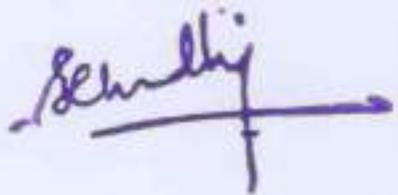


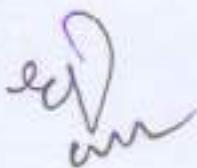
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	6.4	Approaches for Enterprise-wide SOA Implementation-Strategy (Due Diligence, AS IS Assessment), TO BE Strategy		
	6.5	SOA Development (Transition Planning, Validation, Proof of Concept, Business Process Model), Service Deployment and Monitoring		
			Total	42

**References :**

- [1] Michael Rosen, "Applied SOA"
- [2] Shankar Kambhampaty, "Service- Oriented Architecture for Enterprise Applications", Wiley publication
- [3] G. SudhaSadasivam, "Distributed Component Architecture", Wiley India edition.

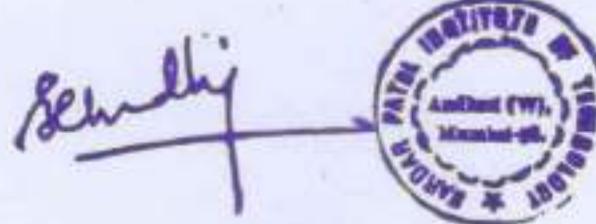




MCA405		Elective I						
Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA4053	Service Oriented Architecture	04	--	--	04	--	--	04
Examination Scheme								
Theory			End Sem. Exam. [ Once in a semester ]		Term Work	Pract	Oral	Total
Test 1	Test 2	Average	80		--	--	--	100

Name of Subject	Service Oriented Architecture		
Semester	IV		
Objectives	To enable the students to understand the core principles of the Service Oriented Architecture. To enable students to learn to produce well designed, effective integration of applications using web services. To enable students to learn to produce well designed, dynamic Web service based applications. To introduce tools, technologies and framework which will include service provider, service consumer, service registry. To increase student business selection knowledge based services.		
Outcomes	Student will understand web-service based working of business between service consumers, service producer. It also make student aware of integration of different web services based on the differ business pattern and using language business process execution language. Student will learn XML based web service description language.		

Unit No	Contents	No of Hrs
Unit I	<b>Introduction to Middleware:</b> Generic Middleware, Service Specific Middleware, Client/Server Building, Working of corba, RPC, Java RMI, Promises and Challenges of SOA, Service Oriented Architecture, Business driven SOA	3 Hrs
Unit II	<b>Introduction to Service oriented architecture:</b> Service orientation in daily life, Drivers for SOA, Dimensions of SOA, Key components of SOA, Services, Enterprise Service Bus, Orchestration, Prospective of SOA, Perspectives of Standard Bodies, Future Trends	4 Hrs
Unit III	<b>Getting started with SOA :</b> Overview of SOA Implementation Methodology, SOA Reference Architecture, Business Architecture, Business Processes, Information Design, Service Identification, Service Specification, Service	11 Hrs



**References:**

1. Applied SOA by Michael Rosen
2. "Service- Oriented Architecture for Enterprise Applications", Shankar Kambhampaty, Wiley publication
3. G SudhaSadasivam "Distributed Component Architecture", Wiley India edition.





BHARATHIYA VIDYA BHAVAN'S  
**SARDAR PATEL INSTITUTE OF TECHNOLOGY**  
MUNSHINAGAR, ANDHERI (WEST), MUMBAI - 400 058.  
MASTER OF COMPUTER APPLICATIONS

Academic Year: 2016-17

Name of the Faculty: Prof. Aarti M. Karande

Subject Name: Service Oriented Architecture

Class: SYMCA

Semester: III

Minutes of meetings:

1. Subject need to moved to sem IV instead of III
2. Business logic need to be focused more.

Sr. No.	Name of the Faculty	Department	Suggestion	Signature
1.	Prof. Radha Shankarmani	IT	Business focus understanding - to develop logic	
2.	Prof. Anjali Yeole	Computer (VESIT)	Web service concept can be redefined in the starting chapters	Email Validation
3.	Prof. Prachi Dhannawat	Computer (SNDT)	Check for real time SOA framework approach	Email validation





# Sardar Patel Institute of Technology

Bhavan's Campus, Manshi Nagar, Andheri (West), Mumbai-400058-India  
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## MCA DEPARTMENT

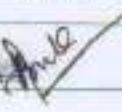
Academic Year: 2017 – 2018

Name of the Course Coordinator: Aarti M. Karande

Course Name: Service Oriented Architecture

Class: SYMCA

Semester: IV

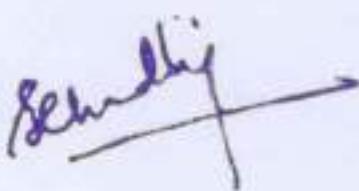
Sr. No.	Name of the committee members	Department	Signature
1	Aarti M. Karande	MCA	
2	Dr. Radha Shankarmani	IT	
3	Prachi Dhanwant	Compute(SNDT)	

Referred syllabus links (URL):

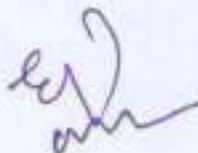
1. Mumbai University

Unit No	Inclusion	Reason
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Unit No	Deletion	Reason
6	SOA best practices	Case study is added in the on going units







Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
MCAL31	Core and Advanced Java Lab	--	--	4	--	--	2	2	
		Examination Scheme							
		Term Work		Practical		Oral		Total	
		40		10		10		60	

Prerequisite Course codes	MCAII		
Course Outcomes	CO1	Understand the basic object oriented features of JAVA and solve problems based on it.	
	CO2	Implement Database connectivity and file handling concept in JAVA	
	CO3	Understand Web technologies like Servlet and JSP in JAVA and implement real time problem based on it.	
	CO4	Apply EJB applications and Struts framework of JAVA to solve real time application.	

Expt. No.	Experiment Details	Ref.	Marks
1	Fundamentals of Java Programming	1,2	5
2	Objects and Classes	1,2	5
3	Generics, Collections and Lambda Expression (4 hrs)	1,2	5
4	Program based on Exception Handling and Multi-threading	1,2	5
5	File Handling	1,2	5
6	Event handling and GUI programming Database Programming	2	5
7	Web development using Servlets and JSP	5	5
8	Introduction to Spring Frameworks (8 Hrs)	13	5
Total Marks			40

References:

- [1] Herbert schildt, " The complete reference JAVA2", Tata McGraw Hill , Seventh Edition.
- [2] Sharanam Shah and vaishali shah, "Core Java for beginners",SPD, First Edition.
- [3] Savalia , "Advance Java Technology" , Dreamtech Press/Wiley India, First Edition.
- [4] Kogent Learning Solutions Inc, " Java Server Programming java EE6" , Dreamtech press First Edition.
- [5] Wigglesworth, " Java Programming Advanced Topics w/2CDs",Third Edition, Cengage Learning.
- [6] Ivan Byaross, "Commercial web development using java 2.0" , BPB, Revised Edition.
- [7] Marty Hall and Larry Brown , " Core Servlets and Java Server Pages :Vol I: Core Technologies", Pearson, Second Edition.
- [8] Sharanam Shah and vaishali shah, "Java EE 6 for Server Programming for professionals" , SPD ,Second Edition .
- [9] E.Balaguruswamy, "Programming with Java A Primer", Tata McGraw Hill, Fourth Edition.
- [10]Craig Walls, "Spring in Action", 3rd Edition, Manning

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L401		Lab I - Core & Advanced JAVA						
Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
L401	Laboratory I – Core & Advanced JAVA	–	06	–	–	03	–	03

**Examination Scheme**

**End Sem. Exam. [ Once in a semester]**

L401	Laboratory Name	Term Work	Pract	Oral	Total
			25	50	25
	Laboratory I – Core & Advanced JAVA	15	25	15	55
	Core JAVA	10	15	10	35
	Advanced JAVA	–	10	–	10
	Journal/Documentation	–	10	–	10

Name of Subject	Laboratory I – Core & Advanced JAVA		
Semester	IV		
Objectives	1. To prepare students to excel and succeed in industry / technical profession through global, rigorous education. 2. Excellence through application development. 3. To provide students with a solid foundation on Tools, Technology and Framework		
Outcomes	1. Students will demonstrate a high degree of proficiency in programming enabling them for careers in software engineering with competencies to design, develop, implement and integrate software applications and computer systems. 2. Students will develop confidence for self education and ability for life-long learning.		

Unit No	Contents	No of Hrs
Unit I	<b>Introduction to Java</b> 1. Program on creation of classes and using different types of function. 2. Program using constructor/function overloading 3. Program on passing Object as parameter to a function 4. Program using static and final variable and methods	4 Hrs
Unit II	<b>Program based on Array , Inheritance and Wrapper Class</b> 1. Program to perform different operations on Array and String 2. Program using Interface and Inheritances covering domain like	4 Hrs

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BHARATIYA VIDYA BHAVAN'S  
**SARDAR PATEL INSTITUTE OF TECHNOLOGY**  
MUNSHI NAGAR, ANDHERI (WEST), MUMBAI - 400 058.  
**MASTER OF COMPUTER APPLICATIONS**

**Academic Year: 2017 – 2018**

Name of the Faculty: Taruna Sharma

Subject Name: Core & Advanced Java Lab

Class: SYMCA

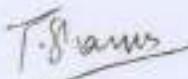
Semester: III

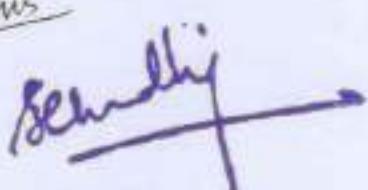
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Minutes of meetings:

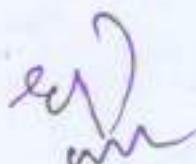
- 1) Prof. Taruna Sharma has set the syllabus in the month of May 2017.
  - 2) I referred the syllabus of Mumbai University, VJTI, and other universities.
  - 3) After making the draft for the syllabus, I discussed with subject expert Prof. Srinivas I.V.
  - 4) He gave us suggestions to add Generics, Collections and Lambda Expression.
  - 5) I incorporated all the suggestions in the syllabus.
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Sr. No.	Name of the Faculty	Department	Suggestion	Signature
1	Prof. Srinivas I.V.	Information Technology Department K.J. Somaiya	Generics, Collections and Lambda Expression	











# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

## MCA DEPARTMENT

Academic Year: 2017 – 2018

Name of the Course Coordinator: Taruna Sharma

Course Name: Core and Advanced Java Lab

Class: SYMCA

Semester: III

Sr. No.	Name of the committee members	Department	Signature
I	Prof. Srinivas I.V	IT,K.J.Somaiya	

Unit No	Inclusion	Reason
3	Generics ,Collections and Lambda Expression	Necessary for students to have knowledge of Generics and Lambda expression in programming.
8	Introduction to Spring Frameworks	Spring Frameworks is an open source application that aims to make J2EE development easier

Unit No	Deletion	Reason
9	EJB( Enterprise Java Beans)	
10	Introduction to struts Framework	

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAL32	Database Management System Lab	--	--	4	--	--	2	2
				Examination Scheme				
		Term Work	Practical	Oral	Total		60	
		40	10	10				

Pre-requisite Course Codes	-
Course Outcomes	CO1 Design database schema using SQL.
	CO2 Write various queries using SQL.
	CO3 Demonstrate cursor, trigger and constraint using PL/SQL.
	CO4 Demonstrate functions, procedures and packages using PL/SQL.

Exp. No.	Experiment details	Ref	Marks
1	<b>SQL Practical</b> <b>Data Definition Language:</b> Create, Alter, Drop, Rename, Truncate <b>Data Manipulation Language:</b> Insert, Update, Delete, Select <b>Data Control Language:</b> Grant, Revoke, Roles <b>Transaction Control Language:</b> Commit, Rollback, Save point	1,2,3	5
2	<b>SQL SELECT Statements:</b> Selecting All Columns, Selecting Specific Columns, Column Alias, Concatenation Operator, Arithmetic Operators, Comparison Conditions, Logical Conditions, ORDER BY Clause	1,2,3	5
3	<b>Functions:</b> Single Row Functions, Character Functions, Number Functions, Date, Functions, Conversion Functions, General Functions, Multiple Row Functions, Group Function <b>Subquery:</b> Subquery, Types of Subquery, Group Function, Having Clause	1,2,3	5
4	<b>Joins:</b> Equijoins, Non-Equijoins, Joining Three Tables, Self Joins, Left Outer Joins, Right Outer Joins, Full Outer Joins, Cross Joins, Natural Joins Other Concepts: Sequence, View, Index, Synonyms <b>Constraints:</b> Not Null, Unique Key, Primary Key, Foreign Key, Check, Dropping a Constraint, Enabling & Disabling	1,2,3	5
5	<b>PL/SQL Practical</b> Programming: Variables, Identifiers, Comment, PL/SQL Block Structure IF Statements: Simple IF Statements, Compound IF Statements IF-THEN-ELSE Statements Loop: Basic Loop, WHILE Loop, FOR Loop	1,2,3	5
6	<b>Cursor:</b> Types of Cursor, Explicit Cursor Life Cycle, Explicit	1,2,3	5

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Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
L302	Laboratory II – DBMS + Software Testing(ST)	—	06 04 (DBMS) + 02(ST)	--	--	03 02 (DBMS) + 01(ST))	--	03

#### Examination Scheme

End Sem. Exam. [ Once in a semester]

	Laboratory Name	Term Work	Pract	Oral	Total
L302	Laboratory II – DBMS + Software Testing	25	50	25	100
	DBMS		15	15	55
	Software Testing		10	10	35
	Journal/Documentation		--	10 (5+5)	10

#### DBMS Practical

Objectives	To teach database handling(creation , manipulation) To teach queries on the databases(single, multiple) To teach PL/SQL programming	No of Hrs.
Outcomes	Students should be able to create and handle databases Students should be able to write and execute queries on the databases Students should be able to write and execute PL/SQL programming	
Practical No.	Contents	
Unit I	<b>SQL Practical</b> <b>Data Definition Language:</b> Create, Alter, Drop, Rename, Truncate <b>Data Manipulation Language:</b> Insert, Update, Delete, Select	4 Hrs
Unit II	<b>Data Control Language:</b> Grant, Revoke, Roles <b>Transaction Control:</b> Commit, Rollback, Savepoint <b>SQL SELECT Statements:</b> Selecting All Columns, Selecting Specific Columns, Column Alias, Concatenation Operator, Arithmetic Operators, Comparison Conditions, Logical Conditions, ORDER BY Clause	4 Hrs
Unit III	<b>Functions:</b> Single Row Functions, Character Functions, Number Functions, Date Functions, Conversion Functions, General Functions, Multiple Row Functions, Group Function	4 Hrs
Unit IV	<b>Subquery:</b> Subquery, Types of Subquery, Group Function, Having Clause <b>Joins:</b> Equijoins, Non-Equijoins, Joining Three Tables, Self Joins, Left Outer Joins, Right Outer Joins, Full Outer Joins, Cross Joins, Natural Joins <b>Other Concepts:</b> Sequence, View, Index, Synonyms	4 Hrs
Unit V	<b>Constraints:</b> Not Null, Unique Key, Primary Key, Foreign Key, Check, Dropping	4 Hrs

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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

## MCA DEPARTMENT

Academic Year: 2017 – 2018

Name of the Course Coordinator: Sakina Salmani, Harshil Kanakia

Course Name: Database Management System Lab

Class: SYMCA

Semester: III

Sr. No.	Name of the committee members	Department	Signature
1	Sakina Salmani	MCA	
2	Harshil Kanakia	MCA	
3	Kiran Gawande	Computers	
4	Jyoti Ramteke	Computers	

No Change

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**SARDAR PATEL INSTITUTE OF TECHNOLOGY**  
MUNSHI NAGAR, ANDHERI (WEST), MUMBAI - 400 058.  
**MASTER OF COMPUTER APPLICATIONS**

Academic Year: 2017 – 2018

Name of the Faculty: Salmani Sakina / Harshil Kanakia

Subject Name: DBMS Lab

Class: SYMCA

Semester:III

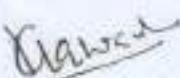
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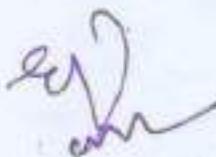
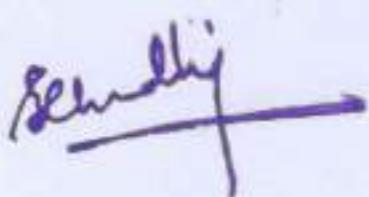
Minutes of meetings:

On 4<sup>th</sup> May, 2017, a meeting was conducted with prof. Kiran Gawande and prof. Jyoti Ramteke regarding syllabus setting of DBMS Lab.

The meeting had discussion to make sure all the aspect of database Query is covered in the syllabus including PL/SQL.

The table below shows the changes told to be incorporated.

Sr. No.	Name of the Faculty	Department	Suggestion	Signature
1	Kiran Gawande	Computer Engineering	Change course Outcomes	
2	Jyoti Ramteke	Computer Engineering	Add all types of joins and triggers.	



Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAL36	Unified Modelling Language Lab	-	-	2	-	-	1	1
				Examination Scheme				
		Term Work		Practical		Oral		Total
		40		10		10		60

Pre-requisite Course Codes	MCA11
Course Outcomes	CO1 Illustrate the use of UML using industrial CASE tool
	CO2 Model of the Problem Space to construct Behavioral diagrams of UML
	CO3 Construct object oriented diagram to model the design of software system.
	CO4 Designing Business Case scenarios with the help of Structural Diagrams of using UML

Exp. No.	Experiment Details	Ref.	Marks
1	Study of UML Overview- The Nature and purpose of Models	1,2	5
2	Implementing Use Case -Capturing a System Requirement, Use Case Relationships, Use Case Overview Diagrams	1,2	5
3	Implementing Activity Diagram - Essentials Activities and Actions, Decisions and Merges, Doing Multiple Tasks at the Same Time, Time Events, Objects, Sending and Receiving Signals, Starting an Activity, Ending Activities and Flows, Partitions , Managing Complex Activity Diagrams	1,2	5
4	Implementing Class and Objects- What is a Class, Getting Started with Classes in Visibility, Class State: Attributes, Class Behavior: Operations, Static Parts of Your Classes Class Relationships, Constraints, Abstract Classes, Interfaces, Templates, Object Instances, Links, Binding Class Templates	1,2	5
5	Implementing Sequence Diagram - Participants, Time, Events, Signals, and Messages, Activation Bars, Nested Messages, Message Arrows	1,2	5
6	Implementing Communication Diagram Participants, Links, and Messages, Fleshing out an Interaction with a Communication Diagrams ,Communication Diagrams Versus Sequence Diagrams Building a Timing Diagram from a Sequence Diagram, Applying Participants to a Timing Diagram,States, Time, A Participant's State-Line, Events and Messages, Timing Constraints	1,2	5
7	Implementing Component A Basic Component in UML,	1,2	5

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	Provided and Required Interfaces of a Component, Showing Components Working Together, Classes That Realize a Component, Ports and Internal Structure, Black-Box and White-Box Component Views		
8	Implementing Deployment Diagram Deploying a Simple System, Deployed Software: Artifacts, What Is a Node?, Hardware and Execution Environment Nodes, Communication Between Nodes, Deployment Specifications, When to Use a Deployment Diagram	1,2	5
Total Marks			40

#### References:

- [1] Grady Booch, James Rumbaugh, Ivar Jacobson "The Unified Modeling Language User Guide ", Addison Wesley (2005) Second edition
- [2] Kim Hamilton, " Learning UML 2.0", Russell Miles, O'Reilly, second edition.



*John M. S.*

### UML LAB

Name of the Subject	UML LAB		
Semester	IV		
Objective	1. To provide an understanding of how modeling can be used in practice and where the Unified Modeling Language Notation fit in practical modeling 2. Develop well-documented UML-based artifacts from the early phases of the development process for the case study. 3. To define system domain, system boundaries and system interfaces		
Outcome	1. Students will be able to create a Model of the Problem Space and a Model of the Architectural Space using an industrial CASE tool. 2. Students will demonstrate skills for successful participation in a small development team.		
Unit No	Contents	No. of Hrs	
Unit I	Introduction to UML	2 Hrs	
Unit II	Use Case Diagram	2 Hrs	
Unit III	Activity Diagram	2 Hrs	
Unit IV	Class Diagram	2 Hrs	
Unit V	Object Diagram	2 Hrs	
Unit VI	Interaction Diagram <ul style="list-style-type: none"> <li>• Sequence Diagram</li> <li>• Collaboration Diagram</li> </ul>	4 Hrs	
Unit VII	State Chart Diagram, Composite State Chart Diagram	2 Hrs	
Unit VIII	Component Diagram, Deployment Diagram	2 Hrs	
Unit IX	Case study	6 Hrs	

**Instructions for conduction:** All practicals are to be performed in any UML CASE tool available e.g. StarUML, Rational Rose, Magic Draw, Net Beans IDE, Microsoft Visio, Eclipse UML2 Tools, Visual Paradigm etc.

#### Reference Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson , The Unified Modeling Language User Guide Second edition, Addison Wesley (2005)
2. Michael Blaha, James Rumbaugh, Object-Oriented Modeling and Design with UML, PHI (2005)
3. Tom Pender , UML Bible, Wiley(2003)
4. Craig Larman , Applying UML and Patterns: An introduction to object-oriented analysis and Design and iterative development , Addison Wesley (2004)
5. Grady Booch, Robert A. Maksimchuk, Michael Engle, Bobbi Young, Jim Conallen, Kelli Houston, Object-Oriented Analysis and Design with Applications Third edition, Pearson Education (2008)
6. Joseph Schmuller, Sams Teach Yourself UML in 24 Hours, Sams Publishing (2004)





**Sardar Patel Institute of Technology**  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

**MCA DEPARTMENT**

**Academic Year: 2017 – 2018**

Name of the Course Coordinator: Nikhita Mangaonkar

Course Name: Unified Modeling Language Lab

Class: SYMCA

Semester: III

Slr. No.	Name of the committee members	Department	Signature
1	Nikhita Mangaonkar	MCA	

No Change

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCA41	Data warehousing and Mining & Business Intelligence	3	1	--	3	1	--	4
Examination Scheme								
ISE			MSE			ESE		
10			30			100 (60% Weightage)		

Pre-requisite Course Codes	DBMS(MCA33), mathematics		
	Student Will be able to		
Course Outcomes	<b>CO1</b>	Understand Data warehouse characteristics with its different models	
	<b>CO2</b>	To design project structure of the data warehouse	
	<b>CO3</b>	Apply data warehouse concepts for data analysis and report generation	
	<b>CO4</b>	Use conceptualization of BI techniques to make use of relevant theories, concepts and techniques to solve real-world BI problems	

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Basic Concepts of Data Warehousing</b>	3	6
	1.1	Introduction, Meaning and characteristics of Data Warehousing,		
	1.2	KDD, Online Transaction Processing (OLTP), Data Warehousing Models,		
	1.3	Data warehouse architecture & Principles of Data Warehousing Data Mining		
2		<b>Data preprocessing</b>	3	6
	2.1	Preprocess the data, Data cleaning Data integration and transformation		
	2.2	Data reduction Dimensionality reduction		
	2.3	Data compression Feature extraction Discretization and concept hierarchy generation		
	2.4	Dimensional Modeling Design		
3		<b>Building Data Warehouse</b>	3	10
	3.1	Project Structure of the Data warehouse, Data warehousing and Operational Systems, Organizing for building data warehousing,		
	3.2	Important considerations – Tighter integration, Empowerment,		
	3.3	Willingness Business Considerations: Return on Investment Design		
	3.4	Considerations, Technical Consideration, Implementation Consideration, Benefits of Data warehousing.		
4		<b>Business Intelligence</b>	1,2	6
	4.1	Introduction and overview of BI-Effective and timely decisions,		
	4.2	Data Information and knowledge, BI Architecture, Ethics and BI		



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MCA402		Advanced Database Theory and Applications												
Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)				Credits Assigned								
		Theory	Pract	Tut	Theory	Pract	Tut	Total						
MCA402	Advanced Database Theory and Applications	04	--	--	04	--	--	04						
Examination Scheme														
Internal Assessment		Theory				Term Work	Pract	Oral	Total					
Test 1	Test 2	Average	End Sem. Exam. [ Once in a semester ]											
20	20	20	80				--	--	100					
Name of Subject	Advanced Database Theory and Applications (ADTA)													
Semester	IV													
Objectives	To acquaint the students with some relatively advanced issues in modern data management, information storage and retrieval.													
Outcomes	Students should be able to gain an awareness of the basic issues parallel and distributed data organizations. Students learn about the emerging database models including multimedia, spatial and temporal databases, Web-DBMS integration technology with XML for Internet database applications, acquaint themselves with the data-warehousing and data-mining techniques and its applications, apply the knowledge acquired to solve simple													

Unit No.	Contents	No of hours
Unit I	<b>Parallel and Distributed Databases :</b>  <b>Parallel Databases:</b> Architecture for Parallel Databases, Parallelizing Individual operations, Parallel query Evaluation	
	<b>Distributed Databases:</b> Introduction to DDBMS, Architecture of DDBs, Distributed Storage, Distributed Database Design and Query Processing, Distributed transaction Processing, Distributed concurrency Control & Recovery, Distributed catalog management.	10Hrs
Unit II	<b>Datawarehousing:</b> Data warehouse overview and concepts, Need for data warehousing, Basic elements of data warehousing, Data warehouse Architecture And Infrastructure, Architectural components, Infrastructure and metadata, DW life cycle, Data extraction, transformation and loading, Data Quality	4Hrs
Unit III	<b>Principles of Dimensional Modeling</b> Dimensional Modeling: Star Schema, Snowflake Schema, Fact Constellation Schema	6Hrs



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BHARATIYA VIDYA BHAVAN'S  
**SARDAR PATEL INSTITUTE OF TECHNOLOGY**  
MUNSHENAGAR, ANDHERI(WEST), MUMBAI - 400 058  
MASTER OF COMPUTER APPLICATIONS

Academic Year: 2016-17

Name of the Faculty: Prof. Aarti M. Karande

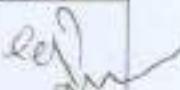
Subject Name: Data ware house and Business Intelligence

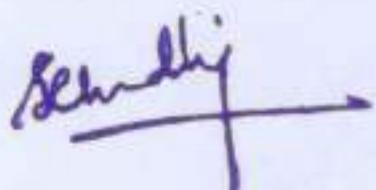
Class: SYMCA

Semester: IV

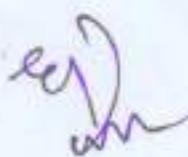
Minutes of meetings:

1. More data mining algorithm need to be considered.
2. Business intelligence concept need to be revolved around the practicing tool
3. DW should be open source

Sr. No.	Name of the Faculty	Department	Suggestion	Signature
1.	Dr. D. R. Kalbande	Computer		
2.	Prof. K.K. Devadkar	IT		
3.	Prof. Jyoti Ramakrishna	Computer	KDD should be added.	
4.	Prof. Seema	Computer (Thadomal)	Add mining concepts covered in this syllabus like classification, clustering, rule mining etc	Email validation
	Prof. Dhannawat	Prachi	Syllabus is up to date after first review. Use practical approach	Email validation

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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

## MCA DEPARTMENT

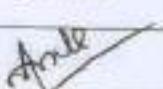
**Academic Year: 2017 – 2018**

Name of the Course Coordinator: Aarti M. Karande

Course Name: Data warehousing, mining and Business Intelligence

Class: SYMCA

Semester: IV

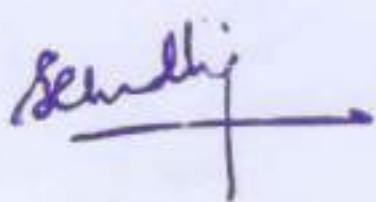
Sr. No.	Name of the committee members	Department	Signature
1	Aarti M. Karande	MCA	
2	Dr. D. R. Kalbande	Computer	
3	K. K. Devadkar	Computer	
4	Seema Kolkure	Computer (TSEC)	
5	Prachi Dhanwant	Compute(SNDT)	
6	Jyoti Ramtake	Computer	

Referred syllabus links (URL):

1. Mumbai University

Unit No	Inclusion	Reason
2	Data Preprocessing	Detail processing of the data before adding to the DW
3	Building a Data warehouse	Full construction of the Data warehouse
5	Prediction method	Required for building BI
6	BI using data warehousing	Comparison of BI using DW

Unit No	Deletion	Reason
1	Parallel and distributed DB	Not related to name
6	Emerging database model technologies and applications	New models not supportive to DW







Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCA42	Software Testing and Quality Assurance	3	1	--	3	1	--	4
Examination Scheme								
ISE			MSE			ESE		
10			30			100 (60% Weightage)		

Pre-requisite Course Codes	MCA12		
Course Outcomes	CO1	Solve the problems using Software Testing techniques and Approaches.	
	CO2	Apply various Software testing Techniques to find bugs in software	
	CO3	Understand Test Automation	
	CO4	Apply various Software Quality Assurance Techniques to ensure the quality in software.	

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Basics of Software Testing</b>		
	1.1	Humans, Errors & Testing, Correctness Vs Reliability,	1,2	3
	1.2	Testing & Debugging, Principles of Testing, Test Metrics		
2		<b>Testing in the Software Life Cycle &amp; Test Levels</b>	1,2	6
	2.1	The General V-Model, W-Model, Component Test, Integration Test, System Test,		
	2.2	Acceptance Test, Generic types of Testing-Functional, Non Functional		
	2.3	Testing software structure, Regression Testing		
3		<b>Static Testing</b>	1,2	5
	3.1	Structured Group Examinations - Reviews,		
	3.2	Static Analysis – Control Flow Analysis & Data Flow Analysis		
	3.3	Tools for Static Testing		
4		<b>Dynamic Testing</b>	1,2	8
	4.1	Black Box Testing- Equivalence Class Partitioning, Boundary Value Analysis,		
	4.2	State Transition Test, Cause Effect Graphing and Decision Table Technique, User Documentation Testing, Domain Testing,		
	4.3	White Box-Statement Coverage, Branch Coverage, Test of Conditions, Path Coverage		
5		<b>Test Management</b>	1,2	6
	5.1	Test Planning, Test Management,		
	5.2	Test Process, Test Reporting		
	5.3	Incident Management – Test Log, Incident Reporting,		

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	Classification, Status		
6	<b>Test automation</b>	1,2	
6.1	Design and Architecture for Automation,	6	
6.2	Test Automation-Design and Architecture for Automation,		
6.3	Generic Requirements for test Tool/Framework,		
6.4	Criteria for selecting test tools, Testing of Object Oriented Systems		
7	<b>Software Quality</b>	3,4	2
7.1	Software Quality Standards, SQA Planning; SQA plan, Organizational Level Initiatives		
8	<b>Software Measurement &amp; Metrics</b>	3,4	6
8.1	Measurement during Software Life Cycle Context		
8.2	Defect Metrics, Metrics for software Maintenance & Requirements		
8.3	Measurement Principles		
8.4	Case study for Identifying Appropriate Measures & Metrics for Projects		
	<b>Total</b>		42

#### References:

- [1] Andreas Spillner , "Software Testing Foundations", Tilo Linz, Hans Schaefer, Shoff Publishers and Distributors, fourth edition
- [2] Aditya P. Mathur , "Foundations of Software Testing", Pearson Education, second edition
- [3] KshirasagarNaik&PriyadarshiTripathi, "Software Testing & Quality Assurance Theory & Practice", Wiley Student Edition.
- [4] Nina S. Godbole , "Software Quality Assurance Principles & Practice", Alpha Science Publication, third edition

100 %.

Newly introduced Subject

Schulby



ek



BHARATIYA VIDYA BHAVAN'S  
SARDAR PATEL INSTITUTE OF TECHNOLOGY

MUNSHI NAGAR, ANDHERI (WEST), MUMBAI - 400 058.

MASTER OF COMPUTER APPLICATIONS

Academic Year: 2017 – 2018

Name of the Faculty: Nikhita Mangaonkar

Subject Name: Software Testing and Quality Assurance (MCA 4PP)

Class: FYMCA Semester: IV

Minutes of meetings:

- 1) Prof. Nikhita Mangaonkar has set the syllabus in the month of May 2017.
- 2) We referred the syllabus of Mumbai University, VJTI, and other universities.
- 3) After making the draft for the syllabus, we went to subject expert Prof. Jignesh Sisodia.
- 4) He gave us suggestions to add Test Automation in Syllabus and for lab.
- 5) We incorporated the suggestions in the syllabus and lab.

Sr. No.	Name of the Faculty	Department	Suggestion	Signature
1	Prof. Jignesh Sisodia	Information Technology Department	Test Automation	

→



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**Sardar Patel Institute of Technology**  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

**INFORMATION TECHNOLOGY DEPARTMENT**

**Academic Year: 2017 – 2018**

Name of the Course Coordinator: Rupesh G. Bhoir

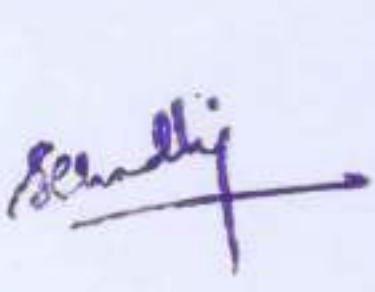
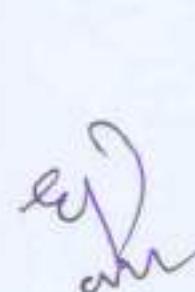
Subject Name: Software Testing and Quality Assurance

Class: SYMCA

Semester:IV

Sr. No.	Name of the committee members	Department	Signature
1	Prof. Jignesh Sisodiya	IT	
2			
3			
4			

Newly introduced subject

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCA43	Design and Analysis of Algorithms	3	1	--	3	1	--	4
		Examination Scheme						
		ISE	MSE		ESE			
		10	30		100 (60% Weightage)			

Pre-requisite Course Codes		Data Structure and C++
Course Outcomes	CO1	Analyze basic, approximation and divide & conquer algorithms.
	CO2	Apply greedy and dynamic method to given problem.
	CO3	Evaluate backtracking and branch and bound techniques.
	CO4	Apply graph and string matching algorithms to a given problem.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Introduction to analysis of algorithm	1,2	4
	1.1	The Role of Algorithms in Computing		
	1.2	Growth of Functions		
	1.3	The substitution method		
	1.4	Recursion tree method		
	1.5	Master method		
2		Approximation Algorithm	3	4
	2.1	P and NP complete problem. P and NP hard problem.		
	2.2	The Vertex-Cover Problem		
	2.3	The set-covering Problem		
3		Divide and Conquer	1	4
	3.1	Binary Search		
	3.2	Merge sort analysis		
	3.3	Quick sort analysis		
4		Greedy Method & Dynamic Programming	3,2	7
	4.1	Introduction to Greedy method		
	4.2	Knapsack problem		
	4.3	Minimum cost spanning tree- kruskal and prim's algorithm		
	4.4	Introduction to Dynamic programming		
	4.5	0/1 Knapsack problem		
	4.6	Matrix Multiplication		
	4.7	Longest Common Subsequence		
	4.8	Optimal Binary Search Tree		
5		Backtracking	1	5
	5.1	Introduction to Backtracking method		
	5.2	8 queen problem		
	5.3	Graph coloring		
	5.4	Hamiltonian cycles		
	5.5	The subset sum problem		



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BHARATIYA VIDYA BHAVAN'S  
SARDAR PATEL INSTITUTE OF TECHNOLOGY

MUNSHI NAGAR, ANDHERI (WEST), MUMBAI - 400 058.

MASTER OF COMPUTER APPLICATIONS

Academic Year: 2017 – 2018

Name of the Faculty: Salmani Sakina

Subject Name: Design and Analysis of Algorithms (Theory)

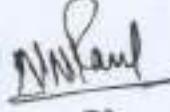
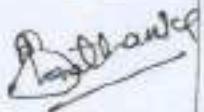
Class: SY.MCA

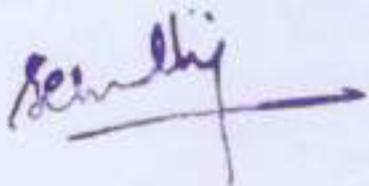
Semester: IV

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Minutes of meetings:

1. On May 2017 meeting with prof. Natasha Raul and Dr. Presenjit Bavatankar was held to discuss the detail syllabus of Design Analysis and Algorithm.
  2. The syllabus was studied in detail by the experts and suggestions are told which needs to be incorporated.
  3. Course Outcome was discussed in detail and necessary changes have been told.
- 

Sr. No.	Name of the Faculty	Department	Suggestion	Signature
1	Prof. Natasha Raul	Computer	Add OBST in Dynamic algorithm. Add String Matching Finite Automata. Change the number of hours in the modules.	
2	Dr. Presenjit R. Bavatankar	I.T.	Change the course outcome as specified.	

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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics Engineering

Undergraduate Program

2017-18 to 2022-23 Revision

Program Code	Program Name	Year of Introduction	Year of Revision	Revision of course carried out in last 5 years Percentage of content added/replaced
Electronics Engineering	Electronics Engineering (Undergraduate)	2017-2022	2017-2018	26.47
			2018-2019	62.5
			2019-2020	33.33
			2020-2021	21.34
			2021-2022	26.28
			2022-2023	50



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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics and Telecommunication Engineering

Undergraduate Program

2022-23

Name of the Course	Course Code	Year of Introduction (during the last five years)	percentage
Image and Video Processing	IT21	2022-23	60
Power Electronic Converters	1X		100
Networking fundamentals	PEIX		100
Embedded System Design for Power Converter App	1Y		100
Energy Storage Systems in EV Applications	1P		100
Power Electronic Converters in EV Applications	1Q		100
Consumer Electronics	OEET3		100
Robotic & Machine Vision Intelligence	OEET4		100



Revised  
B2



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

Project  
video  
presenting

## ELECTRONICS ENGINEERING

Academic Year: 2022-2023

### Theory Course Revision Report

Course Name: Image & video Processing 2022-23  
 Course Code Old (2024-25)

Course Code New (Autonomy 20 - ):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Video Processing (Video formation & Representation)	Syllabus Revised	40 %
2	Motion estimation		20 %
3	Image Restoration		
4			60 %

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



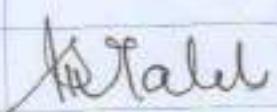
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## Sardar Patel Institute of Technology

Bhavan's Campus, Murshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	K.T. Talek	ETEX	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\* Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100







# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2021-2022

### Theory Course Revision Report

Course Name: Networking Fundamentals

Course Code New (Autonomy 2018-19): PE -1X (General Thread)

Class and Semesters in New Syllabus: TE, BTech- SEM VI, VIII

**Change/Addition in the Syllabus:**

Sr. No.	Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Topologies, LAN, MAN, WAN Introduction to networking devices Transmission Medias: Wired and Wireless network	Newly Introduced Programme Elective with 3 credits only	28/28*100 = 100%
2	Defining Networks with the OSI and TCP/IP Model		
3.	Working with IPv4: IP addressing, Subnet Masks, Subnetting, Introduction to IPv6		
4.	Introduction to Core Security Principles: Confidentiality, Integrity, Availability, Authentication.  Cryptography  Threats: Malware Attacks, Social Engineering Attacks, Networking-based and Server based Attacks		
5.	Self-Study (not included in total hours): Fairness algorithms, Congestion Control mechanisms		



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Laboratory Component, if any. (Minimum 10 Laboratory experiments are expected)

Sr. No	Title of the Experiment
1.	Identify and observe the behaviour of networking command line tools in Ubuntu/Windows OS environment.
2.	To build and test straight through UTP ethernet network cables.
3.	Write a program in C/C++/Python/Java/Scilab to identify the IP address, Subnet mask, DNS server address and Hardware address of the client device.
4.	Write a program in C/C++/Python/Java/Scilab to determine the administrators requirement to define the number of subnets, host/subnet, customized subnet masks and valid subnet ranges for a class C IP addressing scheme.
5.	Examine Data Breaches and Scan for Malware Using the Microsoft Safety Scanner
6.	Handson experience on how to Write-Protect and Disable a USB Flash Drive
7.	Protocol Visualization with open source tools
8.	Network Reconnaissance using open source tools
9.	Web Reconnaissance Using a Web Browser/open source tools
10.	Cryptography using open source tools/Crypt tools and open SSL
11.	Install and configure application based server

## Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Data Communication and Networking	4 <sup>th</sup>	B.A.Forouzan	McGraw Hill	2017
2	Data and Computer Communications	10 <sup>th</sup>	William Stallings	Pearson Education	2013
3	Information Security:Principles and Practice	1 <sup>st</sup>	Deven Shah	Wiley	2007

## Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Computer Networking: A Top-Down Approach	5 <sup>th</sup>	J.F.Kurose and K.W.Ross	Pearson Education	2009
2	Computer Networks	5 <sup>th</sup>	A.Tanenbaum	Pearson Education	2013
3	Computer Networks: Protocols and Standards	2 <sup>nd</sup>	Uyless Black	Prentice Hall	1993



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FEB 2014

2014



## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

Committee members Name & Signature:

1. Dr. Sujata Kulkarni
2. Dr. Anand Mane
3. Dr. D.C.Karia
4. Prof. Dayanand Ambawade

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2022-2023

### Theory Course Revision Report

Course Name: *Embedded System Design for Power converter Applications*  
Course Code Old (2021-22): *EE-401*

Course Code New (Autonomy 20 - ): *EE-101*

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

*BTech Sem VII*

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	<i>Newly Introduced</i>	<i>Recent Trends &amp; Research</i>	<i>100%</i>
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1.

2.

3.

4.



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## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. R. R. Sawant		
2	Dr. R. G. Sutar		
3			
4			

### Details of Experts Name & Signature (if any):

Se. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



~~Sen. Dr. J. P. Dabholkar~~



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai - 400058-India  
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2022-2023

### Theory Course Revision Report

Course Name: Energy Storage Systems in EV Applications  
Course Code Old (2020-21):

Course Code New (Autonomy 2022-23): 1P

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: BTech Semester VII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced	Recent Trends & Research.	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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### Details of Committee members Name & Signature:

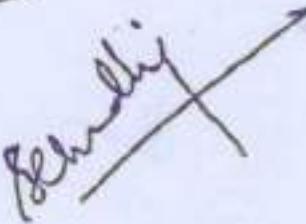
Sr. No.	Name of committee members	Department	Signature
1	Dr. R. R. Sawant		
2	Dr. R. G. Sutar		
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (%) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2022-2023

### Theory Course Revision Report

Course Name: Power Electronic Converters in EV Application

Course Code Old (2020-21):

Course Code New (Autonomy 2022-23) : 10

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

B.Tech Sem VIII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced	Recent Trends & Research	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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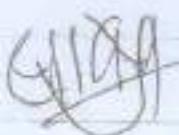
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## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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### Details of Committee members Name & Signature:

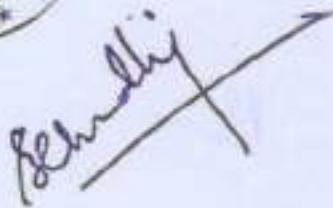
Sr. No.	Name of committee members	Department	Signature
1	Dr. R. R. Sawant		
2	Dr. Rajendra Gites		
3	Dr. B. N. Chaudhari		
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100







# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2022–2023

### Theory Course Revision Report

Course Name: Consumer Electronics

Course Code Old (2020-21):

Course Code New (Autonomy 2022-23) OEEET3

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: B.Tech Sem VII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly introduced	Recent funds in industry & research.	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1.

2.

3.

4.





## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Gavind T. Haldankar	ETRX	<u>Gavind</u>
2	Dr. S. S. Rathod	—	—
3	Prof. Kumar Khandagale	—	—
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 20~~v~~ 20~~v~~ 20~~v~~

### Theory Course Revision Report

Course Name: *Robotic & Machine Vision Intelligence*

Course Code Old (20~~v~~-20~~v~~)

Course Code New (Autonomy 20 - ): DEET4

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: *B.Tech Sem VIII*

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Electric Drives & sensors (4 hrs)	Upgradation of Syllabus	1 to 9
2	Design of Vision Guided System	Application Developmt	
3		New Course Introduced	
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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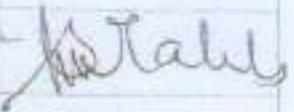
*Ref*



## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

### Details of Committee members Name & Signature:

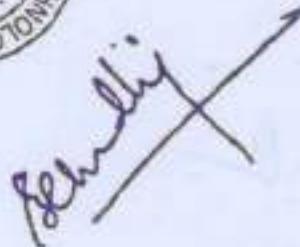
Sr. No.	Name of committee members	Department	Signature
1	K. T. Patel	EXTC	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100











Bharatiya Vidya Bhavan's  
**Sardar Patel Institute of Technology**  
 (Autonomous Institute Affiliated to University of Mumbai)  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

**B. Tech. ETRX**

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		2	-	2	5	8	2	-	1	3
<b>Examination Scheme</b>										
PE- III  ET423 (1T23)	Image and Video Processing	Component	ISE			MSE		ESE		Total
		Theory	50			50		100		200
		Laboratory	50			-		50		100

Pre-requisite Course Codes, if any.	EC207: Signals and Systems EC303: Digital Signal Processing
<b>Course Objective:</b> To study the image and video fundamentals and mathematical transforms necessary for processing and enhancement techniques. To study image restoration procedures and compression procedures for different applications.	
<b>Course Outcomes (CO):</b> At the end of the course students will be able to	
ET423.1 Apply the image fundamentals and mathematical models for digital image and video processing.	
ET423.2 Analyze time and frequency domain techniques for image enhancement.	
ET423.3 Apply segmentation and compression techniques.	
ET423.4 Develop image and video processing applications.	

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ET423.1	3	3										
ET423.2			3	2	3							2
ET423.3					3							
ET423.4	2	2			3	2			3	3		3

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
ET423.1		2					
ET423.2					3		
ET423.3				2			
ET423.4				2		3	





Bharatiya Vidya Bhavan's

## Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

### B. Tech. ETRX

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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#### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Fundamental of Image and Video	1,6	04
	1.1	Structure of the Human Eye, Light, Brightness adaption and discrimination, Pixels, coordinate conventions,		
	1.2	Imaging Geometry, Image acquisition, sampling and quantization, image resolution, basic relationship between pixels, colour images, RGB, HSI and other models		
2	Title	Two Dimensional Transforms and Image Enhancement	1,5	06
	2.1	Discrete Fourier Transform, Discrete Cosine Transform, KL Transform, and Discrete Wavelet Transform		
	2.2	Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution, smoothing filters, sharpening filters, gradient and Laplacian, Frequency domain filtering.		
3	Title	Image Segmentation and Compression	1,5	05
	3.1	Point, line and edge detection, edge linking using Hough transform and graph theoretic approach, thresholding, and region-based segmentation, Morphological operations.		
	3.2	JPEG and MPEG compression standard, H.265 video compression standard		
4	Title	Image Restoration	1,6	04
	4.1	Basic Framework, Image degradation model, Noise characterization, Noise restoration filters,		
	4.2	Adaptive filters, and Estimation of Degradation functions, Restoration Techniques.		
5	Title	Video Formation and Representation	2,3	05
	5.1	Digital Video Sampling, Video Frame classifications, I, P and B frames, Notation		
	5.2	Video Capture and display: Principle of color video camera, video camera, digital video Sampling of video Signals: Required sampling rates, sampling in two dimensions and three dimensions, progressive virus interlaced scans		
6	Title	Motion Estimation	2,3	04
	6.1	Optical Flow: Motion Vs optical flow, optical flow equations, motion representation, motion estimation criteria, optimization		



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Course Code	Course Name	Teaching Scheme			Credits
		L	T	P	
ET332	Embedded System Design for Power Converter Applications	2	0	2	3

### Embedded System Design for Power Converter Applications

#### Coursecontent

Digital Signal Controller (DSC: A micro-controller with a DSP engine): Architecture and real-time programming in Assembly and Embedded C. Introduction to Fixed Point Arithmetic. Understanding the constraints of program memory and execution time. Programming peripherals including GPIO, TIMERS etc. On Chip FLASH and EEPROM programming. Field Programmable Gate Array (FPGA): Architecture and programming of digital circuits including Finite State Machines (FSM) in Verilog HDL. Understanding the CAD tool and various timing issues. Communication-Chip level: AXI, Board level: SPI, I2C, System level: RS 232, CAN, MODBUS RTU on RS 485. Developing a GUI for supervisory control and monitoring. Introduction to different semiconductor memories: RAM, ROM, NVRAM etc. and their applications. Analog sensing: Anti-aliasing filter design, scaling, online calibration and biasing. Continuous time feedback controller design and its discrete time implementation, D/A and A/D converters, effects of sampling, modeling the Pulse Width Modulator (PWM) etc. Co-design: How to optimally implement an embedded task using a programmable processor (DSC) and a re-configurable hardware (FPGA). Embedded design of a typical Power Conversion System. including: process control, protection, monitoring, real-time feedback control etc.

Concept of Hardware-in-the loop simulation in Power converters, Case-study: Design of Embedded system controller for (a) Induction Heating System (b) Three Phase Active Rectifier for PF Correction

#### Prerequisites

Under graduate level analog electronics, digital electronics and classical feedback control theory. Familiarity with micro-processor, digital signal processing and previous experience in programming will be helpful but not a necessity.

#### References

- (1) Fundamentals of Digital logic with Verilog Design, S Brown and Z Vranesic, McGraw Hill Education; 2nd edition (2017).
- (2) PIC Micro-controllers and Embedded Systems, Using assembly and C for PIC 18 Mazidi, McKinley and Causey, Pearson Education India; 1st edition (2008)
- (3) Feedback Control of Dynamic Systems, GF Franklin, JD Powell and Naeini, Pearson (2008)



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- (4) Microelectronic Circuits: Theory and Applications, AS Sedra and K Smith, Oxford University Press (2017)
- (5) Digital Signal Processing, JG Proakis and DK Manolakis, Pearson Education India; 4th edition (2007)
- (6) Digital Control of HighFrequency SwitchedMode Power Converters, (IEEE Press Series on Power Engineering) Luca Corradini, Dragan Maksimovi, Paolo Mattavelli, Regan Zane, Wiley-Blackwell (2015)
- (7) A Practical Introduction to Hardware/Software Co-design, Patrick R. Schaumont Springer; 2nd edition (2014)



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Course Code	Course Name	Teaching Scheme			Credits
		L	T	P	
ET433	Energy Storage Systems in EV Applications	2	0	2	3

**Course Content:**

**Module-1 Batteries and Fuel Cells**

Li-Ion Battery characterization and testing systems & Battery life cycle, Modular battery packs, design, packaging, thermal control and legislative implications. Super-capacitors : Materials and Construction, Basic Model, Specific Behavior of Supercapacitors. Hydrogen Generation and Storage of Hydrogen, Conversion from Hydrogen to Electricity, Power Needed for the Fuel Conditioning, Efficiency of the Fuel Cells, Overall Efficiency.

**Module-2 Battery Management System:**

Need of BMS, Concept of Battery Cell Balancing and strategies, Passive and Active cell Balancing circuits, BMS hardware Design, BMS hardware Protection, BMS Software Strategies, Intelligent Cell Balancing Algorithms, Monitoring and Protections, Charging and Discharging Management, Diagnostics and testing, Communication

**Module-3: Battery Charging Standards and Protocols:**

AC Charging: Bharat EV Charger AC-001, DC Charging : Bharat EV Charger DC-001, Home Charging: AC Charging with Single Phase 230V/15A supply, Public Charging AC-001: AC Charging with three Phase 415V AC supply Mains, Public Charging DC-001, Fast Charging for high voltage EVs: Combined charging system CCS-2 and CHAdeMo with ratings from 50kW to 150kW and DC voltages ranging from 400V to 950V DC.

**Course Projects and Lab Work:**

- (a) battery materials;
- (b) novel thermal management system for maintaining temperature uniformity among the cells and restrict the rise of maximum temperature above normal conditions;
- (c) Digital twin based on IoT, sensors, cloud computing, multi-physics modelling and machine learning for real-time monitoring of SoC and SoH of batteries under dynamic discharge conditions;
- (d) aging controlled fast charging of batteries by evaluation of optimal charging current, and simultaneously optimizing charging time and capacity.

**References:**



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1. Energy Storage by Robert A. Huggins, Springer Publication
2. Energy storage (A new approach) by Ralph Zito Wiley Publication
3. Handbook of Energy Audit, Albert Thummam P.E. CEM, William J. Younger CEM, The Fairmont Press Inc., 7th Edition.
4. Energy Management Handbook, Wayne C. Turner, The Fairmont Press Inc., 5th Edition, Georgia.
5. Energy Storage Systems, Alfred Rufer, CRC Press

**Additional References:**

1. Z.Zhang, H. Gui, D. Gu, Y. Yang and X. Ren, "A Hierarchical Active Balancing Architecture for Lithium-Ion Batteries," in *IEEE Transactions on Power Electronics*, vol. 32, no. 4, pp. 2757-2768, April 2017.
2. M. Daoud, N. Omar, P. Van Den Bossche and J. Van Mierlo, "Passive and active battery balancing comparison based on MATLAB simulation," 2011 *IEEE Vehicle Power and Propulsion Conference*, Chicago, IL, 2011, pp. 1-7.
3. M. Caspar, T. Eiler and S. Hohmann, "Systematic Comparison of Active Balancing: A Model-Based Quantitative Analysis," in *IEEE Transactions on Vehicular Technology*, vol. 67, no. 2, pp. 920-934, Feb. 2018.
4. Xiaoqiang Zhang†, Weiping Zhang, and Geyang Lei, "A Review of Li-ion Battery Equivalent Circuit Models," in *TRANSACTIONS ON ELECTRICAL AND ELECTRONIC MATERIALS*, Vol. 17, No. 6, pp. 311-316, December 25, 2016
5. Min Chen, Student Member, IEEE, and Gabriel A. Rinc'on-Mora, Senior Member, IEEE, "Accurate Electrical Battery Model Capable of Predicting Runtime and I-V Performance", in *IEEE TRANSACTIONS ON ENERGY CONVERSION*, VOL. 21, NO. 2, JUNE 2006
6. Jian Cao, Nigel Schafied and Ali Emadi, "Battery Balancing Methods: A Comprehensive Review", in *IEEE Vehicle Power and Propulsion Conference (VPPC)*, September 3-5, 2008

Course Code	Course Name	Teaching Scheme			Credits
		L	T	P	
ET433	Power Electronic Converters in EV Applications	2	0	2	3



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## **Course Content:**

### **Module-1 Battery Chargers**

Types of EV Chargers, On board Chargers, DC-Fast Chargers, PF Improvement strategies and Control, DC-DC Converter design and Control Scheme, Topology Selection, Control Method for Fast Charger, Charger Converter Hardware Design, Magnetics Design and Selection, Charger Converter Software Design, Enclosure and Connectors, Thermal Engineering

### **Module-2 EV Traction Drive and Control**

Motor Selection and types, Torque-Speed curve of different motor types and their comparison, Motor Inverter hardware Design, MOSFET/IGBT Selection, Gate Driver Circuit Design, Power Supply and Controller Hardware, Motor Inverter Software Strategies for control of BLDC Motor Drive and Induction Motor Drive., Motor Inverter Thermal Engineering, Connectors and Wiring, Active and Passive Discharge (in case of DC Bus > 60V), EMI/EMC Standards Introductions

### **Module-3: DC-DC converter Unit for EV Ancillary Power System**

Power Converter Topology Selection, Control Method for DC-DC converter, Hardware Design, Magnetics Design and Selection, DC-DC Converter Software Design, Enclosure and Connectors, Thermal Engineering, Active and Passive Discharge, EMI/EMC Standards Introductions

### **Case Studies: (To be covered in Practical Session)**

Design and development of high-power density power electronics converters, onboard chargers, machines for electric vehicles, power train technology and various controllers for drives and converters. Development of various novel control algorithms for converters and motor drives

### **References:**

1. Chang Liang Xia, "Permanent Magnet Brushless DC Motor Drives and Controls" Wiley 2012.
2. Rashid M.H., "Power Electronics Circuits, Devices and Applications", Prentice Hall India, Third Edition, New Delhi, 2011.
3. Bimal K Bose, "Modern Power Electronics and AC Drives", Pearson Education, second Edition, 2003.
4. Dubey, G.K., "Thyristorised power controllers", New age International, New Delhi, 2002.
5. Bhambhani P.S., "Power Electronics", Khanna Publishers, New Delhi, 2005
6. Miller, T. J. E., "Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon Press, Oxford, 1989.
7. Kenjo, T and Nagamori, S, "Permanent Magnet and Brushless DC Motors", Clarendon Press, Oxford, 1989.
8. Kenjo, T, "Stepping Motors and their Microprocessor Control", Clarendon Press, Oxford,
9. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education, 9th edition, 2009.
10. David A Bell, "Fundamentals of Electronic Devices and Circuits", Oxford University Press, 2009.
11. Roy Choudhury and Shall Jain, "Linear Integrated Circuits", 2nd Edition, New Age International Publishers, 2003





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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
Open Elective	Cyber Security and Digital Forensics	2	0	2	2	6	2	0	1	3
		Examination Scheme								
		Component	ISE		MSE		ESE		Total	
		Theory	50		50		100		200	
OEEC2		Laboratory	50		--		50		100	

### Pre-requisite Course Codes, if any.

**Course Objective:** Perform end to end forensic investigations. Collect evidence from log files. Understand the importance of time synchronization. How to use typical forensic investigation tools. Follow a scientific approach to investigate network security events and incidents.

### Course Outcomes (CO): At the End of the course students will be able to

OEEC2.1	Classify different cybercrimes and cyber attacks
OEEC2.2	Analyze the risk involved in the critical infrastructures.
OEEC2.3	Create evidence centric procedures and processes To analyze the hardware, software, firmware and tools etc for forensic investigation processes.
OEEC2.4	Develop digital forensics is part of the incident response (IR) capability, as an integral part of information Assurance (IA) and Forensic readiness.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
OEEC2.1	2		2									
OEEC2.2			2									
OEEC2.3					3							
OEEC2.4					3							

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
OEEC2.1							
OEEC2.2							
OEEC2.3							
OEEC2.4							

BLOOM'S Levels Targeted (Pl. Tick appropriate)



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(Autonomous Institute Affiliated to University of Mumbai)

Remember	Understand	Apply	Analyze	Evaluate	Create ✓
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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Fundamentals of Cybersecurity	1,2,3	7
	1.1	Introduction to cyber security - Tenets of Cybersecurity-CIA, Cybercrime, classification of cybercrimes, cyber criminals, various cybercrimes - Phishing, DoS/DDoS, Malware, Ransomware, Virus, Website defacement, scanning & sniffing, SQL injection, Buffer overflow, Session Hijacking, evil twin, wardriving, bluesnarfing, bluebugging, insecure cloud API, Data Breaches in cloud, Abuse of Cloud Services, cyber terrorism etc.		
	1.2	Introduction to critical infrastructure and protection. Classical and Modern Cryptography, Hash functions, MAC, HMAC, Digital Signature, PKI and use cases, Identity and Access Management (IAM), Biometric security, Multi factor authentication, Intrusion detection and prevention - IDS, IPS, Honeypots, Firewall		
2	Title	Cybersecurity Risk Assessment and Management	1,2,3	7
	2.1	Defining security risk, Security risk, Vulnerability assessment (VA), Penetration testing (PT), Network VAPT, Web VAPT, Cloud VAPT.		
	2.2	IT infrastructure and inventory management, threats analysis, risk residue, Risk appetite, computation of risk matrix, Use cases		
3	Title	Introduction to Digital Forensics	4	7
	3.1	Digital Forensics Science (DFS), Forensics and Legal perspective, Phases of Digital Forensics, Cardinal rules of forensics, Chain of custody (CoC), Forensic standards and guidelines,		
	3.2	Computer/Host Forensics, Network Forensics, Memory Forensics (Hard drives, RAM, flash memory, diskettes etc), Mobile/Portable Device Forensics (PDAs, Servers etc.), Live forensics Vs. Traditional forensics, Write blocking, Data imaging and hashing, Device and data acquisition guidelines and best practices, Code Analysis: Review of software for malicious signatures, Network Analysis: Scrutinize network traffic and logs to identify and locate		
4	Title	Advance Forensics: Incident Response Methodology and advance network forensic	4	7
	4.1	Preparation, Detection, Containment, Analysis, Eradication, Recovery and Follow up, Evidence Acquisition and Preservation, Drive and partition recognition in Linux,		



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	Maintaining evidence integrity,		
4.2	Cloud forensics: Access control within three cloud computing service models, Methodology and Evaluation Criteria Catalogue for Digital Forensics in SaaS, PaaS and IaaS, Cloud forensic challenges and Law enforcement. (All these contents should be covered through published research papers)		
6	<b>Self Study</b> Cybersecurity and Digital Forensic Standards		4*
Total			28

- \* Hrs are not counted in total

Laboratory Component, if any (Minimum 10 Laboratory experiments are expected)

Sr. No.	Title of the Experiment
	<b>Preparatory Laboratory:</b> [a] Install and configure Virtual Environment- Virtual Box [b] Select Intrusion Dataset
1	<b>Lab-1A:</b> Network Scanning (nmap), Web Server Vulnerability Scanning (Nikto) and Host scanning (fping) <b>Lab-1B:</b> Network Sniffing (TCPDUMP/Wireshark/tshark/Ettercap), Vulnerability Scanning (nmap ad CVE) and Security Visualization (Etherape)
2	<b>Lab-2A:</b> Infosec Coding using Python Network Socket Programming (Build the port scanner) <b>Lab-2B:</b> Network Scanning, Packet manipulation, Network Attacks using Scapy
3	<b>Lab-3: Backdoor-</b> Network Socket/ File Transfer and Reverse Shell using Netcat
4	<b>Lab-4:</b> Vulnerability Assessment and System Hacking (VAPT) VA-Nessus/OpenVAS and Penetration Testing using Metasploit
5	<b>Lab-5A:</b> Cyber Security and Machine Learning-Intrusion Detection KDDCUP99/NSL-KDD/CIC-IDS2017 dataset <b>Lab5B:</b> Anomaly detection- network traffic analysis using tshark
6	<b>Lab-6:</b> Cryptosystems- PKI using Openssl and pycrypto
7	<b>Lab-7A:</b> Intrusion Detection System (IDS) and Firewalls Snort-NIDS, Logwatch-HIDS, Design and Development Anomaly detection using Simple Event Correlator (SEC) and Integration with Email (Postfix/Sendmail Server) <b>Lab-7B:</b> Security Operation Center (SOC) and Security Event Information Event Management (SIEM): Prelude-SIEM, Snort-NIDS, Suricata-NIDS, Logwatch-HIDS, OSSEC-HIDS, IPTABLES-Firewall and Syslog
8	<b>Digital Forensics: Part-I</b> <b>Lab-8A:</b> Network Forensics using Xplico and tshark <b>Lab-8B:</b> Digital Forensics (Host/Disk) with TCT/Sleuthkit
9	<b>Digital Forensics: Part-II</b>



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	Lab-9A: Memory Forensics using Volatility Lab-9B: Email Forensics using Online utilities
10	Incident Handling and Threat Hunting using ELK

### Text Books

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Security in Computing	Fifth	Charles Pfeeger Shari Pfeeger Jonathan Margulies	Prentice-Hall	2015
2	Effective Cybersecurity Understanding and Using Standards and Best Practices	First	William Stallings	Addison-Wesley	2019
3	Cybersecurity – Attack and Defense Strategies	Second	Yuri Diogenes Erdal Ozkaya	Packt Publications	2019
4	Digital Forensics with Kali Linux Second Edition	Second	Shiva V. N. Parasram	Packt Publications	2020

### Reference Books

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Digital Forensics and Incident Response Second Edition	Second	Gerard Johansen	Packt Publications	2020
2	A Practical Guide to Digital Forensics Investigations	Second	Darren R. Hayes	Pearson	2020



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Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
Open Elective		2	0	2	4	8	2	0	1	3
Examination Scheme										
OEET4	Robotics & Machine Vision Intelligence	Component	I	S	E	M	S	E	Total	
		Theory	50			50		100	200	
		Laboratory	50	--		--	50		100	

Pre-requisite Course Codes, if any.	Microprocessor
<b>Course Outcomes (CO): At the End of the course students will be able to</b>	
OEET4. 1	Classify different types of robot and evaluate coordinate frame transformation
OEET4. 2	Perform direct kinematics analysis of Robot Systems.
OEET4. 3	Relate the electric drive system and smart sensors
OEET4. 4	Extract object features for Representation& Description
OEET4. 5	Demonstrate Vision Guided System

## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Fundamentals of Robotics	I	04
	1.1	Robot Classification, Robot Components, Degrees of freedom		
	1.2	Coordinate frames Fundamental rotation Matrices. Coordinate Frames Transformation, Screw Transformation		
2	Title	Direct Kinematics Analysis	I	08
	2.1	Description of links and joints, Link co-ordinates, Kinematic Modeling of the manipulator, Denavit- Hartenberg Parameters, Manipulator Transformation Matrix - The Arm Matrix		
	2.2	Direct kinematic analysis of Two axis, Three axis and Four Axis articulated Robots.		
3	Title	Electric Drives and Sensors	I	04
	3.1	Electric Drives: Introduction, Types, DC electric motor, AC electric motor, stepper motors, half step mode operation, micro step mode. Types of stepper motors, Direct drive actuation.		
	3.2	Sensors: Introduction: An Introduction to sensors and transducers, Need of sensors in Robotics, Position sensors - optical, non-optical, Velocity sensors, Accelerometers, Proximity Sensors - Contact, non-		



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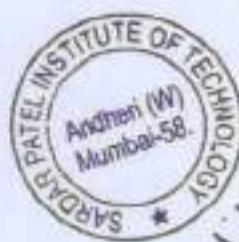
		contact, Range Sensing, touch and Slip Sensors, Force and Torque Sensors.		
4	Title	Image Formation and Camera Models	2	04
	4.1	Pinhole camera model, Perspective projection, Camera model, Camera Calibration, Stereo Vision.		
	4.2	3D reconstruction: Active Method, Passive Method, Stereo vision, Epipolar geometry.		
5	Title	Object Representation and Description	2	04
	5.1	Feature Extraction from images Interest points * Harris detector, Hessian detector, Histogram of Gradient (LoG), Local Binary Pattern(LBP)		
	5.2	Projection vectors, Edge features, Boundary detection, Boundary Descriptors, Regional Descriptors, Chain Code, Fourier descriptors, Statistical Features.		
6	Title	Design of Vision Guided System	2	04
	6.1	Industrial applications of Vision-controlled robotic systems.		
	6.2	Object Detection, Object Classification, Object Recognition, Surveillance, Real Time Monitoring, Human Motion Recognition and Tracking.		
7	Self Study	Direct Kinematics of SCARA Robot, Inverse Kinematics, Robotic operating System (ROS)		
			Total	28

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

OEET4	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
OEET4.1	2	2										
OEET4.2	3	3										
OEET4.3					2							
OEET4.4	3	3										
OEET4.5			3						2	2		1

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

OEET4	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
OEET4.1							
OEET4.2							
OEET4.3							
OEET4.4							
OEET4.5							



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BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	<input checked="" type="checkbox"/> Apply	<input checked="" type="checkbox"/> Analyze	<input checked="" type="checkbox"/> Evaluate	Create
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### Laboratory Component

Sr. No.	Title of the Experiment
1	Coordinate frame transformation
2	Obstacle detection and avoidance*
3	Direct Kinematics
4	Motion Planning*
5	Boundary feature descriptors
6	Hybrid Feature Descriptor : HOG, LBP
7	Sensor based robot system development*
8	Object Detection & Recognition*
9	Object Classification*
10	Guided Vision System Development*

\*Real time implementation using Microcontroller Based System/ TI DSP Boards/Raspberry Pi Boards/ e-Yantra Boards,

### Text Books :

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Fundamentals of Robotics Analysis and Control	1 <sup>st</sup>	Robert J. Schilling	PHI Learning	1990
2	Computer Vision Algorithm and Applications	1 <sup>st</sup>	Richard Szeliski	Springer	2010

### Reference Books :

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Robotics Engineering an Integrated Approach	1 <sup>st</sup>	Richard D. Klafter, Thomas, A. Chmielewski, Michael Negus	Prentice Hall of India Pvt. Ltd.,	1989
2	Engineering Foundation of Robotics	1 <sup>st</sup>	D Francis N-Nagy Andras Siegler	Prentice Hall Inc.	1987
3	Robotics and Image Processing an Introduction	1 <sup>st</sup>	P.A. Janaki Raman	Tata McGraw Hill Publishing company Ltd.	1995
4	Robot Operating System for Absolute Beginners: Robotics Programming Made Easy	1 <sup>st</sup>	Lentin Joseph	Apress	2018



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BHARATIYA VIDYA BHAVAN'S  
SARDAR PATEL INSTITUTE OF TECHNOLOGY  
MUNSHI NAGAR, ANDHERI (W), MUMBAI 400058

Electronics Department

**Subject:** Consumer Electronics  
**Class:** Third Year Engineering, Sem: - VI, Academic Year: - 2021-2022

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(OEI-A)	Consumer Electronics	2	-	2	3	7	2	-	1	3
		Examination Scheme								
		Component		ISE		MSE		ESE		Total
		Theory		50		50		100		200
		Laboratory		50		-		50		100

Pre-requisite Course Codes	Basics of Electrical and Electronics Engineering
	At the end of the successful completion of the course students will be able to
Course Outcomes	CO1 List and classify devices used in consumer products based on their specifications, identify sub-systems of consumer electronic products, also choose and use proper interface standard for a given consumer electronic product
	CO2 Illustrate working principle of consumer electronic products and carry out basic tests to identify their correct operation
	CO3 Experiment with Haptics, Multitouch devices, Device interconnects and peripherals and also suggest modification in consumer electronic product using modern tools to enhance user experience
	CO4 Assemble subsystem of Television set and analyze technology used in audio systems.
	CO5 Demonstrate working principle of Healthcare and home electronics consumer products.
	CO6 Demonstrate working principle consumer electronic products used in Occupational safety.

Module No.	Unit No.	Topics	CO	Ref.	Total Hrs.
1	1.1	Introduction to consumer Electronic Haptics and Multi-touch Devices: Introduction to Touch panel, Capacitive Touch screen, Light pen.	CO1, CO3	4	04
	1.2	Displays for Consumer Electronics: OLED Display,			



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		Alphanumeric Display, LED Display, LCD Display,			
2	2.1 2.2	Device Interconnects and Peripherals Introduction to Serial Interfaces, RS-232, I2C, SPI, USB. Introduction to ZIG-BEE Standards, WI-FI, Bluetooth, Thunderbolt, JTAG and various Interconnection standards	CO3	3	04
3	3.1 3.2	Interactive and Immersive TV Introduction to PAL TV System, NTSC TV System, SECAM TV System. Advanced Television System: High Definition TV, 3D-TV.	CO4	1	04
4	4.1 4.2	Audio System Technologies and Home electronics Introduction to Audio system and major components of Audio System. Introduction to Home Electronics, Microwave Oven, Refrigerator, AirConditioning System, Washing Machine.	CO2, CO4	1	04
5	5.1 5.2 5.3	Healthcare Electronics Wearable Devices: Activity Trackers, Smart Watch, Smart Glass. Fitness Devices: Blood Pressure Monitor, Digital Weighing Scale, Digital Glucometer. Biomedical Devices: ECG Sensor, EKG Sensor, EMG Sensor, Respiratores.	CO5	5	06
6	6.1 6.2 6.3	Consumer Electronics used in Occupational Safety Printers, Scanners, Projection System. Bio-metric Devices: Finger Print Scanner, IRIS Scanner. Security Devices: CCTV, Electronics Lock, Video Intercom System, Doorbell.	CO6	2	06
*Self study	<b>Study of</b> Virtual Reality, Digital Satellite TV, 4K TV, Microphone, Loudspeaker, Noise Cancelling Headphones.		Total (*Not included)	28	

#### Teaching Learning Methodology in Laboratory: Role Play Model



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- a) **Instructor:**  
 Responsibilities: Explanation of theoretical background  
 To provide required sample formats  
 To guide students in identification of appropriate online material.  
 Supervision and assessment of the overall activity
- b) **First Group of students : Customer**  
 Responsibilities: To finalize specifications of instrument to be purchased Prepare request for quotations  
 Prepare the comparative statement  
 Preparation for purchase order
- c) **Second Group of students: Manufacturer/Vendor**  
 Responsibilities: To maintain the specifications of the manufactured instruments To submit quotations including all applicable taxes  
 To prepare invoice as per purchase order
- a) **Third Group of Students: Sales/Service Engineer**  
 Responsibilities: To demonstrate capabilities of various instruments and convince customer to purchase a particular instrument  
 To prepare Delivery Challan  
 Install the instruments and prepare Installation Report, Demonstrate all the functions and uses of the instrument

Expt. No.	Suggested list of Experiments
1	Experiment on Haptics and Multi-touch devices.
2	Experiment on Device interconnects and Peripherals (USB and Bluetooth).
3	Experiment on assembly of parts used in Television set.
4	Experiment on Audio system technology.
5	Experiment on Home electronics Consumer products.
6	Experiment on Wearable and fitness devices.
7	Experiment on Biomedical data acquisition devices.
8	Experiment on occupational safety in electronic devices.



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**References:**

1. S. P. Bali; "Consumer Electronics", Pearson Education, 1<sup>st</sup> Edition, 2005
2. Peter H. Gregory; "Biometrics for Dummies", Wiley Publishing Inc., 2008.
1. N. Mathivanan, "PC Based Instrumentation: Concepts and Practices", Prentice HallLearning India Pvt. Ltd., 1<sup>st</sup> Edition, 2007.
2. Deborah Morley, "Understanding Computers: Today and Tomorrow", Course Technology, 16<sup>th</sup> Edition, 2016.
3. Sanjay Mishra, "Wearable Android: Android Wear and Google FIT App Development", Wiley Blackwell publication, 1<sup>st</sup> Edition, 2015.



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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics Engineering

Undergraduate Program

2021-22

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
Electromagnetic Waves	ET304	2021-22	68
Java Programming Lab	ET305	2021-22	50
Real Time Operating Systems	IT13	2021-22	100
Speech and Audio Processing	IT21	2021-22	100



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS ENGINEERING

Academic Year: 2020 – 2021

### Theory Course Revision Report

Course Name: Electromagnetic Waves

Course Code Old (2019-20): Electromagnetic Engineering (EL54)

Course Code New (Autonomy 2019-20): ET304

Class and Semester in Old Syllabus: TE ETRX SEM V

Class and Semesters in New Syllabus: TE ETRX SEM V

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	<b>Module 4: Waveguide</b> Wave propagation in parallel plane waveguide (No derivation expected), Analysis of waveguide general approach (No derivation expected), in Waveguide. Rectangular waveguide, Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization, Attenuation	In the discussion it was found that the topic is very important considering the name of the subject Electromagnetic Waves which was previously Electromagnetic Engineering. It is also there in the GATE syllabus.	68% Change in syllabus. (Practical 20 hours included hence 42/62)
2	<b>Module 6: (Self Study) Applications of Electromagnetics</b> Xerography, Laser printer, Faraday's cage, lightning, RF MEMS, Magnetic levitation, Meta materials, RFID, Stealth aircraft, remote sensing, radio astronomy, EMI and Electromagnetic Compatibility, Different types of antenna	In the discussion it was suggested that the "Applications of Electromagnetic Waves" should be known to the students and hence should be given as a self-study.	
3	Laboratory experiments are also included in the syllabus.	Lab experiment decided to include. Using simulation experiments it will become easy to understand the concept.	

Text Books :



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S. N.	Title	Edition	Authors	Publisher	Year
1	Electromagnetic Waves	Third	R.K. Shevgaonkar	Tata McGraw Hill	2009
2	Principles of Electromagnetics	Sixth	Matthew N.O. Sadiku	Oxford International Student	2015

**Reference Books :**

S. N.	Title	Edition	Authors	Publisher	Year
1	Engineering Electromagnetics	Third	W.H. Hayt, and J.A. Buck	McGraw Hill	2006
2	Electromagnetic Waves and Radiating Systems	Second	Edward C. Jordan and Keth G. Balmain	Pearson Publications	2006
3	Engineering Electromagnetics	Third	Nathan Ida	Springer Publications	2015
4	Antennas & Wave Propagation	Fourth	J.D. Kraus, R.J. Marhefka, and A.S. Khan	McGraw Hill	2011

**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department
1	Dr. Deepak Karia	Electronics
2	Dr. Sukanya Kulkarni	Electronics and Telecommunication
3	Prof. Pallavi Malme	Electronics and Telecommunication
4	Prof. G. T. Haldankar	Electronics

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## ELECTRONICS ENGINEERING

Academic Year: 2021-2022

### Lab Course Revision Report

Course Name: Java Programming Lab

Course Code Old (20 - ):

Course Code New (Autonomy 20 - ):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly introduced course to IE	As per the industry requirement	50 %
2			
3			
4			

#### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1			
2			
3			
4			



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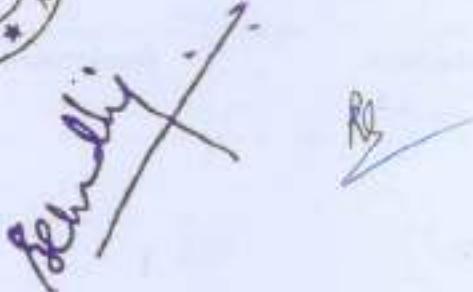
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Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dayanand Ambawade	EXTC	
2	G. T. Haldankar	EXTC	
3			
4			

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



  
J. S. Patel

  
R. C.



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**ELECTRONICS ENGINEERING DEPARTMENT**

Academic Year: 2021– 2022

**Theory Course Revision Report**

**Course Name:** Real time Operating System

**Course Code Old (2019-20):** ELL63 (Fundamentals of Operating system lab) & ELE81C (Electronics System Design)

**Course Code New (Autonomy 2020-21):** IT13

**Class and Semester in Old Syllabus:** TE, SEM-VI, B.E, Sem-VIII

**Class and Semesters in New Syllabus:** BE, Sem-VII

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Task / Process Management	Task communication is required	
2	Memory Management	To write program in secure environment	100%
3	Case Studies of RTOS and its comparison	Case studies give real time implementation of concepts	(As new subject introduced in sem VII with addition done in prerequisites and next sem subjects)

**Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)**

1. University of Texas: [http://users.ece.utexas.edu/~gerstl/ee445m\\_s19/syllabus.html](http://users.ece.utexas.edu/~gerstl/ee445m_s19/syllabus.html)
2. <https://www.cse.iitb.ac.in/~cs684/>
3. <https://erp.iitkgp.ac.in/ERPWebServices/curricula/CurriculaSubjectsList.jsp?stuType=PG&sp1Code=ATI>
4. <https://www.udemy.com/course/introduction-to-rtos>

**Committee members Name & Signature:**

1. Dr. Surendra Rathod (Coordinator)
2. Prof. Priya Deshpande

**\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100**





# Sardar Patel Institute of Technology

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14-20

Speech &  
audio  
processing

## ELECTRONICS ENGINEERING

Academic Year: ~~2021-2022~~ 2019 - 2020

### Theory Course Revision Report

Course Name: **Speech & Audio Processing**

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	New Content introduced.	New Course .	1W 1.
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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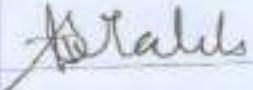
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## Sardar Patel Institute of Technology

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### Details of Committee members Name & Signature:

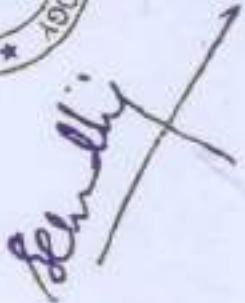
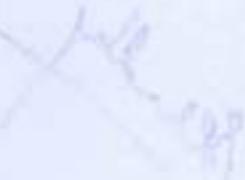
Sr. No.	Name of committee members	Department	Signature
1	K. T. Talele	EE&RX	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100







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**B. Tech. ETRX**

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
PC	Electromagnetic Engineering	3	0	2	6	11	3	0	1	4
Examination Scheme										
ET304		Component		ISE		MSE		ESE		Total
		Theory		75		75		150		300
		Laboratory		50		—		50		100

Pre-requisite Course Codes, if any.	MA101: Engineering Calculus MA102: Differential Equations and Complex Analysis MA201: Linear Algebra
Course Objective:	To teach fundamentals of Electromagnetic Waves
Course Outcomes (CO):	<i>At the end of the course students will be able to</i>
ET304.1	Apply basic laws of electromagnetic and Maxwell's equations.
ET304.2	Illustrate the behavior of EM waves and travelling of waves in free space as well as media.
ET304.3	Solve problems related to the propagation of electromagnetic waves.
ET304.4	Discuss the types of antennas and their parameters.
ET304.5	Discuss types of radio wave propagation.
ET304.6	Design applications using Electromagnetic Waves theory.

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ET304.1	1	1	2		2					3		
ET304.2	1	1	2		2					3		
ET304.3	1	1	2		2					3		
ET304.4	1	1	3		2					1		
ET304.5	1	1	2		2					2		
ET304.6	1	1	3		2					2		3

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PSO1	PSO2	PSO3
ET304.1		2			2	
ET304.2		2			2	
ET304.3		2			2	
ET304.4		2			2	
ET304.5		2			2	
ET304.6		1			1	



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### B. Tech. ETRX

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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#### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Coordinate system transformation and vector calculus		
	1.1	Cartesian, cylindrical and spherical coordinate, Differential length, area and volume, line surface and volume integrals.	2	3
	1.2	Del Operator, Gradient of scalar, Divergence of a vector and Divergence Theorem, Curl of a Vector and Stoke's Theorem, Laplacian Theorem, Classification of a Vector Field.		
2	Title	Basic Laws of Electromagnetic and Maxwell's Equations	1	9
	2.1	Coulombs law, Electric fields due to continuous charge distributions, Gauss law and its applications, Electric potential (Magnetic vector potential and Electrical Scalar Potential), relationship between E and V, Poisson and Laplace equations, Bio-Savarts law, Amperes law.		
	2.2	Boundary conditions for static electric and magnetic fields		
	2.3	Faradays Law, Displacement current, Maxwell's Equations: Integral and differential form for static and time varying fields and its interpretation		
3	Title	Electromagnetic Wave Propagation	1,2	9
	3.1	Wave equation: Derivation and its solution in Cartesian co-ordinates.		
	3.2	Solution of wave equations: Partially conducting media, perfect dielectrics and good conductors, Concept of Skin Depth.		
	3.3	Electromagnetic Power: Poynting Vector and power flow in free space and in dielectric, conducting media.		
	3.4	Polarization of wave: Linear, Circular and Elliptical.		





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### B. Tech. ETRX

3	Write a program that displays the distribution of the electric potential due to an electric dipole with a moment located at the origin of a spherical coordinate system.
4	Numerical Integration and Calculating the Electric Field from a Ring of Charge.
5	3-D and 2-D radiation patterns of a Hertzian dipole using MATLAB/Python.
6	<b>Antenna parameters</b> Visualization of a wireless system with two antennas. Radiation patterns of a small loop antenna. Radiation patterns of a quarter-wave monopole.
7	<b>Waveguide:</b> Verify the relationship between wavelength of an EM wave in air and inside a rectangular waveguide.
8	Simulating the Two-ray Propagation Model in any simulation platform or Python.
9	<b>Using Virtual Lab:</b> Introduction to Smith chart and its application for the unknown impedance measurement using virtual lab IIT K
10	Measurement of Frequency and wavelength of a waveguide using Microwave bench setup.
11	Using Virtual Lab: Study of field pattern of various modes inside a rectangular waveguide using virtual lab IIT K
12	<b>Case Study-</b> The student is required to develop a simple tool to carry out unit conversions that are associated with EM-related calculations.

#### Text Books :

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Electromagnetic Waves	Third	R.K. Shevgaonkar	Tata McGraw Hill	2009
2	Principles of Electromagnetics	Sixth	Matthew N.O. Sadiku	Oxford International Student	2015

#### Reference Books:

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Engineering Electromagnetics	Third	W.H. Hayt, and J.A. Buck	McGrawHill	2006
2	Electromagnetic Waves and Radiating Systems	Second	Edward C. Jordan and Keith G. Balmain	Pearson Publications	2006
3	Engineering Electromagnetics	Third	Nathan Ida	Springer Publications	2015
4	Antennas & Wave Propagation	Fourth	J.D. Kraus, R.J. Marhefka, and A.S. Khan	McGrawHill	2011



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**B. Tech. ETRX**

	3.5	Propagation in different media: Behavior of waves for normal and oblique incidence in dielectrics and conducting media.		
4	Title	Waveguide	1,2	6
	4.1	Wave propagation in parallel plane waveguide (No derivation expected), Analysis of waveguide general approach (No derivation expected), in waveguide.		
	4.2	Rectangular waveguide, Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization, Attenuation.		
5	Title	Transmission Lines	1,2	9
	5.1	Power frequency lines: Representation, losses and efficiency in power lines, effect of length, calculation of inductance and capacitance.		
		Radio frequency lines: Representation, propagation constant, attenuation constant, phase constant, group velocity, input impedance, characteristic impedance, trade-off between attenuation and power transfer, reflection coefficient, standing wave ratio, VSWR, ISWR, ABCD parameters of transmission line.		
6	5.2	Smith Chart: Impedance locus diagram, impedance matching.		
	Title	Applications of Electromagnetics	2,3	6
	Self-Study	Xerography, Laser printer, Faraday's cage, lightning, RF MEMS, Magnetic levitation, Metamaterials, RFID, Stealth aircraft, remote sensing, radio astronomy, EMI and Electromagnetic Compatibility, Different types of antennas.	1,2,6	06
Total				42

Laboratory Component, if any. (Minimum 10 Laboratory experiments are expected)

Sr. No.	Title of the Experiment
1	<b>Basic operations on scalar and vectors</b> Working with Numbers: Scalars and Vectors using any simulation platform or Python. Working with Complex Numbers using any simulation platform or Python. Working with Matrices using any simulation platform or Python.
2	<b>Curl and Divergence</b> Numerical Computation of Divergence and Curl. Numerical Computation of Divergence and Curl for a Current Carrying Wire.





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**B. Tech. ETRX**

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(SBC)		0	1	2	1	4	0	1	1	2
Examination Scheme										
ET305	Java Programming Lab	Component	ISE (%)			MSE (%)	ESE (%)		Total	
		Theory	100*			--	--		100	
		Laboratory	50			--	50*		100	

**Pre-requisite Course Codes, if any.** CS101: Problem Solving using Imperative Programming  
CS102: Problem Solving using OOPs

**Course Objective:** To learn Object-Oriented programming paradigm using Java programming language.

**Course Outcomes (CO):** At the end of the course students will be able to

- ET305.1 Demonstrate programming using basic constructs of JAVA.
- ET305.2 Apply Inheritance and polymorphism for a given scenario.
- ET305.3 Apply abstraction and exception handling to create an efficient program.
- ET305.4 Use Generic classes and collection for solving problem.
- ET305.5 Develop a mini project based on the real-world problem.

Note:

\*= Tutorial-50 marks and Mini Project-50 marks (Preferably based on real-world problem statement from Industry/Academia/Research)

#= oral exam-20 marks and Lab experiment-30 marks

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ET305.1	3				2							2
ET305.2	2				2							2
ET305.3	2				2							2
ET305.4	2				2							2
ET305.5	2	1	1	1	2	1			2	2	,	2

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PSO1	PSO2	PSO3
ET305.1		2		2		
ET305.2		2		2		
ET305.3		2		2		
ET305.4		2		2		
ET305.5		2		2		



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**B. Tech. ETRX**

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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**Theory Component**

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Introduction to JAVA</b>	1,2,3	3
	1.1	Fundamentals of Java Programming: Classes, JDK, JRE, JVM, Unicode system, I/O using Scanner class and BufferedReader class.		
	1.2	Instance variables, Methods, Constructors.		
	1.3	Object class, Nested class, Access Specifiers, Abstract Classes and Wrapper Classes.		
2	Title	<b>OOP Concepts Mapping to JAVA</b>	1,2,3	4
	2.1	Inheritance (IS – A), Aggregation & Composition (Has – A) Method overloading & overriding, this, super, final keyword, Static.		
	2.2	Autoboxing and Unboxing, Polymorphism.		
	2.3	Packages and Interfaces: Package concept, creating user defined package, Access control protection, Interface.		
3	Title	<b>Exception Handling and Multithreading</b>	1,2,3	4
	3.1	Try and catch block, Multiple catch block, Nested try, finally block, Throw, Throws keywords, Exception propagation, Custom exception.		
	3.2	Create thread using Thread and Runnable class. Thread methods, schedule, sleep, join, Thread priority, Thread group, perform multiple tasks using multiple thread Thread synchronization.		
4	Title	<b>Generics and Collection</b>	1,2,3	3
	4.1	Creating Generic Classes, Generic Methods, Bounded Type		
	4.2	Collection's framework, methods of collection interface (ArrayList, Linked list, Queue etc.)		
				Total 14

**Laboratory Component, if any.**

Sr. No	Title of the Experiment
1	Program on I/O using command line arguments, scanner class, BufferedReader etc.
2	Program on Constructor, types of constructors and constructor overloading.
3	Program on Polymorphism, Runtime polymorphism.
4	Program on Inheritance, Abstract Class, Interface.



*Revised by [Signature]*



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**B. Tech. ETRX**

5	Program on Nested Class, Aggregation, Composition.
6	Program on Multithreading.
7	Program on Exception Handling (built in and User defined)
8	Program on Package and access modifiers.
9	Program on Generics
10	Program on Collection

**Textbooks**

Sr. No	Title	Edition	Authors	Publisher	Year
1	Java Programming From the Ground Up	First	Ralph Bravaco, Shai Simoson	Tata McGraw-Hill	2009
2	Java The Complete Reference	Eleventh	Herbert Schildt	Tata McGraw-Hill	2019

**Reference Books**

Sr. No	Title	Edition	Authors	Publisher	Year
1	An introduction to Programming and Object Oriented Design using Java	Third	Jaime Nino, Frederick A. Hosch	Wiley Student Edition	2008
2	Java Programming A Practical Approach	First	C Xavier	Tata McGraw-Hill	2011
3	Java™ Programming Language	Fourth	Ken Arnold, James Gosling, David Holmes	The (Java Series) by Sun	2005



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)						Credits Assigned			
		L	T	P	O	E	L	T	P	Total	
PE-I		2	0	2	8	8	2	0	1	3	
Examination Scheme											
EC321 (IT21)	Speech and Audio Processing	Component	ISE		MSE		ESE		Total		
		Theory	50		50		100		200		
		Laboratory	50		—		50		100		

Pre-requisite Course Codes, if any. EC303: Digital Signal Processing

Course Objective: To familiarize the basic & advance mechanisms of speech and audio processing.

Course Outcomes (CO): At the end of the course students will be able to

- EC321.1 Apply concepts of speech coding.
- EC321.2 Analyze Audio Perception& psycho-acoustic model.
- EC321.3 Demonstrate parametric representation, time domain & frequency domain representation of speech.
- EC321.4 Analysis of predictive methods of speech.
- EC321.5 Develop systems for various applications of speech & audio processing.

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC321.1	2											
EC321.2		2										
EC321.3			2									
EC321.4				2								
EC321.5					2							

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PSO1	PSO2	PSO3
EC321.1	2			2		
EC321.2	2			2		
EC321.3		2			2	
EC321.4		2			2	
EC321.5		2			2	

BLOOM'S Levels Targeted (Pl. Tick appropriate)



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Remember	Understand	Apply	Analyze	Evaluate	Create
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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Mechanics of speech</b>		
	1.1	Speech production: Mechanism of speech production, Acoustic phonetics – Digital models for speech signals -Sampling speech signals, basics of quantization, delta modulation, and Differential PCM	1,2	8
	1.2	Signal Processing Models of Audio Perception: Basic anatomy of hearing System. Auditory Filter Banks, Psycho-acoustic analysis: Critical Band Structure, Absolute Threshold of Hearing, Simultaneous Masking, Temporal Masking, Quantization Noise Shaping, MPEG psycho-acoustic model.	1,2	
2	Title	<b>Time domain methods for speech processing</b>		8
	2.1	Time domain parameters of Speech signal – Methods for extracting the parameters Energy, Average Magnitude, zero crossing Rate – Silence Discrimination using ZCR and energy	1,2	
	2.2	Short Time Auto Correlation Function – Pitch period estimation using Auto Correlation Function.	4	
3	Title	<b>Frequency domain method for speech processing</b>	1,2	8
	3.1	Short Time Fourier analysis: Fourier transform and linear filtering interpretations.	4	
	3.2	Sampling rates - Spectrographic displays - Pitch and formant extraction - Analysis by Synthesis - Analysis synthesis systems: Phase vocoder, Channel Vocoder.	2,3	
	3.3	Homomorphic speech analysis: Cepstral analysis of Speech, Formant and Pitch Estimation, Homomorphic Vocoder, Speech coding, speech enhancement.	3,5	
4	Title	<b>Linear predictive analysis, synthesis of speech</b>	3,5	4
	4.1	Basic Principles of linear predictive analysis – Auto-correlation method – Covariance method.		
	4.2	Solution of LPC equations – Cholesky method – Durbin's Recursive algorithm.		
	4.3	Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP, Speech synthesis: basics of articulatory, source-filter, and concatenative synthesis – VOIP.		
5	Self Study	Audio compression methods, Audio quality analysis, Spatial Audio Perception and rendering, Speaker identification and verification		



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## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Total 28

### Laboratory Component

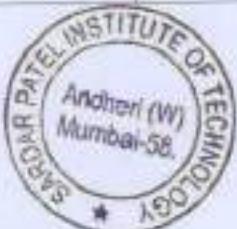
Sr No.	Experiment Title
1	Speech production
2	Analysis of speech signal
3	Short-time spectrum analysis of speech
4	Spectrographic analysis of speech
5	Linear prediction analysis of speech
6	Formant synthesis
7	Cepstral analysis of speech
8	Analysis by synthesis of speech
9	Manual speech signal-to-symbol transformation
10	Speaker Analysis /speaker recognition

### Text Books :

Sr. No	Title	Edition	Authors	Publisher	Year
1	Speech Communications: Human & Machine	Second	Douglas O'Shaughnessy	IEEE Press, Hardcover 2/e, ISBN: 0780334493,	1999
2	Discrete-Time Speech Signal Processing	First	Thomas F. Quatieri,	Prentice Hall /Pearson Education	2004

### Reference Books:

Sr. No	Title	Edition	Authors	Publisher	Year
1	Speech Processing and Synthesis Toolboxes	First	Donald G. Childers	John Wiley & Sons, September ISBN:0471349593	1999
2	Fundamentals of Speech Recognition	First	L.R. Rabiner and B. H. Juang	Prentice Hall	2009
3	Speech and Audio Signal Processing	Second	Ben Gold and Nelson Morgan	John Wiley and Sons Inc., Singapore	2011
4	Discrete Time Processing of Speech Signals	First	J.R. Deller, J.H.L. Hansen and J.G. Proakis	John Wiley, IEEE Press	1999
5	Digital Processing of Speech Signals	First	L.R. Rabiner and R.W. Schaffer	Prentice Hall	1979



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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics Engineering

Undergraduate Program

2020-21

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
Electronic Devices	ET202	2020-21	54
Analog circuits	ET205	2020-21	88.99
Microcontrollers	ET206	2020-21	51.19
Signals and Systems	ET207	2020-21	62



# Sardar Patel Institute of Technology

Bhatia Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS ENGINEERING

Academic Year: 2019 – 2020

### Theory Course Revision Report

Course Name: Electronic Devices

Course Code Old (2018-19): EL31: Analog Electronics-I

Course Code New (Autonomy 2019-20): E T 202

Class and Semester in Old Syllabus: S.E-III

Class and Semesters in New Syllabus: S.E-III

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	DC and AC analysis of FET	Application of FET Suggestions given by stake holders to include problems solving in the syllabus along with theory	30/42*100= 71%
2	DC and AC analysis of MOSFET	Application of MOSFET Suggestions given by stake holders to include problems solving in the syllabus along with theory	
3	Frequency response and multistage amplifier	Analysis of applications of devices	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- [1.https://manipal.edu/content/dam/manipal/mu/mit/documents/CO\\_Electrical%20&%20Electronics.pdf](https://manipal.edu/content/dam/manipal/mu/mit/documents/CO_Electrical%20&%20Electronics.pdf)
- [2.https://drive.google.com/file/d/1nqSUDm1\\_iatP\\_udGZzYX\\_NC5YFpL9O-ow/view](https://drive.google.com/file/d/1nqSUDm1_iatP_udGZzYX_NC5YFpL9O-ow/view)

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Manisha Bansode	ETRX	
2	Dr. Reena Sonkusare	EXTC	

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Uday Pandit	EXTC (SFIT)	

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

Bhavani's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS ENGINEERING

Academic Year: 2019 – 2020

### Lab Theory Course Revision Report

Course Name: Electronic *Per class* Laboratory

Course Code Old (2018-19): ELL31: Analog Electronics-I Laboratory

Course Code New (Autonomy 2019-20): ELL31

Class and Semester in Old Syllabus: S.E-III

Class and Semesters in New Syllabus: S.E-III

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	AC analysis of FET/MOSFET	To validate theoretical concepts	
2	Fault identification	To map PSO2	3/8*100= 37.5%

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- [1.https://manipal.edu/content/dam/manipal/mu/mit/documents/CO\\_Electrical%20&%20Electronics.pdf](https://manipal.edu/content/dam/manipal/mu/mit/documents/CO_Electrical%20&%20Electronics.pdf)
- [2.https://drive.google.com/file/d/1noSUDmltarP\\_udGZzYX\\_NCSYFpl9O-ow/view](https://drive.google.com/file/d/1noSUDmltarP_udGZzYX_NCSYFpl9O-ow/view)

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Manisha Bansode	ETRX	
2	Dr. Reena Sonkusare	EXTC	

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Uday Pandit	EXTC (SFIT)	

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

Note:  $71\% + 37.5\% = 108.5\% = 54\%$

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# Sardar Patel Institute of Technology

Bhavani Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS ENGINEERING

Academic Year: 2019 – 2020

### Theory Course Revision Report

#### Analog Circuits

Course Name: Electronic Circuit Design-II

Course Code Old (2018-19): EL41: Analog Electronics-II

Course Code New (Autonomy 2019-20): ET 205

Class and Semester in Old Syllabus: S.E-IV

Class and Semesters in New Syllabus:S.E-IV

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	<ul style="list-style-type: none"> <li>✓ Fundamentals of Operational Amplifier</li> <li>✓ Linear Applications of Operational Amplifier</li> <li>✓ Non-Linear Applications of Operational Amplifier</li> <li>✓ Data Converters</li> <li>✓ Special Purpose Integrated Circuits</li> <li>✓ Voltage Regulators</li> </ul>	Syllabus of linear integrated circuit is included as per need of industry	38/42*100= 90.48%

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1 [https://manipal.edu/content/dam/manipal/mu/mit/documents/CO\\_Electrical%20&%20Electronics.pdf](https://manipal.edu/content/dam/manipal/mu/mit/documents/CO_Electrical%20&%20Electronics.pdf)
- 2 [https://drive.google.com/file/d/1n0SUDmLtatP\\_udGZzYX\\_NCSYFpL9O-ow/view](https://drive.google.com/file/d/1n0SUDmLtatP_udGZzYX_NCSYFpL9O-ow/view)

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Payal Shah	ETRX	
2	Dr. Reena Sonkusarc	EXTC	

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Uday Pandit	EXTC (SFIT)	

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

Bhavani's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS ENGINEERING

Academic Year: 2019 – 2020

### Lab Theory Course Revision Report

#### Analog Circuits

Course Name: E

Course Code Old (2018-19): ELL41: Analog Electronics-II

Course Code New (Autonomy 2019-20): ET 205

Class and Semester in Old Syllabus: S.E-IV

Class and Semesters in New Syllabus: S.E-IV

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Experiments based on validation and implementation of Fundamentals of Operational Amplifier, Linear Applications of Operational Amplifier, Non-Linear Applications of Operational Amplifier, Data Converters, Special Purpose Integrated Circuits, Voltage Regulators are included	Syllabus of linear integrated circuit is included as per need of industry hence experiments are designed based on the syllabus	7/8*100= 87.5%

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. [https://manipal.edu/content/dam/manipal/mu/mit/documents/CO\\_Electrical%20&%20Electronics.pdf](https://manipal.edu/content/dam/manipal/mu/mit/documents/CO_Electrical%20&%20Electronics.pdf)

2. [https://drive.google.com/file/d/1noSUDmLtatP\\_udGZzYX\\_NC5YFpL9O-ow/view](https://drive.google.com/file/d/1noSUDmLtatP_udGZzYX_NC5YFpL9O-ow/view)

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Payal Shah	ETRX	
2	Dr. Reena Sonkusare	EXTC	

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Uday Pandit	EXTC (SFIT)	

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

$$\text{N.D.R. : } \frac{90.48 + 87.5}{177 - 78} = 88.99\%$$





# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS ENGINEERING

Academic Year: 2020-21

### Theory Course Revision Report

#### Microcontrollers

Course Name:

Course Code Old (2019-20): ELL52: Micro-Architecture

Course Code New (Autonomy 2019-20): ET206

Class and Semester in Old Syllabus: TE ETRX Sem V

Class and Semesters in New Syllabus: SE ETRX Sem IV

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Fundamentals of Embedded System	As subject name suggest the fundamentals of embedded system should be added first	22/42*100 = 52.38%
2	ARM7IDMI(ARMv4T) Architecture	It was not detailed studied in electronic system design in final year. So, the detailed ARM architecture is added in the syllabus	
3	LPC2148 ARM7 Processor Programming and Interfacing	IV semester has the minor projects so students should have programming and interfacing knowledge of ARM	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. Microprocessor and Microcontroller Syllabus by IIT Kharagpur by Prof. Shantanu Chattopadhyay

#### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Priya Deshpande	ETRX	
2	Prof. M.M Parmar	EXTC	





**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

**ELECTRONICS ENGINEERING**

**Academic Year: 2020 – 2021**

**Lab Course Revision Report**

Course Name: Microcontrollers Laboratory

Course Code Old (2019-20): ELL52: Micro-Architecture Laboratory

Course Code New (Autonomy 2019-20): ET206

Class and Semester in Old Syllabus: TE ETRX Sem-V

Class and Semesters in New Syllabus: SE ETRX Sem-IV

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Programming ADC with 8051	Students should know the difference between on chip and off chip interfacing with IC	4/8 *100 = 50%
2	Programming on chip Resources with LPC2148	Syllabus has theory concepts of ARM which should be learned handson during laboratory	

**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Prof. Priya Deshpande	ETRX	
2	Prof. M.M Parmar	EXTC	

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1	Mr. Govind Gaundalkar	Microdevice Technologies	

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100

Note:  $52.38\% + 50\% = 51.19\%$





# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

**Electronics Engineering**  
**And**  
**Electronics And Telecommunication Engineering Department**  
**Academic Year: 2020– 2021**  
**Theory Course Revision Report**

Course Name: Signals and Systems

Course Code Old (2019-20): ET207/EC207

Course Code New (Autonomy 2020-21): EC207

Class and Semester in Old Syllabus: S.E. EXTC & ETRX, Sem-IV

Class and Semesters in New Syllabus: S.E. EXTC & ETRX, Sem-IV

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Design of Ideal Analog filter, Butterworth Low Pass Filter (LPF) design, Butterworth High Pass Filter (HPF) design, Butterworth Band Pass Filter (BPF) and Band Reject Filter design, Pole zero plot of Butterworth filters, Magnitude Spectrum	The course covers analysis and design of continuous time signals and systems. Analysis of system using Laplace Transform was part of course which is not changed. The knowledge of filter design is introduced in new course which is a pre-requisite for digital filter design in the DSP course (of Sem V).	23.80 %
2	Equiripple Filters, Chebyshev Type-I LPF, HPF Design, Pole zero plot of Chebyshev filter, magnitude spectrum.	Two examples of analog filter are included: Butterworth filter design & Chebyshev filter design.	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. [https://www.iithbs.ac.in/curriculum\\_doc/ece\\_bttech.pdf](https://www.iithbs.ac.in/curriculum_doc/ece_bttech.pdf)
2. [https://www.siue.edu/~gengel/ece428WebStuff/ece428\\_syllabus.pdf](https://www.siue.edu/~gengel/ece428WebStuff/ece428_syllabus.pdf)

Dates of meeting conducted for Syllabus revision:

1. 12<sup>th</sup> July 2020

2.

Committee members Name & Signature:

1. Prof. K. T. Talele (Convenor)
2. Dr. Reena Sonkusare
3. Prof. Amol Deshpande

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100  
=(10/42)\*100 = 23.8 %





# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

## Electronics Engineering

And

## Electronics And Telecommunication Engineering Department

Academic Year: 2020 – 2021

### Lab Course Revision Report

Course Name: Signals and Systems Laboratory

Course Code Old (2019-20): N.A.

Course Code New (Autonomy 2020-21): EC207

Class and Semester in Old Syllabus: S.E. EXTC & ETRX, Sem-IV

Class and Semesters in New Syllabus: S.E. EXTC & ETRX, Sem-IV

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Representation of Signals	To understand practical aspect of the course, laboratory experiments are introduced.	100%
2	Operations on Signals		
3	Convolution on Continuous Time Signals		
4	Synthesis of signals using Fourier Series		
5	Synthesis of signals using Fourier Transform		
6	Analysis of LTI system using Laplace Transform		
7	Plotting of frequency spectrum		
8	Butterworth filter design		
9	Chebyshev filter design		
10	Miniproject: Analysis of real world signals		

#### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. K. T. Talele (Convenor)	ETRX	
2	Dr. Reena Sonkusare	EXTC	
3	Prof. Amol Deshpande	EXTC	

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100

$$\text{Note: } 23.8\% + 100\% = 123.8/2 = 62\%$$



ETR  
19/20  
20-21

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET202	Electronic Devices	03	--	--	03	--	--	03
		Examination Scheme						
		ISE	MSE	ESE	Total			
		20	20	60	100			

Pre-requisite Course Codes		ES13 (Basic Electrical Technology) BS22 (Engineering Physics)					
After successful completion of the course, student will be able to							
Course Outcomes	CO1	Describe semiconductor devices through energy band diagrams					
	CO2	Analyze the characteristics of semiconductor junctions					
	CO3	Differentiate between bipolar and unipolar conduction					
	CO4	Discuss working principle of semiconductor devices					
	CO5	Illustrate DC and AC analysis of single stage FET and MOSFET amplifier circuits					
	CO6	Analyze multistage amplifier circuits					

Module No.	Unit No.	Topics	Ref.	Hr
1	1.1	<p><b>Applications of Diode:</b> Simple diode model, Limiter circuits, Rectifiers, Clamper Circuits, Peak Detector and Voltage Doubler</p> <p><b>Metal semiconductor and Semiconductor Heterojunctions:</b> <b>Schottkey barrier diode:</b> qualitative characteristics, Ideal junction properties, Nonideal effects on barrier height, V-I characteristics</p> <p><b>Metal-semiconductor Ohmic Contacts:</b> Ideal Non rectifying barriers, Tunneling Barrier, Specific contact resistance</p> <p><b>Heterojunctions:</b> Heterojunction materials, Energy Band Diagrams, Two dimensional electron gas</p> <p><b>Self-Learning:(Only ISE(NO ESE)will be conducted)</b> <b>Carrier Statistics and Transport</b> <b>Semiconductors, Electron Density, Hole Density, Temperature Dependence of intrinsic concentration, Position of Fermi Level, Computation of n and p, Drift current, Diffusion Current, Generation, Recombination and Continuity Equation</b> <b>Junction Analysis</b> <b>PN Junction Diode:</b> Basic Structure, Band Diagrams, Zero Applied Bias, Reverse Applied Bias, PN Junction current, Small</p>	1,3	6



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		<p><i>signal model of PN junction, Generation and recombination of currents, junction breakdown.</i></p> <p><b>Zener Diode:</b> Breakdown mechanisms, Characteristics, Effect of Temperature, Application as voltage regulator and backward diode</p>		
2	2.1	<p><b>Bipolar Devices</b></p> <p><b>BJT:</b> The bipolar transistor action, minority carrier distribution, low-frequency common-base current gain, non-ideal effects, Ebers-Moll Model, Gummel-Poon Model, Hybrid-Pi Model, Frequency Limitations</p> <p><b>BJT Amplifiers:</b> CE Amplifiers</p> <p><b>Self-Learning:</b>(Only ISE(NO ESE)will be conducted)</p> <p><b>HBT (Heterojunction bipolar transistor):</b> Current gain in HBT, Basic n-p-n HBT structure with band diagram</p> <p><b>BJT Amplifiers:</b> CB and CC Amplifiers</p>	1	6
3	3.1	<p><b>Field Effect Devices</b></p> <p><b>JFET:</b> Construction, operation and device characteristics, V-I relationship and transconductance. Small signal equivalent model, frequency limitation factors and cutoff frequency</p> <p><b>DC Circuit Analysis:</b></p> <p><b>Junction Field Effect Transistor (JFET):</b> Self bias, Voltage divider bias, Design and Analysis of Biasing Circuits</p> <p><b>AC Analysis:</b></p> <p><b>JFET Amplifiers:</b> Small-Signal Equivalent Circuit, Small-Signal Analysis</p> <p><b>Self-Learning:</b>(Only ISE(NO ESE)will be conducted)</p> <p><b>MOSFET (i.e. HEMT):</b> Fundamentals, V-I Characteristics, Cutoff frequency</p> <p><b>MESFET:</b> Device structure, principle of operation, V-I characteristics, High frequency performance</p>	1,2,3	12
4	4.1	<p><b>Field Effect Devices</b></p> <p><b>MOSFET:</b> Two terminal MOS structure, MOSFET construction, Band diagrams under equilibrium and external bias, Threshold Voltage, V-I and CV characteristics, Channel length modulation, Short Channel effects, MOSFET Model</p> <p><b>DC Circuit Analysis:</b></p> <p><b>Metal-Oxide Field Effect Transistor (MOSFET):</b> Common-Source circuits, DC load line and region of operation, Common-MOSFETs configurations, Analysis and Design of Biasing Circuits</p> <p><b>MOSFET Amplifiers:</b> Graphical Analysis, load line and Small-Signal parameters, AC Equivalent Circuit, Small-Signal Model, Common-Source, Source Follower, Common-Gate</p>	1,2,3	12



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5	5.1	<p><b>Frequency analysis of amplifiers:</b> Effect of capacitors (coupling, bypass, load) on frequency response of JFET and MOSFET Amplifiers, High frequency hybrid-pi equivalent circuits of MOSFET, Miller Effect and Miller capacitance, unity gain bandwidth, Low and high frequency response of single stage (CS,CG, CD) and multistage (CS-CS).</p> <p><b>Multistage Amplifiers:</b> Multistage (CS-CS) amplifier</p> <p><b>Self-Learning:(Only ISE(NO ESE)will be conducted)</b></p> <p><b>Frequency analysis of amplifiers:</b></p> <p><i>Low and high frequency response of single stage (CG, CD) and multistage (CS-CS).</i></p> <p><b>Multistage Amplifiers:(CS-CE) cascode (CS-CG) Amplifiers &amp; Darlington pair.</b></p>	2,3	6
			<b>Total</b>	<b>42</b>

\* Only ISE(NO ESE) will be conducted for self-learning

#### References:

- [1] Donald A. Neamen, "Semiconductor Physics and Devices" Tata McGraw Hill, Third Edition
- [2] Donald A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill, Second Edition.
- [3] RL Boylestad and Luis Nashelsky, "Electronic Devices and Circuits" Prentice Hall, second Edition

#### Additional References for Self-learning:

- [1] Sung-Mo Kang, Yusuf Leblebici, "CMOS Digital Integrated Circuits", Tata McGraw Hill, Third Edition
- [2] S. Sivaharan and N. Suresh Kumar, "Electronic Devices and Circuits", McGraw Hill, Third Edition
- [3] S. M. Sze, "Semiconductor Devices: Physics and Technology", Wiley, Second Edition
- [4] Mahesh B. Patil, "Basic Electronic Devices and Circuits," PHI, First Edition



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET202	Electronic Devices Lab-I	--	--	2	--	--	1	1
Examination Scheme								
ISE			MSE		ESE		Total	
40			--		20		60	

**Pre-requisite Course Codes**

EL31 (Electronic Circuit Design - I)

After successful completion of the course, student will be able to

Course Outcomes	CO1	Implement the given circuit on breadboard and test it with measuring instrument
	CO2	Validate characteristics of semiconductor devices.
	CO3	Implement applications of semiconductor devices.
	CO4	Examine the given circuit for the possible faults.
	CO5	Simulate the given application of semiconductor device and obtain its performance parameters.
	CO6	Record the observations of given experiment and arrive at valid conclusions to correlate with theory

Exp. No.	Suggested List of Experiments	Ref.	Mark
1	Validate characteristics of semiconductor devices using hardware implementation. (like pn junction diode, BJT, FET)	1,2	5
2	Validate characteristics of semiconductor devices using circuit simulator. (like pn junction diode, BJT, FET, MOSFET)	1,2	5
3	Implement clipper and clamper circuits	1	5
4	Implement halfwave and fullwave rectifier circuits	1	5
5	Design and implement single stage BJT/ FET/ MOSFET based amplifier for the required specifications.	1,2	5
6	Obtain frequency response of single stage BJT/ FET/ MOSFET based amplifier	1,2	5
7	Implement given multistage amplifier.	1,2	5
8	Identify the circuit and possible faults in it for the desired output.		5
Total Marks			40

**References:**

- [1] R L Boylestad and Louis Nashelsky, "Electronic Devices and Circuits" Pentice Hall, second Edition
- [2] Donald A. Neamen, "Electronic Circuit Analysis and Design", TATA McGraw Hill, 2<sup>nd</sup> Ed.
- [3] Mahesh B. Patil, "Basic Electronic Devices and Circuits," First Edition, PHI
- [4] [http://www.i-vis.co.jp/pdf/cogenda/Quick\\_Start\\_Guide.pdf](http://www.i-vis.co.jp/pdf/cogenda/Quick_Start_Guide.pdf)
- [5] Datasheets of components



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET205	Analog Circuits	03	--	--	03	--	--	03
<b>Examination Scheme</b>								
ISE		MSE		ESE		<b>Total</b>		
20		20		60		100		

**Pre-requisite Course Codes**

ES13:(Basic Electrical Technology)

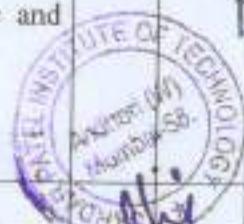
ES22: ( Digital Circuits)

EL31: (Electronic Circuit Design-I)

After successful completion of the course, student will be able to

Course Outcomes	CO1	Describe the working and calculate parameters for different power amplifier circuits.
	CO2	Discuss fundamentals of operational amplifier IC
	CO3	Analyze the various applications and circuits based on particular linear integrated circuit
	CO4	Design linear and non-linear applications using operational amplifier IC
	CO5	Design and analysis of circuits and applications with data converter ICs, voltage regulator ICs and special purpose ICs
	CO6	Design and develop the complete block diagram and circuit diagram for typical applications using integrated circuits

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	<b>Power amplifiers:</b> Power BJTs, Power MOSFETs, Heat Sinks, Class A, Class B, Class C and Class AB operation, Power efficiency  <b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Class AB output stage with diode biasing, VBE multiplier biasing, input buffer transistors, Darlington configuration</i>	1	04
	1.2	<b>Fundamentals of Operational Amplifier</b> Functional Block Diagram of op amp, DC and AC characteristics of an op-amp, Ideal op-amp Single Supply op-amp Vs Dual Supply op amp  <b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Noise analysis circuits</i>	2,4, 6	04
2	2.1	<b>Linear Applications of Operational Amplifier</b> Inverting and non Inverting Amplifier, Adder, subtractor, integrator, differentiator, difference amplifier, instrumentation amplifier <b>Converters:</b> Current to voltage converters <b>Active Filters:</b> First order filters, second order active finite and infinite gain low pass, high pass  <b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Voltage to current converters, band pass and band reject filters</i>	2,4, 6	07
3	3.1	<b>Non-Linear Applications of Operational Amplifier</b>		



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		<b>Comparators:</b> Inverting comparator, non-inverting comparator, zero crossing detector <b>Schmitt Triggers:</b> Inverting Schmitt trigger <b>Waveform Generators:</b> Square wave generator with duty cycle modulation <b>Precision Rectifiers:</b> Half and full wave precision rectifiers and their applications, sample and hold circuits, logarithmic converters <b>Sine Wave Oscillators:</b> RC phase shift oscillator	2,4, 6	07
		<b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Window detector and level detector, non-inverting Schmitt trigger with adjustable threshold level, triangular wave generator with duty cycle modulation, Peak detectors and antilog converters, Wien bridge oscillator</i>		
4		<b>Data Converters</b>		
	4.1	Performance parameters of ADC, single ramp ADC, ADC using DAC, dual slope ADC, successive approximation ADC Performance parameters of DAC, binary weighted register DAC, R/R ladder DAC  <b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Flash ADC, inverted R/R ladder DAC</i>	4,7	07
5		<b>Special Purpose Integrated Circuits</b>		
	5.1	Functional block diagram, working, design and applications of Timer 555 Functional block diagram, working and applications of VCO 566, PLL 565  <b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Functional block diagram, working and applications of multiplier 534</i>	4,6	06
6		<b>Voltage Regulators</b>		
		Functional block diagram, working and design of three terminal fixed (78XX series) and three terminal adjustable LM 317 voltage regulator Functional block diagram, working and design of general purpose 723 (LVLC, LVHC, HVLC and HVHC) with current limit and current fold-back protection, Switching regulator topologies,  <b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Functional block diagram, working and design of three terminal fixed 79XX series, three terminal adjustable LM 337 voltage regulator, functional block diagram and working of LTI070 monolithic switching regulator</i>	2,4, 6	07

\* Only ISE(NO ESE) will be conducted for self-learning



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Total 42

**References:**

- [1] Donald A. Neamen, "Electronic Circuit Analysis and Design", TataMcGraw Hill, Second Edition.
- [2] Sergio Franco, "Design with operational amplifiers and analog integrated circuits", TataMcGraw Hill, 3rd Edition.
- [3] William D. Stanley, "Operational Amplifiers with Linear Integrated Circuits ", Pearson, 4<sup>th</sup> Edition.
- [4] D. Roy Choudhury and S. B. Jain, "Linear Integrated Circuits", New Age International Publishers, 4th Edition.
- [5] David A. Bell, "Operation Amplifiers and Linear Integrated Circuits", Oxford University Press, Indian Edition.
- [6] Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Pearson Prentice Hall, 4<sup>th</sup> Edition.
- [7] R. P. Jain, "Modern Digital Electronics," Tata McGraw Hill, 3 rd Edition.



*Bennily* *Be*

A handwritten signature in blue ink, appearing to read "Bennily" followed by a stylized "Be". The signature is written over a diagonal line.

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET205	Analog Circuits	--	--	2	--	--	1	1
Examination Scheme								
		ISE		MSE		ESE		Total
		40		--		20		60

Pre-requisite Course Codes	ES13:(Basic Electrical Technology)
	ES22: ( Digital Circuits)
	EL31: (Electronic Circuit Design-I)
	After successful completion of the course, student will be able to
	CO1 Validate electrical characteristics of given ICs.
	CO2 Design, debug and test electronic circuit using ICs like op-amp 741, IC 555, IC 566, IC723, etc.
	CO3 Validate the simulation results with experimental results for the given circuit using Analog System Trainer Kit by Texas Instruments.
Course Outcomes	CO4 Validate circuits by simulation using modern tools available like ngspice and LTspice, TINA, Multisim.
	CO5 Design, develop and troubleshoot the complete electronic system for typical applications like speed control of DC Motor, Temperature control, development of signal conditioning circuits for various transducers.
	CO6 Infer data sheet of the given IC.

Exp. No.	Suggested List of Experiments	Ref.	Marks
1	To measure (a) Input bias current, (b) Input offset current,(c)Input offset voltage & (d) Slew rate of the given Op-Amp IC 741.	1,2, 3	5
2	Design, Implement and analyze Schmitt Trigger Circuit using Op-Amp IC 741.	1,2	5
3	Design, Implement and analyze Square Wave Generator Circuit using Op-Amp IC 741.	1,2	5
4	Design, Implement and analyze Monostable Multivibrator Circuit using IC 555 and its operation as divide by N frequency.	1,2	5
5	Design, Implement and analyze Inverting Adder Circuit using Op-Amp IC 741.	1,2	5
6	Design, Implement and analyze Voltage Regulator Circuit using IC 723.	1,2	5
7	a) Design, Simulate and analyze the given problem statement (circuit/Power Amplifier) using Circuit Simulation S/W preferably NI-Multisim/ TINA/ SPICE. b) Implement and analyze this Circuit using Op-Amp (TL802): Analog System Trainer Kit - TEXAS INSTRUMENTS.	1,2,5,6	5



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8	TSC: Trouble Shooting Competition	TSC Man ual	5
		Total	40

**References:**

- [1] Electronic Circuit Design-II Laboratory Manual
- [2] D. Roy Choudhury and S. B. Jain, "Linear Integrated Circuits", New Age International Publishers, 4th Edition.
- [3] David A. Bell, "Operation Amplifiers and Linear Integrated Circuits", Oxford University Press, Indian Edition.
- [4] Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Pearson Prentice Hall, 4<sup>th</sup> Edition.
- [5] Analog System Trainer, Texas Instruments Laboratory Manual
- [6] Donald A. Neamen, "Electronic Circuit Analysis and Design", TataMcGraw Hill, Second Edition.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BT206	Microcontrollers	03	01	—	03	01	—	04
Examination Scheme								
ISE			MSE		ESE		Total	
20			20		60		100	

Pre-requisite Course Codes	DS12: Digital Circuits
	EL32: Computer Organization and Architecture

After successful completion of the course, student will be able to

Course Outcomes	CO1	Get insight of design metrics of Embedded system to design real time applications to match recent trends in technology
	CO2	Explain the architectural features of 8-bit microcontroller, ARM7TDMI and compare with other microcontrollers.
	CO3	Apply addressing modes and write assembly as well as C program for the given task.
	CO4	Effectively utilize the on chip and off chip hardware resources to microcontroller

Module No.	Unit No.	Topics	Ref.	Hrs.
1	<b>Fundamentals of Embedded System</b>			
	1.1	Introduction to Embedded Systems, Characteristics of Embedded System, Design Process, Design Metrics and optimization of various parameters of embedded system. Real time System's requirements, real time issues, interrupt latency	1	4
	1.2	Embedded Product development lifecycle, Program Modelling concepts: DFG, FSM, Petri-net, UML	1	
	<i>Self Learning: (Only ISE will be conducted. No ESE). C Programming Exercises for creating header files and hex files (Modular Style)</i>			5
2	<b>8051 Architecture</b>			4
	2.1	Overview of 8051 Family	2	
	2.2	8051 block diagram, 8051 Port Structure	2	
3	2.3	Pin Description of 8051	2	
	<b>8051 Programming in C</b>			12
	3.1	Addressing Modes, Data Types, Time Delay, Logic	2	



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## Tutorials on Embedded System Design

Sr. No	Topic of tutorial	No. of hours
1.	Interfacing External Memory RAM and ROM with 8051 microcontroller	2
2.	Programming and Interfacing 3 seven segment for making 3 digit counter for counting pulses on the input pin with 8051 microcontroller in simulation environment.	2
3.	Programming and Interfacing of LCD with 8051 microcontroller in Simulation Environment	2
4.	Programming and Interfacing of 4x4 Keypad with 8051 microcontroller in Simulation Environment	2
5.	Programming and Interfacing DAC with 8051 microcontroller for generating Square wave and Sine wave using Interrupts in Simulation Environment	2
6.	Programming and Interfacing LCD with LPC2148 ARM based processor in Simulation Environment	2
7.	Using the watchdog timer in LPC2148 ARM based processor in simulation environment	2
	Total	14

### Recommended Books:

- [1] Embedded System: Architecture, Programming and Design, Rajkamal, Tata McGraw-Hill Education, 2011
- [2] Muhammad Ali Mazidi, Janice G. Mazidi and R. D. McKinlay "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", 2nd Edition,
- [3] David Seal, "ARM Architecture".Reference Manual (2nd Edition)
- [4] ARM System-on-Chip Architecture, Steve Furber

### Material for Self Learning: (Only ISE will be conducted, No ESE)

- [5] Dennis Ritchie, "The C Programming Language", 2<sup>nd</sup> Edition (Chapter 4)
- [6] Handouts and weblinks.



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## Recommended Books:

- [1] Embedded System: Architecture, Programming and Design, Rajkamal, Tata McGraw-Hill Education, 2011
- [2] Muhammad Ali Mazidi, Janice G. Mazidi and R. D. McKinlay "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", 2nd Edition,
- [3] David Seal, "ARM Architecture", Reference Manual (2nd Edition)
- [4] ARM System-on-Chip Architecture, Steve Furber

## Material for Self Learning: (Only ISE will be conducted, No ESE)

- [5] Dennis Ritchie, "The C Programming Language", 2<sup>nd</sup> Edition (Chapter 4)
- [6] Handouts and weblinks.

Name & Sign of the Expert1:

(Renuka  
(Piyush Deshpande))

Name & Sign of the Expert2:

(R.  
(C.M. Parmar))

Name & Sign of the Expert3:



R.S

Renuka



## Sardar Patel Institute of Technology

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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		3	0	2	6	11	3	0	1	4
<b>Examination Scheme</b>										
(PC)	Signals and Systems	Component		ISE		MSE		ESE		Total
		Theory		75		75		150		300
ET207/EC207		Laboratory		50		—		50		100

Pre-requisite Course Codes, if any.	MA101, MA102
<b>Course Objective:</b> To develop strong foundation of continuous time signals and systems	
<b>Course Outcomes (CO):</b> At the End of the course students will be able to	
XX207.1	Classify and illustrate various operations on signals and systems
XX207.2	Analyze the properties of a continuous time signal in frequency domain and observe the spectrum
XX207.3	Apply Laplace Transform on continuous time signals
XX207.4	Evaluate Linear Time Invariant system response using Laplace Transform
XX207.5	Design analog Butterworth and Chebyshev filter
XX207.6	Interpret system using state space model

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
XX207.1												
XX207.2												
XX207.3												
XX207.4												
XX207.5												
XX207.6												

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
XX207.1							
XX207.2							
XX207.3							
XX207.4							
XX207.5							
XX207.6							



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BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	<input checked="" type="checkbox"/> Apply	<input checked="" type="checkbox"/> Analyze	Evaluate	Create
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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Overview of Continuous Time Signals and Systems	1,2	08
	1.1	Introduction: Signals, systems, elementary signals, exponential, sinc, step, impulse, ramp, rectangular, triangular and operations on signals		
	1.2	Classification of signals: Continuous Signals, deterministic and non-deterministic, periodic and aperiodic, symmetric (even) and asymmetric (odd), energy and power, causal and anti-causal signals.		
	1.3	Operations of Signals: Shifting, Scaling, Time Reversal, Addition and Multiplication, Convolution, Correlation		
2	Title	Fourier Series and Fourier Transform	1,2	10
	2.1	Fourier series: Orthogonal representation of signals, Continuous Time Fourier Series (CTFS), magnitude and phase spectra, Gibbs phenomenon, Parseval's relation,		
	2.2	Fourier Transform: Fourier Transform and Inverse Fourier Transform on periodic and non-periodic signals, Limitations of Fourier Transform and need for Laplace Transform, Properties of Fourier Transform, Parseval's relation, Energy and Power Spectral Density and Bandwidth.		
3	Title	Laplace Transform	1,2	04
	3.1	Laplace Transform, Properties of Laplace Transform, Relation between Laplace Transform and Fourier Transform,		
	3.2	Inverse Laplace Transform using Partial Fraction method		
4	Title	Linear Time Invariant (LTI) Systems	1,2	08
	4.1	Classification of systems: Static and dynamic, time variant and time invariant, linear and nonlinear, causal and non-causal, stable and unstable systems		



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	4.2	Impulse Response, Transfer Function, Differential Equation, Stability of Systems, Frequency Response, Solution of Differential Equation using Laplace Transform		
5	Title	Analog Filter Design	1.2	12
	5.1	Design of Ideal Analog filter, Butterworth Low Pass Filter (LPF) design, Butterworth High Pass Filter (HPF) design, Butterworth Band Pass Filter (BPF) and Band Reject Filter design, Pole zero plot of Butterworth filters, Magnitude Spectrum		
	5.2	Equiripple Filters, Chebyshev Type-I LPF, HPF Design, Polezero plot of Chebyshev filter, magnitude spectrum.		
	5.3	Realization diagram (Form I and II)		
6	Self Study	State Space Model: Procedure to determine state equations, State equations from transfer function, Laplace transform solution of state equations	6*	
Total (*Not included)				42

### Laboratory Component

Sr. No	Title of the Experiment
1	Representation of Signals
2	Operations on Signals
3	Convolution on Continuous Time Signals
4	Synthesis of signals using Fourier Series
5	Synthesis of signals using Fourier Transform
6	Analysis of LTI system using Laplace Transform
7	Plotting of frequency spectrum
8	Butterworth filter design
9	Chebyshev filter design
10	Mini-project: Analysis of real world signals





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### Text Books

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Signals and Systems	3 <sup>rd</sup>	Nagoor Kani	Tata McGraw-Hill	2011
2	Digital Signal Processing	4 <sup>th</sup>	Ramesh Babu	Schaeff	2014

### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Signals and Systems	2 <sup>nd</sup>	Alan V Oppenheim, Alan S. Willsky and A Hamid Nawab	Pearson	2002
2	Signals and Systems	3 <sup>rd</sup>	Simon Haykin and Barry Van Veen	John Wiley & Sons	2002
3	Linear Systems and Signals	4 <sup>th</sup>	B. P. Lathi	Oxford University Press	2005
4	Signals and Systems	2 <sup>nd</sup>	H. P Hsu, R. Rajan	Schaum's outlines	2006





## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics Engineering

Undergraduate Program

2019-20

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
IC and MEMS Technology	ELE71A	2019-20	100
Photovoltaic systems and Smart Grid	ELE73A	2019-20	100
Mixed Signal VLSI Design	ELE81A	2019-20	100
Electronic System Design	ELEL81A	2019-20	100
Radiating Systems	ELEL81B	2019-20	100
Technology Entrepreneurship Lab	HSS81	2019-20	100



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## ELECTRONICS ENGINEERING

Academic Year: 2019 - 2020

### Theory Course Revision Report

Course Name: Integrated Circuits & MEMS Technology (ICMT)  
 Course Code Old (2018-19): EXC702 / EXC803 ICT / MEMS Technology  
 Course Code New (Autonomy 2019-20): ELE71A  
 Class and Semester in Old Syllabus: BE VII & VIII  
 Class and Semesters in New Syllabus: BE Sem VII  
 Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	This subject is modified for such a way that topics from IET & MEMS Technology which are more relevant	Since it was difficult to add a separate subject of MEMS Technology in new scheme.	
2			100%
3	to convey the fundamental aspects and applications of both the technologies.		
4	New topics are added.		

Few topics from IIT level Characterization tools and design are removed.

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. —
2. —
3. —
4. —



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# Sardar Patel Institute of Technology

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## Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	P. V. Kasambe	Electronics	<u>Pr</u>
2	Dr. S. S. Rathod	Electronics	<u>S. S. Rathod</u>
3			
4			

## Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-

\*\* Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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ELECTRONICS ENGINEERING

Academic Year: 2019 – 2020

Lab Course Revision Report

Course Name: EXL702 Electronics ICMT Laboratory

Course Code Old (2018-19): EXL702 / EXL803 ICMT/MEMS Technology Lab.

Course Code New (Autonomy 2019-20): ELEL71A

Class and Semester in Old Syllabus: BE VII / OTII

Class and Semesters in New Syllabus:

BE Sem VIII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	list of the experiments	Since it was difficult	
2	is modified to cover important topics from both the laboratories for ICMT & MEMS Tech courses.	to add a separate laboratory course on MEMS Technology in new scheme. At the same time MEMS Tech subject is identified as one of the important subjects for in which lot of scope for development and research exists.	10%
3			
4			

Details of Committee members Name & Signature: Set of Scope for development and Research exists

Sr. No.	Name of committee members	Department	Signature
1	P. V. Desai	ETRA.	<u>PD</u>
2	DY. S. S. Rathod	ETRA.	<u>DR</u>
3			
4			

S. Desai



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Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus ( $\gamma$ ) =  $(\text{No. of experiments changed or added} / \text{Total No. of experiments}) \times 100$



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## ELECTRONICS ENGINEERING

Academic Year: 20 - 20

### Theory Course Revision Report

Course Name: Photovoltaic Systems and Smart Grids

Course Code Old (2020-21): —

Course Code New (Autonomy 2019-20): —

Class and Semester in Old Syllabus: —

Class and Semesters in New Syllabus: Sem - VII B.E ETRX

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly Introduced	Focus on Renewable Energy	100 %
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.





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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. R. G. Sutari	ETRX	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in syllabus (N) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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## ELECTRONICS ENGINEERING

Academic Year: 2019 – 2020

### Lab Course Revision Report

Course Name: Mixed Signal VLSI Design Lab

Course Code Old (2018-19): —

Course Code New (Autonomy 2019-20): EEL81A

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: BE - ETRX SEM. VIII

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	New lab course introduced	continuation of analog course lab	100%
2		Requirement of industry & higher studies	
3			
4			

#### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. S. S. Rathod	ETRX	Rathod
2	Prof. N. A. Bhagat	ETRX	Bhagat
3	Prof. Payal Shah	EIRX	Shah
4			



2019-20  
R. J. Shah

BB



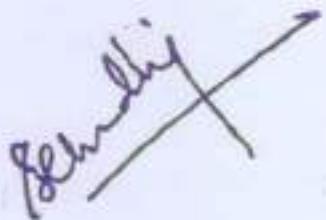
**Sardar Patel Institute of Technology**  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	prof. Reena Sonkavate	EXTC	
2			
3			
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\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100





# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS ENGINEERING

Academic Year: 2019 – 2020

### Theory Course Revision Report

Course Name: *Mixed Signal VLSI Design*

Course Code Old (2018-19): —

Course Code New (Autonomy 2019-20): *ELE81A: Mixed signal VLSI Design*

Class and Semester in Old Syllabus: —

Class and Semesters in New Syllabus: *SEM VIII - BE-EIRX*

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	<i>New course introduced</i>	<i>continuation of Analog course.</i>	<i>100%</i>
2		<i>Requirement of industry &amp; for higher studies</i>	
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. *IIT Bombay syllabus*
2. *IIT Roorkee syllabus*
3. *—*
4. *—*



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## Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. S. S. Rathod	EIRY	Rathod
2	Prof. Narendra Bhagat	EIRY	N. Bhagat
3	Prof. Payal Shah	EIRY	Shah
4			

## Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Prof. Reena Sonawane	ETTC	R
2			
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\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2019– 2020

### Course Revision Report

**Course Name:** Electronic System Design

**Course Code Old :** ELI63 (Fundamentals of Operating system lab)

**Course Code New :** ELER1C

**Class and Semester in Old Syllabus:** TE, SEM-VI

**Class and Semesters in New Syllabus:** BE, Sem-VII

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Task / Process Management	Task communication is required	100% (As new subject introduced in sem VII with addition done in prerequisites and next sem subjects)
2	Memory Management	To write program in secure environment	
3	Case Studies of RTOS and its comparison	Case studies give real time implementation of concepts	
4	Introduction to MicroC/OS-II	As in company RTOS is mostly used	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. University of Texas: [http://users.ece.utexas.edu/~gerstl/ee445m\\_s19/syllabus.html](http://users.ece.utexas.edu/~gerstl/ee445m_s19/syllabus.html)
2. <https://www.cse.iitb.ac.in/~cs684/>
3. <https://erp.iitkgp.ac.in/ERPWebServices/curricula/CurriculaSubjectsList.jsp?stuType=PG&splCode=AT1>
4. <https://www.udemy.com/course/introduction-to-rtos>

Committee members Name & Signature:

1. Dr. Surendra Rathod (Coordinator)
2. Prof. Priya Deshpande

\*\*Percentage Change in Syllabus (X) – (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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## ELECTRONICS ENGINEERING

Academic Year: 2019-2020

### Theory Course Revision Report

Course Name:

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ): ELE810 Radiating system

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Types of antenna	All topics required as part of Radiating system	100%
2	Microstrip antenna Smart antenna	Radiating system	
3	Microwave Engg.	System	
4	Optical Communication		

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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### Details of Committee members Name & Signature:

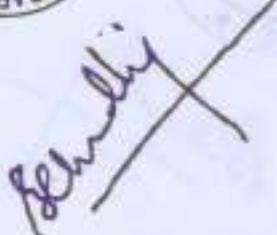
Sr. No.	Name of committee members	Department	Signature
1	Manisha Bonade	EPRX	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



  
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 Faculty



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ELE81C	Electronic System Design	3	-	-	3	-	--	3
		Examination Scheme						
		ISE		MSE		ESE		Total
		20		20		60		100

Pre-requisite Course Codes	EL33 (Digital Circuits) EL43 (Computer Organization and Architecture) EL52 (Micro-Architectures) ELL63 (Fundamentals of Operating Systems Lab)
----------------------------	---

After successful completion of the course, student will be able to

Course Outcomes	CO1	Get insight of design metrics of Embedded system to design real time applications to match recent trends in technology.
	CO2	Understand the Real time operating system concepts
	CO3	Know the Hardware-Software design issues and testing methodology of Embedded system
	CO4	Design reliable embedded system

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Fundamentals of Embedded System</b>		08
	1.1	Introduction to Embedded Systems, Characteristics of Embedded System, Design Process, Design Metrics and optimization of various parameters of embedded system. Real time System's requirements, real time issues, interrupt latency	1	
	1.2	Embedded Product development lifecycle, Program Modeling concepts: DFG, FSM, Petri-net, UML	1	
2		<b>Embedded Hardware and Design</b>		08
	2.1	Introduction to ARM-v7-M (Cortex-M3), ARM Architecture, Comparison of ARM-v7-A (Cortex A8), ARM-v7-R (CortexR4), ARM-v7-M (Cortex-M3)	2	
3		<b>Real time Operating System</b>		08
	3.1	Tasks, Task states, Message Queue, Mailbox, Pipe Function, Mutex, RPC Function, Shared Resources	1,3,4	
	3.2	Interprocess Communication, Semaphore, Spinlock Semaphore, round robin scheduler, Blocking Semaphore, Mailbox, Pre-emptive scheduler		
4		<b>Introduction to MicroC/OS-II: real time Kernel</b>		08
	4.1	Foreground Background System, Critical Section of codes, Task control Blocks, Task Scheduling, Creating a Task and Deleting a Task.	4	



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	4.2	Creating and Deleting Semaphore, Creating and deleting Mutex, creating and Deleting Mailbox, Creating and deleting Message Queue.		
5		<b>Industry Standards</b>		10
	5.1	Introduction to IEC 61508 standard : Organizing and managing the life-cycle, Requirements involving the specification, Requirements for design and development, Integration and test, Operations and maintenance, Validation, Modifications, Acquired sub-systems, Organizing and managing the software engineering.	05.06	
	5.2	Introduction to IEC 60601 standard : Protection of radio services, Protection of the Public Mains network, Immunity, Electrostatic Discharge, Radiated RF electromagnetic fields, Electrical fast transients and bursts.	07	
	5.3	Introduction to IEC 26262 : Introduction of ISO/DIS 26262 (ISO 26262), Parts of ISO 26262, ASIL Levels, Product Development – System Level, Product Development Software Level, Fitting software tools into ISO 26262 process.	08	
	5.4	Reliable Embedded System : Single-program, real-time embedded systems, TT vs. ET architectures, Modeling system timing characteristics, basic tick lists, determining the required tick interval, short tasks, importance of task offsets, task sequence initialization, task jitter, response times, importance of WCET/BCET information, challenges with WCET/BCET measurements, TTC scheduler.	09	
			Total	42

## Recommended Books:

- [1] Embedded System: Architecture, Programming and Design, Rajkamal, Tata McGraw-Hill Education, 2011
- [2] ARM System-on-Chip Architecture, Steve Furber
- [3] Embedded System: Real time Operating Systems for the ARM Cortex™M3, Jonathan W. Valvano, Create Space Independent Publishing Platform, 2012
- [4] MicroC/OS-II: The Real Time Kernel, Jean J. Labrosse, CRC press, 05 Feb 2002.
- [5] David Smith , Functional Safety, A Straightforward Guide to applying IEC 61508 and Related Standards, Elsevier.
- [6] IEC 61508: IEC standard for the functional safety for electrical, electronics and programmable electronics equipment
- [7] IEC 60601: IEC standard on Medical Electric Equipment
- [8] IEC 26262: IEC standard on Road vehicles
- [9] The Engineering of Reliable systems: LPC1769 Edition, Pont M. J (2014), Published by Safety Systems.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned		
		L	T	P	L	T	P
EEL81C	Electronic System Design Lab	—	—	2	--	—	1
			Examination Scheme				
		ISE		MSE		ESE	Total
		40		—		--	40

Pre-requisite Course Codes	ELE82A (Electronic System Design)				
After successful completion of the course, student will be able to					
Course Outcomes	CO1	Understand how applications that incorporate a real-time kernel differ from foreground/ background, or super-loop, applications			
	CO2	Understand process flow of porting OS on Microcontroller			
	CO3	Understand Micrium OS Kernel's API			
	CO4	Know how to utilize many of the services that Micrium OS Kernel provides			
	CO5	Understanding interprocess communication in Real time operating System			
	CO6	Understanding scheduling strategies in Real time operating system			

Exp. No.	Experiment Details	Ref.	Marks
1	Porting Micrium OS on Cortex M3 architecture and understanding file hierarchy.	02,03	05
2	Initializing the Kernel, Create Task and Start the Task in Micrium OS	01	05
3	Implementing Micrium OS interrupt Handler.	01	05
4	Performing Micrium OS Kernel Scheduling, (Pre-emptive Scheduler)	01	05
5	Implementing various Kernel Services in Micrium OS	01	05
6	Implementing Semaphore in Micrium OS.	01	05
7	Performing Shared Resources Protection in Micrium OS.	01	05
8	Implementing Mutexes in Micrium OS. OR Implementing Message Queues in Message Queues.	01	05
			Total Marks 40

#### Recommended Books:

- [1] MicroC/OS-II: The Real Time Kernel, Jean J. Labrosse, CRC press, 05 Feb 2002.
- [2] <https://www.silabs.com/documents/public/training/wireless/micrium-os-kernel.pdf>
- [3] <https://www.silabs.com/support/getting-started/micrium-os#series>



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ELE81D	Radiating Systems	3	-	-	3	-	-	3	
				Examination Scheme					
		ISE		MSE	ESE		Total		
		20		20	60		100		

Pre-requisite Course Codes		EL53 Signals and Systems, EL54 Electromagnetic Engineering
Course Outcomes	CO1	Describe the radiation mechanism and parameters of antenna
	CO2	Describe various types of antennas
	CO3	Discuss microstrip and smart antennas
	CO4	Discuss fundamental principles of microwave engineering
	CO5	Discuss the fundamental principle, construction and working principle of optics and light wave

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Types of Antennas, radiation mechanism, current distribution on a thin wire antenna and fundamental parameters.	1	8
	1.2	Infinitesimal dipole, small dipole and half wavelength dipole	1	
2	2.1	Yagi Uda Antenna, Monopole, Loop Antenna, Slot Antennas, Helical Antennas, Horn antennas and Parabolic Reflectors	1	8
	2.2	Broadside and Endfire array	2	
3	3.1	Microstrip antenna Introduction: Rectangular Patch, Circular Patch, Quality Factor, Bandwidth, and Efficiency, Input Impedance, Coupling, Circular Polarization, Arrays and Feed Networks, Corporate and Series Feeds, Reflect array.	1.5	10
	3.2	Smart antennas Introduction, Need of smart antenna system, Overview of smart antenna system, Types of smart antennas, Switched beam system, Adaptive system, Beam forming, Fixed weight beam forming: Maximum signal-to-interference ratio beam-former, Minimum mean square error. Adaptive beam forming: LMS algorithm, Sample matrix inversion method.	1.5	



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4	Microwave Engineering		10
4.1	General Solutions for TEM, TE and TM waves. Parallel plate waveguide, rectangular waveguide, circular waveguide, stripline, microstrip, wave velocities and dispersion.	3	
4.2	Scattering Matrix, Two Cavity Klystron and Gunn Diode	3	
5	Optical Communication		6
5.1	Elements of an optical fiber transmission link, block diagram, Ray theory transmission, total internal reflection, acceptance angle, numerical aperture and skew rays	4	
5.2	Modes, linearly polarized modes, electromagnetic mode theory and propagation and types of fibers according to refractive index profile.	4	
	Total	42	

### Recommended Books:

1. C. A. Balanis, "Antenna Theory – Analysis and Design" ,John Wiley& Sons, Inc. 2nd Edition, 2007
2. R. E. Collin, Antennas and Radio Wave Propagation, McGraw-Hill., 1985.
3. D. M. Pozar, Microwave Engineering, John Wiley & Sons Publication, 2013.
4. Gerd Kaiser, "Optical Fiber Communication" , Mc-Graw Hill Publication , Singapore, 4th Edition, 2012
5. Tapan Sarkar, Michael Wicks, "Smart Antennas", John Wiley and sons , 2013.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ELE73A	Photovoltaic systems and Smart Grid	3	---	--	3	--	--	3
		Examination Scheme						
		ISE		MSE		ESE		Total
		20		20		60		100

Pre-requisite Course Codes		ES11: Basic Electrical & Electronics Engineering EL42: Principles of Control Systems EL62: Power Electronics
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Compare different available renewable energy resources
	CO2	Evaluate parameters of PV modules in different interconnecting modes.
	CO3	Analyze PV power system to optimize it's performance parameters.
	CO4	Discriminate Smart Grid Architecture and Design,

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Introduction to renewable energy sources Renewable and non-renewable energy sources, solar radiation energy, Estimating energy requirement, Energy from solar PV conversion, other renewable energy technologies	1,2,3	06
	1.2	Solar cells, PV cell characteristics and equivalent circuit, Model of PV cell, Short circuit, Open circuit and Peak power parameters, Factors affecting electricity generated by solar cell, Cell efficiency, Fill factor		
	2.1	Interconnection and Sizing of PV module Identical cells in series, Load line, Non Identical Cells in series, Protecting cells in series, Interconnecting modules in parallel, Identical cells in parallel, Load line in parallel, Non Identical Cells in parallel, Protecting cells in parallel	1,2,3	
2	2.2	Sizing PV for applications without batteries, Battery Batteries, Battery Energy and Power Densities, Battery Selection, Battery Comparison, Other Energy storage methods, Battery Charger, Charge controller, PV system design	1,2,3	
	3.1	Maximum Power Point Tracking MPPT concept, Input impedance of Buck Converter, Input impedance of Boost Converter, Input impedance of Buck and Boost Converter	1,2,3	
	3.2	MPPT Algorithm: Impedance control method, Reference cell voltage scaling method, Reference cell current scaling method	1,2,3	





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	3.3	Power slope method, Gate Driver, MPPT for Non resistive method,	1,2,3	
4		<b>Smart Grid Architecture, Communications and Measurement Technology</b>		08
	4.1	Today's grid versus smart grid, Standards for smart grid system, Functions of smart grid,	3,4,5	
	4.2	Communication and Measurement, Monitoring PMU, Smart Meters and Measurements Technologies, GIS and Google Mapping tool, Multiagent System Technologies, Microgrid and smart grid comparison	3,4,5	
5		<b>Computational Tools for Smart Grid Design</b>		10
	5.1	Introduction to smart computational tools, Decision Support Tools (DS), Optimization Techniques, Classical Optimization Methods, Heuristic Optimization,	3,4,5	
	5.2	Evolutionary Computational Techniques, Adaptive Dynamic Programming Techniques, Pareto Methods, Hybridizing Optimization Techniques and Applications to the Smart Grid	3,4,5	
			Total	42

## ISE Evaluation:

Case studies from three different locations in Mumbai 10M

Two quizzes 5M (Best of the two)

Two Assignments (Average of Two)

## Recommended Books:

- Chetan Solariki, "Solar Photovoltaics: Fundamentals, Technologies And Applications", PHI Publication, 3rd Edition.
- Alexander P. Kirk, "Solar Photovoltaic Cells", Academic Press.
- Qing-Chang Zhong, Tomas Hornik, "Control of Power Inverters in Renewable Energy and Smart Grid Integration", Wiley Publications, IEEE press.
- Janaka B. Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications" Wiley Publications.
- James Momoh, "Smart Grid Fundamentals of Design and Analysis", Wiley Publications, IEEE press.



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## ELECTRONICS ENGINEERING

Academic Year: 2022-2023

### Theory Course Revision Report

Course Name: **Technology Entrepreneurship Lab**

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	All contents changed.	Syllabus Revised	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



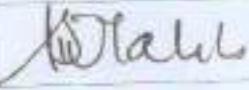
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## Sardar Patel Institute of Technology

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Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	K. T. Talele	ETRY	
2			
3			
4			

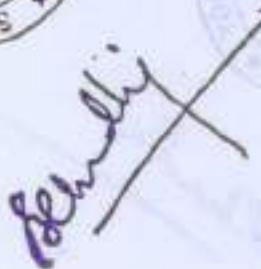
Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





  
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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics Engineering

Undergraduate Program

2018-19

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
Micro-Architectures Lab	ELL52	2018-19	50
Action Research Project I	ELP56	2018-19	100
Action Research Project II	ELP65	2018-19	100
Industrial and Organizational Psychology	MEC3	2018-19	100
Law for Engineers	MEC4	2018-19	100
Creative Thinking, Diversity and Workplace Etiquette (Noncredit)	ABL3	2018-19	100
Consumer Electronics	OE1	2018-19	100
Robotic Vision	OE2	2018-19	100
Cyber Security and Digital Forensics	OE3	2018-19	100
Internet of Things	OE4	2018-19	100
Technical Paper and Patent Drafting (Noncredit)	ABL4	2018-19	100
French Language	MEC1	2018-19	100
German Language	MEC2	2018-19	100



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 Computer Engineering Department

## Theory Course Revision Report

### Theory Course Information

Course Name: Micro-Architecture

Course Code Old (2016-17): EXC501 and EXC403

Course Code New (Autonomy 2019-18): EL52

Class and Semester in Old Syllabus: T.E. Semester-V and S.E. Semester- IV

Class and Semesters in New Syllabus: T.E. Semester-V

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Comparative Study of microprocessors and microarchitectures with respect to their important features from the perspective of computer organization: INTEL (X86, Pentium, Celeron, Core 2, Core i3, Core i5 and Core i7) and AMD (Am86, K5, K10, Zen Core).	To explore new trends in Architecture and organization	$(14 / 42 ) * 100 = 33.33 \%$
2	Comparative study of microcontrollers: Architectural features and development tools: Intel, Atmel (AVR), TI (MSP430), Microchip (PIC) Architectural features and development tools for ARM; NXP (LPC 2148) and Cypress Semiconductor (PSoC) Comparative study of Architectural features and development tools of Single board microcontrollers: Arduino, Raspberry-Pi and Intel Galilio. Mixed Signal Microcontrollers from Silicon Labs: 8-bit C8051F02x and EFM32 Giant Gecko OG Series 32-bit microcontroller	To compare various architecture and student should able to select the controller based on the specific applications.	
Sr. No.	Topics Removed	Reason	
1	Peripheral Controllers for 8086 family and System Design: Functional Block Diagram and description, Control Word Formats, Operating Modes and Applications of the Peripheral Controller namely 8255-PPI, 8259- PIC and 8237-DMAC. Interfacing of the above Peripheral Controllers, Keyword and Display Interface using 8255.	Not required as it covers while explaining overview	
2	Multiprocessor Systems: Study of Multiprocessor Configurations namely Closely Coupled System (CCS) and Loosely Coupled System (LCS). CCS	Not required as some part covered in IV sem new syllabus	



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	with the case study of the Maths Coprocessor, Various System Bus Arbitration Schemes in LCS, and Role of the Bus Arbiter (Intel 8289) in the LCS.	
3	8051 Microcontroller Assembly Language Programming	Only C program is sufficient
4	ARM7TDMI(ARMv4T) Assembly Language Programming	Not required as it covers while explaining in practicals
5	LPC2148 based C Program Applications	Not required as it covers while explaining in practicals

Referred Syllabus links:

1. [www.TI.com](http://www.TI.com)
2. [www.Silabs.com](http://www.Silabs.com)
3. [www.cypress.com](http://www.cypress.com)
4. [www.microchip.com](http://www.microchip.com)

Coordinators Name & Signature:

1) Prof. Priya Deshpande(Coordinator)

Experts Name & Signature:

1) Dr. S. S. Rathod

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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 Computer Engineering Department

## Laboratory Course Revision Report

### Laboratory Course Information

Course Name: Micro-Architecture Laboratory

Course Code Old (2016-17): EXL501 and EXL402

Course Code New (Autonomy 2017-18): ELL52

Class and Semester in Old Syllabus: T.E. Semester-V and S.E. Semester- IV

Class and Semesters in New Syllabus: T.E. Semester-V

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)	
1	Programming and interfacing for utilization of various on-chip resources of 16-bit Microcontroller (e.g. MSP430)	To have hands-on session on different resources for students	(4 / 8 ) * 100 = 50 %	
2	Programming and Interfacing for utilization of various on-chip resources of ARM based microcontrollers (e.g. PSoC)	To have hands-on session on different resources for students		
Sr. No.	Topics Removed	Reason		
1	Practicals on interfacing Peripheral Controller namely 8255-PPI, , 8259- PIC and 8237-DMAC. Interfacing of the above Peripheral Controllers. Keyword and Display Interface using 8255.	Not required as discussed in department meeting		
2	Assembly level programming of 8051 practicals.	Not required as already one practical is covered in assembly level programming of 8086		

Referred Syllabus links (URL\*)

1. [www.TI.com](http://www.TI.com) (MSP430)
2. [www.silabs.com](http://www.silabs.com)

Coordinators Name & Signature:

1) Prof. Priya Deshpande(Coordinator)

Experts Name & Signature:

1) Dr. S. S. Rathod



\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



Electronics Engineering Department

Academic Year: 2017 – 2018

Name of the Course Coordinator: Dr. S.S Pathad / Prof. P.V Kalambe / Prof. Priya Deshpande / Prof. Parman Fakultkar / Prof. P.H. Shah

Subject Name: Action Research Plan - I

Class: T.E. - Mechanics

Semester: V

Sr. No.	Name of the committee members	Department	Signature
1	Prof. P.V. Kalambe	Mechanics	MR
2	Prof. P.H. Shah	Electronics	Fresh
3	Prof. Priya Deshpande	Electronics	Alvin
4	Prof. G.T. Haldankar	Electronics	

Referred syllabus links (URL\*):

1 [www.tiss.edu](http://www.tiss.edu)

2 [www.mygov.in](http://www.mygov.in)

3

Unit No	Inclusion	Reason	MR
	The entire content and name of the subject is changed.	Since action research plan is based on small research projects and encourages students to solve real life problems.	
			100%

Unit No	Deletion	Reason
	Entire content of the syllabus and evaluation criteria is changed.	Since in mini Project-I evaluation there was not enough motivation for students to undertake projects to solve society problems. It was just an implementation of some project idea.

Please specify the link here if referred.



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MR

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# Sardar Patel Institute of Technology

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## Electronics Engineering Department

Academic Year: 2018 - 2019

Name of the Course Coordinator: Dr. S.S. Rathod / Prof. P.V. Kasambe / Prof. Priya Deshpande / Prof. Pavani Patankar / Prof. P.H. Shah  
Subject Name: Action Research Plan - II  
Class: T.E. Electronics Semester: VI

Sr. No.	Name of the committee members	Department	Signature
1	Prof. P.V. Kasambe	Electronics	✓.pr
2	Prof. P.H. Shah	Electronics	✓.Shah
3	Prof. Priya Deshpande	Electronics	✓.Deshpande
4	Prof. G.T. Haldankar	Electronics	

Referred syllabus links (URL\*):

1. [www.tiss.edu](http://www.tiss.edu)

2. [www.mygov.in](http://www.mygov.in)

3.

Unit No	Inclusion	Reason
	The entire content and Name of the subject is changed.	Since action research plan is based on small research project 100% and encourages students to solve real life problems.

Unit No	Deletion	Reason
	Entire content of syllabus evaluation criteria is changed.	Since mini Project II evaluation criterias were not enough to motivate students to undertake projects to solve society/real life problems. It was just an implementation of some project idea in most of the cases.

specify the link here if referred.

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**ELECTRONICS ENGINEERING DEPARTMENT**

**Academic Year: 2017 – 2018**

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: **Industrial and Organizational Psychology**

Class: TE

Semester: V

Comments:

This course is introduced to impart knowledge and understanding of the basic concepts in and various facets of Industrial and Organizational Psychology. Students should be aware about the role and importance of Psychological factors and processes in the world of work.

This course is also introduced to create a foundation for higher education and a professional career in Industrial Psychology and Organizational Behavior.



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Signature of Domain Expert: Dr. Surendra Rathod



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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

1/0

Subject Name: Law for Engineers

Class: TE

Semester: V

### Comments:

This course is a survey of legal topics relevant to engineers, including basic of legal system, labor law, intellectual property, torts, and contracts. This is an introductory course, emphasizes on legal principles that can provide engineers with the ability to recognize legal issues that are likely to arise in the engineering profession.

In this course student will be able to recognize the importance of the legal system, and the controls it exerts on the activities of engineers in practice. Also student will be able to express the details of what the individual's responsibilities are to ensure legal behaviour in engineering practice.



Rb

*Rathod*

Signature of Domain Expert: Dr. Surendra Rathod



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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Creative Thinking, Diversity and Workplace Etiquette

Class: TE

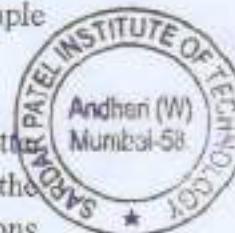
Semester: V

### Comments:

This is activity based course on creative thinking, diversity and workplace etiquette. Organizations thrive on innovative ideas and new answers to old problems. To become successful not only these approaches be fresh, they must also be sound. This activity shall inspire students to push them for critical thinking and decision making. Students may be asked to provide innovative solutions to specific issues within the organization to meet business needs. Through this activity students shall learn how to step out of their comfort zone, able to isolate problems, recognize differences between left brain and right brain thinking, and apply creative thinking techniques to business problems.

Nowadays students are becoming global and degree from an accredited institute is considered as 'Educational Passport' hence it is necessary to include training on diversity. Training on working in a culturally diverse team to prepare students for an international work is required. A better understanding of others can improve communication, encourage engagement, reduce inappropriate behavior and increase the strength of a team. A strategy of inclusion can also help employees realize their full workplace potential. Activities shall be planned for diversity awareness, unconscious bias, generational differences, communicational style preferences and tactics for managing heterogeneous teams. Igniting thought provoking questions and conversations related to diversity in race, gender, culture, age and other observable differences shall be fundamental to this activity. Activity shall also address cognitive biases which are influences that cause us to make decisions based on information outside of logic and rational thinking for example behavioral partiality and social favoritism.

Organizations expect that employees are aware of workplace expectations and etiquette. While the use of good business etiquette will not make up for technical knowledge in the workplace but bad manners and poor etiquette can cost both employees and organizations for which they work. This activity shall focus on ins and outs of business etiquette by



*Surendra Rathod*



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managing technology and social media effectively. Activity shall be based on Cell phone etiquette, Email etiquette, social media etiquette, board meeting etiquette, sales meeting etiquette, business dressing and dining skills, international manners along with exceptional etiquette like hosting corporate guests, interacting with public or customers and business networking.

Signature of Domain Expert: Dr. Surendra Rathod



*Surendra* ✓

*Rs*



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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Prof. Kumar Khandagale

Subject Name: Consumer Electronics

Class: TE

Semester: VI

### Comments:

Consumer electronics is a very big market in the world. Today's engineers are expected to know working details of consumer electronic products. One of the expected outcome of this course is student will be able to list and classify devices used in consumer products based on their specifications, identify sub-systems of consumer electronic products and choose and use proper interface standard for a given consumer electronic product.

This course will introduce students to working principle of consumer electronic products and carry out basic tests to identify their correct operation. In this course students will be able to experiment with Haptics, Multitouch devices, Device interconnects and peripherals and also suggest modification in consumer electronic product using modern tools to enhance user experience. In this course student will be able to assemble subsystem of Television set, analyze technology used in audio systems, demonstrate working principal of Healthcare and home electronics consumer products. Also student will be able to demonstrate working principal consumer electronic products used in Occupational safety.

Signature of Domain Expert: Prof. Kumar Khandagale

Dr. S.S. Rathod  
  
P.V. Karanambe



B. Shinde



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Robotics  
vision.

## ELECTRONICS ENGINEERING

Academic Year: 2018-2019

### Theory Course Revision Report

Course Name: *Robotics Vision*

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ).

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

SR. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	New Course Content- Introduced	New course	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



*Shubham*



## Sardar Patel Institute of Technology

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 (Autonomous Institute Affiliated to University of Mumbai)

### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	K. T. Taleu	ESTR	K. T. Taleu
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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*R. S.*



# Sardar Patel Institute of Technology

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1979  
 Cyber security  
 and digital  
 forensics

## ELECTRONICS ENGINEERING

Academic Year: 2018-2019

### Theory Course Revision Report

Course Name: Cyber Security & digital forensics

Course Code Old (2018-21):

Course Code New (Autonomy 20 - ):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly introduced	As per the autonomous curriculum looking at trends & appln.	
2			100 %
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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### Details of Committee members Name & Signature:

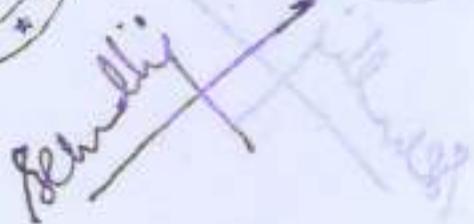
Sr. No.	Name of committee members	Department	Signature
1	Dnyanand Ambawade	EXTC	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



  
 Faculty Member

  
 Faculty Member



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## ELECTRONICS ENGINEERING

Academic Year: 20 – 20

### Theory Course Revision Report

Course Name:

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: *Internet of things*

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	All Modules	New Subject	100 %
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



RJ

*RJ**Secretary*



## Sardar Patel Institute of Technology

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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1			
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



*Shrikant*

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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Technical Paper and Patent Drafting

Class: TE

Semester: VI

### Comments:

This course aims to encourage students to study advancement in engineering developments, prepare a technical paper based on the research topic and give holistic insight on the various aspects of patents that would be relevant to them.

Invited talks and workshop on latex shall be conducted to impart the knowledge in technical paper drafting and presentation. The primary learning outcomes expected are:

- Knowledge about importance of paper publication
- Key parts of a technical paper and drafting related issues
- Submission and review process of paper
- Paper presentation related issues
- Ethical issues

Invited talks and workshop shall be conducted to impart the knowledge in patent drafting. The primary learning outcomes expected are:

- Knowledge about Intellectual Property & Patents
- Patent Searching
- Patent Drafting
- Patent Commercialization & Case Studies

Signature of Domain Expert/Dr. Surendra Rathod



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# Sardar Patel Institute of Technology

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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: French Language

One of the outcome expected will be to develop ability in a student to greet the other, to be able to introduce oneself and the partner, to be able to talk about their address, to be able to count upto 20, make use of knowledge of alphabets, speak about countries and languages, telephone numbers, to be able to speak about hobbies.

Also student will be able to speak about hobbies, to be able to talk about work, jobs, and office timings, to be able to count beyond 20, to be able to talk about seasons, to be able to register own data on internet site. Student will be able to name places and important buildings like the marketplace, to be able to ask questions regarding places, to be able to relate texts to a picture story, ask for things, name the means of public transport, ask for directions Student will be able to identify food items and to talk about them, to be able to write a shopping list, understand conversations in a supermarket, understand W-questions. Student will be able to understand time, plan time table as per required time, to be able to speak about family, to excuse oneself for being late, to be able to fix an appointment telephonically. Student will be able to plan something together, to be able to speak about birthday, to understand and draft an invitation, to be able to order and pay food items in a restaurant, to be able to talk about routine events, understand event information on radio.

B. Rathod  
Dr. Surendra Rathod



BB



# Sardar Patel Institute of Technology

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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: German Language

Class: TE

Semester: VI

### Comments:

Nowadays students are becoming global and degree from an accredited institute is considered as 'Educational Passport' hence it is necessary to include training on foreign languages. German language is introduced by looking at the demand of foreign language in market.

One of the outcome expected will be to develop ability in a student to greet the other person, say good bye, introduce oneself and the partner, to be able to talk about the others, to be able to count upto 20, make use of knowledge of numbers as regards understanding telephone numbers, to be able to recognize alphabets, speak about countries and languages.

Also student will be able to speak about hobbies, take leave of someone, name the days of the week, to be able to talk about work, jobs, and office timings, to be able to count beyond 20, to be able to talk about seasons, to be able to register own data on internet site. Student will be able to name places and important buildings like the marketplace, to be able to ask questions regarding places, to be able to relate texts to a picture story, ask for things, name the means of public transport, ask for directions Student will be able to identify food items and to talk about them, to be able to write a shopping list, understand conversations in a supermarket, understand W-questions. Student will be able to understand time, plan time table as per required time, to be able to speak about family, to excuse oneself for being late, to be able to fix an appointment telephonically. Student will be able to plan something together, to be able to speak about birthday, to understand and draft an invitation, to be able to order and pay food items in a restaurant, to be able to talk about routine events, understand event information on radio.

Signature of Domain Expert: Dr. Surendra Rathod



16



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
EILP56	Action Research Project-I	-	--	2	-	--	2	2
<b>Examination Scheme</b>								
ISE			MSE		ESE		Total	
Phase-I:10			--		50		100	
Phase-II:10								
Phase-III:10								
Phase-IV:20								

**Pre-requisite Course Codes** All the Courses till Vth Semester.

Action research is an opportunity to make a difference in the experience of education in its own way. It is an attempt of scientific study of the problem in surrounding in order to guide, correct and evaluate the actions and decisions about it. Action research is based on small research project correlating scientific knowledge and day to day experience which encourages development of scientific attitude to solve real life problems among students.

**The Objectives of Action Research are:**

- ✓ To make students sensitive towards societal issues
- ✓ To learn scientific principles from day-to-day experiences
- ✓ To develop psychotechnological skills through observation, classification, statement of hypothesis etc.
- ✓ Development of communication, organizational skills and maturity through discussion, presentation etc.
- ✓ To develop ability to correlate science, technology and society
- ✓ To apply engineering knowledge and propose innovative, sustainable solutions to the real life challenges

**Steps of action research:**

- ✓ Keen observation of the surrounding/society
- ✓ Identification of the problem
- ✓ Analysis of the problem
- ✓ Collection of relevant information by formulating research questions
- ✓ Suggesting plan of action
- ✓ Conducting experiments
- ✓ To draw conclusion
- ✓ To find the possible solution to rectify the problem
- ✓ To execute experiments and remedial measures wherever possible

Students can seek guidance from teachers, other experts and make effective use of other sources of information available around them.



*Renuka*  
Renuka

*RB*



## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		--	--	2	--	--	2	2
Examination Scheme								
EXL504	Mini Project-I	ISE		Practical		Oral		Total
		Phase-I:10		--		50		100
		Phase-II:10						
		Phase-III:10						
		Phase-IV:20						

### ISE:

The main intention of Mini Project is to make student enable to apply the knowledge and skills learned out of courses studied to solve/implement predefined practical problem. The students undergo various Laboratory/ tutorial/ simulation laboratory/work shop courses in which they do experimentation based on the curriculum requirement. The Mini Project may be beyond the scope of curriculum of courses taken or may be based on the courses but thrust should be on

- Learning additional skills
- Development of ability to define and design the problem and lead to its accomplishment with proper planning
- Learn the behavioral science by working in a group

The group may be maximum **four (04)** students. Each group will be assigned one faculty as a supervisor. The college should keep proper assessment record of progress of the project and at the end of the semester it should be assessed for awarding TW marks. The TW may be examined by approved internal faculty appointed by the head of the institute. The final examination will be based on demonstration in front of internal and external examiner. In the examination each individual student should be assessed for his/her contribution, understanding and knowledge gained about the task completed. The students may use this opportunity to learn different computational techniques as well as some model development. This they can achieve by making proper selection of Mini Projects.



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Students must ensure that problem to be solved in manageable in one semester.

Teachers must follow the below mentioned principles:

- ✓ Make student confront problem solving
- ✓ Develop methods and techniques of handling problems. Teach how to use the methods and not directly give solution to the problem.
- ✓ Emphasize positive thinking
- ✓ Lead the students to the peak of their powers for improvement of better learning.

Criteria of a good project:

- ✓ Appropriate idea, clear understanding and proper presentation of the concept
- ✓ Quality of work
- ✓ Project plan and its execution
- ✓ Credibility of the work
- ✓ Probable impact of the work on the attitude of students and society
- ✓ Scientific attitude, creativity and novelty reflected in project work and analysis of the situation
- ✓ Utility and innovation of the remedial measures
- ✓ Efforts taken towards implementation
- ✓ Desirability, Feasibility and Viability in real life

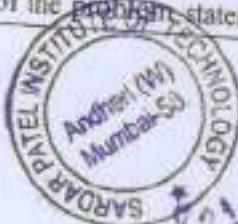
The H/W and S/W resources required to complete the Action Research Project I may be beyond the scope of curriculum of courses taken or may be based on the courses but thrust should be on • Learning additional skills • Development of ability to define and design the problem and lead to its accomplishment with proper planning • Learn the behavioral discipline by working in a team. The team may be maximum three (03) students.

Evaluation:

Project report should be submitted on A-4 size pages. Use both printing. Report must carry project title, student details, certificate and acknowledgements. Other sections of the report shall be decided by the department based on projects. But it must have introduction, necessity of project, objectives, hypothesis ("If I do... then I may get..."), plan, observations, analysis of results, conclusion and references along with other sections related to technology.

The ISE and ESE evaluation will be carried out based on the rubrics framed by the Department. ISE marks will be based on the performance of the individual student in four phases of evaluation. The evaluation of the Phase-I will be based on presentation of the market/literature survey, problem definition and project title finalization. Evaluation of Phase-II will be based on circuit/algorithm design, purchase of H/W and S/W resources, simulation/testing of circuit/algorithm. Phase-III evaluation will consist of PCB design, PCB making/verification of algorithm and testing of circuit/algorithm. Phase-IV evaluation is based on demonstration, poster presentation, technical report and paper writing during Action Research Project I contest.

The ESE marks will be based on demonstration in front of the expert appointed by the Department. In the ESE examination each individual student would be assessed for his/her contribution in selecting the originality of the problem statement, understanding and knowledge gained about the task completed



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through presentation/demonstration, work done, and preparing the technical report/poster/technical paper of the project in the standard format provided by the Department.



*Tendulkar*

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# Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ELP56	Action Research Project-II	--	--	2	--	--	2	2
Examination Scheme								
ISE			MSE		ESE		Total	
Phase-I:10			--		50		100	
Phase-II:10								
Phase-III:10								
Phase-IV:20								

Pre-requisite Course Codes All the Courses till Vth Semester.

Action research is an opportunity to make a difference in the experience of education in its own way. It is an attempt of scientific study of the problem in surrounding in order to guide, correct and evaluate the actions and decisions about it. Action research is based on small research project correlating scientific knowledge and day to day experience which encourages development of scientific attitude to solve real life problems among students.

### The Objectives of Action Research are:

- ✓ To make students sensitive towards societal issues
- ✓ To learn scientific principles from day-to-day experiences
- ✓ To develop psychotechnological skills through observation, classification, statement of hypothesis etc.
- ✓ Development of communication, organizational skills and maturity through discussion, presentation etc.
- ✓ To develop ability to correlate science, technology and society
- ✓ To apply engineering knowledge and propose innovative, sustainable solutions to the real life challenges

### Steps of action research:

- ✓ Keen observation of the surrounding/society
- ✓ Identification of the problem
- ✓ Analysis of the problem
- ✓ Collection of relevant information by formulating research questions
- ✓ Suggesting plan of action
- ✓ Conducting experiments



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[Signature]



## Sardar Patel Institute of Technology

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- ✓ To draw conclusion
- ✓ To find the possible solution to rectify the problem
- ✓ To execute experiments and remedial measures wherever possible

Students can seek guidance from teachers, other experts and make effective use of other sources information available around them.  
Students must ensure that problem to be solved in manageable in one semester.

Teachers must follow the below mentioned principles:

- ✓ Make student confront problem solving
- ✓ Develop methods and techniques of handling problems. Teach how to use the methods and not directly give solution to the problem.
- ✓ Emphasize positive thinking
- ✓ Lead the students to the peak of their powers for improvement of better learning.

### Criteria of a good project:

- ✓ Appropriate idea, clear understanding and proper presentation of the concept
- ✓ Quality of work
- ✓ Project plan and its execution
- ✓ Credibility of the work
- ✓ Probable impact of the work on the attitude of students and society
- ✓ Scientific attitude, creativity and novelty reflected in project work and analysis of the situation
- ✓ Utility and innovation of the remedial measures
- ✓ Efforts taken towards implementation
- ✓ Desirability, Feasibility and Viability in real life

The H/W and S/W resources required to complete the Action Research Project I may be beyond the scope of curriculum of courses taken or may be based on the courses but thrust should be on - Learning additional skills • Development of ability to define and design the problem and lead to its accomplishment with proper planning - Learn the behavioral discipline by working in a team. The team may be maximum three (03) students.

### Evaluation:

Project report should be submitted on A-4 size pages. Use both printing. Report must carry project title, student details, certificate and acknowledgements. Other sections of the report shall be decided by the department based on projects. But it must have introduction, necessity of project, objectives, hypothesis ("If I do...then I may get..."), plan, observations, analysis of results, conclusion and references along with other sections related to technology.



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## Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
EXL604	Mini Project II	-	-	2	-	-	2	2
<b>Examination Scheme</b>								
		ISE		Practical		Oral		Total
		Phase-I:10		-		50		100
		Phase-II:10						
		Phase-III:10						
		Phase-IV:20						

### ISE:

The main intention of Mini Project is to make student enable to apply the knowledge and skills learned out of courses studied to solve/implement predefined practical problem. The students undergo various laboratory/tutorial/simulation laboratory/work shop courses in which they do experimentation based on the curriculum requirement. The mini Project may be beyond the scope of curriculum of courses taken or may be based on the courses but thrust should be on

- Learning additional skills
- Development of ability to define and design the problem and lead to its accomplishment with proper planning.
- Learn the behavioral science by working in a group

The group may be maximum **four** (04) students. Each group will be assigned one faculty as a supervisor. The college should keep proper assessment record of progress of the project and at the end of the semester it should be assessed for awarding TW marks. The TW may be examined by approved internal faculty appointed by the head of the institute. The final examination will be based on demonstration in front of internal and external examiner. In the examination each individual student should be assessed for his/her contribution, understanding and knowledge gained about the task completed.

The topic of Mini Project I and II may be different and / or may be advancement in the same topic. The students may use this opportunity to learn different computational techniques as well as some model development. This they can achieve by making proper selection of Mini Projects.





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned						
		L	T	P	L	T	P	Total			
OE2	Robotic Vision	1	..	2	1	..	1	2			
		Examination Scheme		ISE		MSE		ESE		Total	
		40		10		20		70			

Pre-requisite Course Codes	EL 42: Principle of Control Systems	
At the end of the course students will be able to		
Course Outcomes	CO1	Discuss the fundamentals of Robotics
	CO2	Apply direct and inverse kinematics algorithms
	CO3	Justify the need of vision algorithms

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1	Fundamentals of Robotics		4
	1.1	Robot Classification, Robot Components, Degrees of freedom, Joints, Coordinates, Coordinate frames		
	1.2	Transformation matrix, inverse Transformation matrix,		
	1.3	Screw Transformation, Link co-ordinates		
2	2	Forward and Inverse kinematic equation, D-H Representation		4
	2.1	The Arm Matrix		
3	3	Introduction to Robot Vision		3
	3.1	Image Representation, Edge Detection		
	3.2	3D image to 2D image Transformation		
	3.3	Stereo Vision		
4	4	Edge Detection , Template Matching,		3
	4.1	Object detection and recognition		
	4.2	Object Classification		
Total				14



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Expt. No.	Suggested List of Experiments	Ref.	Marks
1	Identify the types of robot based on configuration and application.	1,2	5
2	Using the information based on length of links and no. of joints, specified angles verify the DH algorithm for forward kinematics and also to determine the maximum and minimum position of links.	1,2	5
3	Design a robots drive system and its end effectors for a given application.	1,2,3	5
4	Verify the transformation (Position and orientation) with respect to gripper and the coordinate system using any simulation software.	1,2	5
5	Estimation of accuracy, repeatability and resolution of a given robotic manipulator.	1,2	5
6	Robot programming exercises (Point-to-point and continuous path programming)	1,2,3	5
7	Edge detection		4
8	Object Detection		4
9	Object recognition using Template Matching		4
10	Vision based Application development		4
	<b>Eight Experiments Total Marks</b>		<b>40</b>

**ISE Evaluation:** Continuous evaluation of experiments for 40 Marks

**MSE Evaluation:** Subjective evaluation for 10 Marks based on theory for one hour duration

**ESE Evaluation:** Subjective evaluation for 20 Marks based on theory for one hour duration

### References:

- [1] Robert Shilling, Fundamentals of Robotics - Analysis and control, Prentice Hall of IndiaFourth edition [ISBN-81-203-1047-0]
- [2] Howie Choset, Kevin M. Lynch, Seth Hutchinson, George Kantor, Wolfram Burgard, Lydia E.
- [3] Mittal R.K. & J. Nagrath, "Robotics and Control", TataMcGraw Hill, 2003 [ISBN 0-07-048293-4]
- [4] Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Second Edition, Thomson Brooks/Cole 2004[ISBN: 981-240-061-3]



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
OE4	Internet of Things	1	-	2	1	-	1	2
<b>Examination Scheme</b>								
		ISE	MSE	ESE	<b>Total</b>			
		40	10	20	70			

## Pre-requisite Course Codes

Course Outcomes	CO1	Describe IoT value chain structure (device, data cloud), application areas, IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, RF and sensing modules.
	CO2	Describe the Architectural Overview of IoT, Reference Architecture and Real World Design Constraints and various IoT Protocols ( Datalink, Network, Transport, Session, Service)
	CO3	Apply the concepts of big data analytics, Internet of things and implement smart systems.

Module No.	Unit No.	Topics	Ref.	Hrs.
1[CO1]	1.1	<b>Overview and Introduction of Internet of Things:</b> Internet of Things Promises–Definition– Scope–Sensors for IoT Applications–Structure of IoT– IoT Map Device.	1,2,3	1
	1.2	<b>Overview and Introduction of Seven Generations of IoT sensors to Appear:</b> Industrial sensors – Description & Characteristics–First Generation – Description & Characteristics–Advanced Generation – Description & Characteristics– Integrated IoT Sensors – Description & Characteristics–IoT Generation Roadmap.	1,2,3	1
	1.3	<b>Overview and Introduction of Technological Analysis:</b> Wireless Sensor Structure–Energy Storage Module–Power Management Module–RF Module–Sensing Module. IoT Development Examples: ACOEM Eagle – EnOcean Push Button – NEST Sensor – Ninja Blocks - Focus on Wearable Electronics	1,2,3	2
2[CO2]	2.1	<b>Overview and Introduction of IoT Architecture and Protocols:</b> IoT–An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations, M2M and IoT Technology Fundamentals– Devices and gateways, Local and wide-area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management.	5,6,8	2
	2.2	<b>Overview and Introduction of IoT Data Link Layer &amp;</b>	7,8	1





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		<b>Network layer Protocols:</b> PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), WirelessHART,Z-Wave,Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP.		
	2.3	<b>Overview and Introduction of Transport &amp; Session Layer Protocols:</b> Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT	7.8	2
	2.4	<b>Overview and Introduction of Service Layer protocols &amp; Security:</b> Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 , 6LoWPAN, RPL, Application Layer.	7.8	1
3[CO3]	3.1	<b>Overview and Introduction of Data Analytics for IoT</b> <b>Introduction</b>	8.9	1
	3.2	<b>Overview and Introduction of Apache Hadoop</b> MapReduce Programming Model Hadoop MapReduce Job Execution MapReduce Job Execution Workflow Hadoop Cluster Setup <b>Using Hadoop MapReduce for Batch Data Analysis</b> Hadoop YARN  <b>Apache Spark</b> <b>Using Apache Storm for Real-time Data Analysis</b> REST-based approach WebSocket-based approach <b>Structural Health Monitoring Case Study</b>	8.9	3
<b>Total</b>				<b>14</b>

### Recommended Books:

- [1] Editors Ovidiu Vermesan Peter Friess, Internet of Things – From Research and Innovation to Market,
  - [2] N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.
  - [3] Dr. Guillaume Girardin , Antoine Bonnabel, Dr. Eric Mounier, Technologies & Sensors for the Internet of Things Businesses & Market Trends 2014 - 2024, Yole Développement
- Copyrights ,2014





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MEC3	Industrial and Organizational Psychology	2	-	-	2	-	-	2
				Examination Scheme				
		ISE1		ISE2		Attendance		Total Marks
		20		20		10		50

Pre-requisite Course Codes		—
Course Objectives	CO1	To impart knowledge and understanding of the basic concepts in and various facets of Industrial and Organizational Psychology
	CO2	To create awareness about the role and importance of Psychological factors and processes in the world of work
	CO3	To create a foundation for higher education and a professional career in Industrial Psychology and Organizational Behavior

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Theories of Employee Motivation	1,2	05
	1.1	What is motivation? Work motivation theories, need theories		
	1.2	Other theories - Reinforcement theory, expectancy theory and self-efficacy theory; Justice theories, goal-setting theory, control theory and action theory		
2		Feelings about Work: Job Attitudes and Emotions	1,2	07
	2.1	The nature of job satisfaction; how people feel about their jobs; the assessment and antecedents of job satisfaction		
3.	2.2	Potential effects of job satisfaction; organizational commitment and emotions at work	1,2	05
		Productive and Counterproductive Work Behavior		
	3.1	Productive work behavior: ability, motivation, personal characteristics and task performance; environmental conditions and task performance; organizational constraints; organizational citizenship behavior (OCB)		
4.	3.2	Counterproductive work behavior: withdrawal – absence, lateness, turnover, aggression, sabotage, and theft; labor unrest and strikes.	1,2	06
		Leadership and Power in Organizations		
	4.1	What is leadership? Sources of influence and power; abuse of supervisory power; sexual and ethnic harassment		
5.	4.2	Approaches to the understanding of leadership; women in leadership positions; cross-cultural issues in leadership	1,2	05
		Organizational Development and Theory		
	5.1	Organizational Development		
	5.2	Organizational Theories		



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Total 28

### Books Recommended

1. Spector, P. E. (2012). Industrial and Organizational Psychology: Research and Practice. Singapore: John Wiley & Sons Pte. Ltd. (Indian reprint 2015)
2. Schultz, D., & Schultz, S. E. (2010). Psychology and Work Today. ( 10<sup>th</sup> ed.). Pearson Prentice Hall



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MEC4	Law for Engineers	2	-	-	2	-	-	2
				Examination Scheme				
		ISE1		ISE2		Attendance		Total Marks
		20		20		10		50

Pre-requisite Course Codes		
Course Outcomes	CO1	Student will be able to recognize the importance of the legal system, and the controls it exerts on the activities of engineers in practice.
	CO2	Student will be able to express the details of what the individual's responsibilities are to ensure legal behaviour in engineering practice.

This course is a survey of legal topics relevant to engineers, including basic of legal system, labor law, intellectual property, torts, and contracts. This is an introductory course, emphasizes on legal principles that can provide engineers with the ability to recognize legal issues that are likely to arise in the engineering profession.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	General Principles of Contract under Indian Contract Act, 1872.	1	4
	1.2	<b>Introduction to Human Rights.</b> Enforcement of Human Rights in India including Supreme Court, High Courts, Statutory Commissions- NHRC, NCW, NCM, NC-SC/ST etc.		
2	2.1	<b>Right to Information Act, 2005:</b> Evolution and concept; Practice and procedures; Official Secret Act, 1923; Indian Evidence Act, 1872.	1	4
	2.2	<b>Information Technology-</b> legislation and procedures, Cyber crimes – issues and investigations.		
3	3.1	<b>Labor Laws:</b> Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmens Compensation Act, 1923.	1	12
	3.2	Apprentices Act, 1961. Bonded Labor System (Abolition) Act, 1976. Child Labor (Prohibition and Regulation) Act, 1986. Contract Labor (Regulation and Abolition) Act, 1970.		
	3.3	Employees' Provident Funds and [Miscellaneous Provisions] Act,		



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		1952.		
		Employees' State Insurance Act, 1948. Equal Remuneration Act, 1976. Factories Act, 1948. Fatal Accidents Act, 1855. Industries (Development and Regulation) Act, 1951. Maternity Benefit Act, 1961. Minimum Wages Act, 1948. Payment of Bonus Act, 1965. Payment of Gratuity Act, 1972. Payment of Wages Act, 1936. Trade Unions Act, 1926.		
4	4.1	Law relating to Intellectual property Law relating to Copyright in India. Law relating to Trademarks under Trademark Act, 1999. Law relating to Patents under Patents Act, 1970.	1	4
5	5.1	Corporate Law: Meaning of corporation; Law relating to companies, public and private (Companies Act, 1956) general provisions; Law and multinational companies – International norms for control, FEMA 1999, Corporate liability, civil and criminal. Election provisions under Indian Constitution (Art.324–329); Representation of Peoples Act and Prevention of Corruption Act, 1988;	1	4
			Total	28

### Books Recommended:

- [1] Nikita Agarwal and Rishi Kumar, "Laws for Engineers," Genius Publications.
- [2] P. L. Malik Handbook of Labour and Industrial Law, Eastern Book Company
- [3] Industrial labour and general laws, The Institute of Company Secretaries of India



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## ABL3: Creative Thinking, Diversity and Workplace Etiquette

### I. Creative Thinking:

Organizations thrive on innovative ideas and new answers to old problems. To become successful not only these approaches be fresh, they must also be sound. This activity shall inspire students to push them for critical thinking and decision making. Students may be asked to provide innovative solutions to specific issues within the organization to meet business needs. Through this activity students shall learn how to step out of their comfort zone, able to isolate problems, recognize differences between left brain and right brain thinking, and apply creative thinking techniques to business problems.

### II. Diversity:

Nowadays students are becoming global and degree from an accredited institute is considered as 'Educational Passport' hence it is necessary to include training on diversity. Training on working in a culturally diverse team to prepare students for an international work is required. A better understanding of others can improve communication, encourage engagement, reduce inappropriate behavior and increase the strength of a team. A strategy of inclusion can also help employees realize their full workplace potential. Activities shall be planned for diversity awareness, unconscious bias, generational differences, communicational style preferences and tactics for managing heterogeneous teams. Igniting thought provoking questions and conversations related to diversity in race, gender, culture, age and other observable differences shall be fundamental to this activity. Activity shall also address cognitive biases which are influences that cause us to make decisions based on information outside of logic and rational thinking for example behavioral partiality and social favoritism.

### III. Workplace Etiquette:

Organizations expect that employees are aware of workplace expectations and etiquette. While the use of good business etiquette will not make up for technical knowledge in the workplace but bad manners and poor etiquette can cost both employees and organizations for which they work. This activity shall focus on ins and outs of business etiquette by managing technology and social media effectively. Activity shall be based on Cell phone etiquette, Email etiquette, social media etiquette, board meeting etiquette, sales meeting etiquette, business dressing and dining skills, international manners along with exceptional etiquette like hosting corporate guests, interacting with public or customers and business networking.



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### Methodology:

Guest lectures by professionals shall be arranged on Creative Thinking, Diversity and Workplace Etiquette. At least one lecture on each topic shall be taken. Assessment shall be based on performance in following activities:

1. Short Film Making
2. Skit Performance
3. Poster Presentation
4. Project Presentation
5. Physical Model Presentation
6. Scientific Case Study



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Ranvir Singh

Ranvir Singh





## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics Engineering

Undergraduate Program

2017-18

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
HDL Programming Lab	ELL35	2017-18	100
Computer Methods for Circuit Simulation Lab	ELL46	2017-18	100
Building Automation, Fire Safety and Electronic	ABL1	2017-18	100
Yoga Vidya	LA1	2017-18	100
Music Appreciation	LA2	2017-18	100
Dramatics	LA3	2017-18	100
Occupational safety and legal stdies for engineers	ABL2	2017-18	100
Human Health Systems Approach (Noncredit)	HSS	2017-18	100
Operating systems	ETC605	2017-18	100





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Curator

HDL Lab

## ELECTRONICS ENGINEERING

Academic Year: 2017-2018

2017-2018

### Lab Course Revision Report

Course Name: HDL Programming Lab

Course Code Old (2016-17): NA

Course Code New (Autonomy 2017-18): ELL35

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: S.E (Sem III)

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Addition of VHDL programming Language	Introduction to FPGA programming	
2	Design of combinational, sequential logic on FPGA	Implementation of System on FPGA	100%.
3	Interfacing of ADC/DAC with FPGA	Building device driver for Hardware	
4			



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#### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1			
2			
3			
4			



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## Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Prof. Kumar Khandagje	EIRX	XMM 19/02/19
2			
3			
4			

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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ETR<sup>0</sup>  
2017-18

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## ELECTRONICS ENGINEERING

Academic Year: 2016-17  
2017-18

### Lab Course Revision Report

Course Name: Computer Methods for Circuit Simulation Lab

Course Code Old (2015-16): -

Course Code New (Autonomy 2016-17): ELL 46

Class and Semester in Old Syllabus: -

Class and Semesters in New Syllabus: S.E. Sem IV Electronics

#### Change/Addition in the Syllabus:

Sr. No	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	All the topics in this lab	Instead of performing experiments	100%
2	course are newly added.	simulation experiments, using circuit simulation softwares	
3		this lab enable students to understand and develop programs which are required to build any circuit simulation software package.	
4			

#### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. P. V. Kasambe	Electronics	
2	Prof. Ganpat. Patilkar	Electronics & Telecomm.	
3			
4			



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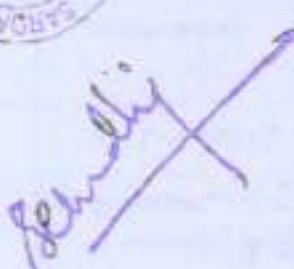
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Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. S. S. Rathod	Electronics	
2			
3			
4			

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100



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Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 - 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Building Automation, Fire Safety and Electronic Security

Class: SE

Semester: III

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### Comments:

Safety of human beings from fire is the burning issue in the society. Everyday some or the other incidence of fire is reported in the newspaper. Today's engineers are supposed to know how to deal with fire incidence in real life. Also there are various industrial products available in the market related to fire detection, fire suppression, building automation and electronic security.

This course shall introduce various aspects of building automation, fire safety and electronic security to the students. This is an activity based learning course related to the life skill.



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Signature of Domain Expert: Dr. Surendra Rathod



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**ELECTRONICS ENGINEERING DEPARTMENT**

**Academic Year: 2017 – 2018**

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: **Liberal Arts:**

**LA1: Yoga Vidya, LA2: Music Appreciation, LA3: Dramatics**

Class: SE

Semester: IV

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**Comments:**

A solid liberal arts education is more necessary than ever for today's students. Liberal arts typically refer to the courses of dramatics, music appreciation and yoga vidya. True education is meant to develop the individual human being. The overall development of human being as a person can be done through liberal arts courses.

In Yoga Vidya course student will be able to perform various techniques of Yoga. Student will be able to follow healthy habits to improve immune system, describe the importance of Yoga in one's life and to make resolution to practice techniques of Yoga

Student must appreciate various processes of Music composition. Also it is important to understand the role of engineers in sound recording

Dramatics course is introduced to make students understand an Art of Theatre. It is expected that they express their thoughts, create and visualize new ideas and perform impressively.

Signature of Domain Expert: Dr. Surendra Rathod



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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Occupational Safety & Legal Studies for Engineers

Class: SE

Semester: IV

### Comments:

Engineering is the branch of science and technology concerned with design, building and the use of engine, machines and structures. In this fast moving world scenario, it is seen that the field of Engineering has travelled a very long distance of time space. In the modern parlance, this field must be properly knitted with the other two important dimensions—SAFETY & LAW. An Engineer must have adequate knowledge of these vital subjects if he ever wishes to establish himself in this Industrial world.

This activity based learning course is introduced to impart life skills related to occupational safety and legal studies. The activities have been designed to meet up with the growing expectations with the concerned topic.

Signature of Domain Expert: Dr. Surendra Rathod





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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Human Health Systems Approach

Class: SE

Semester: III

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### Comments:

One of the necessary ingredient of an engineer is the ability to understand how things work. An engineer must know how something is supposed to work before she or he can quantitatively analyze the prospective design. The laws of physics, chemistry, mathematics, and engineering sciences are relevant, just as are the unique uses to which they are put in living things. And, to make this clear, this course deal with the entire realm of human health. This course presents biology as a set of concepts that work together.

Elementary knowledge of biology is very important for engineers from various perspectives. First of all students must understand that physiology is an integrated interdisciplinary Science. Also to remain healthy in life they must know the physiological significance of balanced diet and exercise. This course gives knowledge to the students about control mechanism and defense system of the human body. This course is introduced to make students aware of the significance of cleanliness and hygiene in daily routine. The knowledge of dynamics and homeostasis of human health will also give them edge in prospective projects in third and final year of engineering.

Signature of Domain Expert: Dr. Surendra Rathod





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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Prof. D. D. Ambawade / Prof. Najib Ghatte

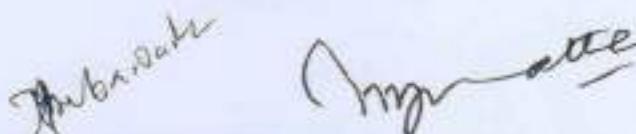
Subject Name: Fundamentals of Operating Systems Lab (ELL63)

Class: TE (Electronics) Semester: Sixth

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) Comments:

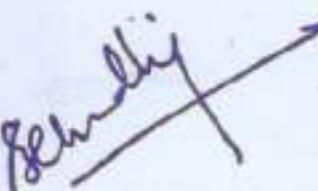
- Nowadays, working knowledge of Operating System is essential for any Engineering graduate irrespective of type of operating system.
- Also, fundamentals of Operating System and its various features should be covered as hands-on experience than a theory class.
- Advanced Instrumentation Systems (EXC602) in place of which, Fundamentals of Operating System (ELL63) is added and has the importance only if it is taught and practiced in laboratory.
- Hence, two lab courses are added ie. Fundamentals of Operating Systems Lab (ELL63) and Instrumentation Laboratory (ELL56) in sixth semester and fifth semester respectively.

  
Prof. D. D. Ambawade / Prof. Najib Ghatte

Signature of Domain Expert

% change in syllabus : 100 %



  
Najib



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ELL35	HDL Programming Lab	-	-	2	--	--	1	1
		Examination Scheme						
		ISE		ESE		Total		
						Practical	Oral	
		40	10	10	60			

Pre-requisite Course Codes	EL33 (Digital Circuits)
After successful completion of the course, student will be able to	
Course Outcomes	CO1 Write VHDL code to build the given hardware
	CO2 Verify the behavior of given hardware with VHDL simulation tool
	CO3 Write synthesizable VHDL code and perform physical verification on FPGA and CPLD device
	CO4 Write, simulate, synthesize and implement VHDL code with behavioral, dataflow and structural modeling style
	CO5 Interface the external peripherals with FPGA and design a hardware to create an application.
	CO6 Interpret the RTL, synthesis, Floorplan report and optimally utilize the internal resources of given FPGA

Exp. No.	Experiment Details	Ref.	Marks
1	Design, simulate and synthesize 9 bit parity generator using dataflow modeling and carry out physical verification on given FPGA.	1,2,3	5
2	Design, simulate and synthesize ripple carry adder and carry-look ahead adder using structural modeling and carry out physical verification on given FPGA	1,2,3	5
3	Design, simulate and synthesize a stepper motor control hardware using Johnson counter. Use behavioral modeling for designing this hardware. Carry out physical verification on given FPGA	1,2,3	5
4	Write the testbench to verify the given IP.	1,2,3	5
5	Interface ADC/ DAC with FPGA. Give input signal to ADC, digitally amplify the input signal, give amplified data to DAC and observe the amplified output on DSO.	1,2,3	5





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6	FPGA implementation of Traffic light controller in VHDL using Finite State Machine	4	5
7	Design of Microcomputer using existing IP. Use instantiation for designing the hardware.	2	5
8	Mini project as an application of HDL	4	5
<b>Total Marks</b>			<b>40</b>

**References:**

- [1] J. Bhaskar, "VHDL Primer", Pearson Education.
- [2] Gaganpreet Kaur, "VHDL Basic to Programming", Pearson
- [3] Douglas Perry, "VHDL: Programming by Example" McGraw Hill
- [4] Application notes by Xilinx and Altera



*Semester*

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned					
		L	T	P	L	T	P	Total		
ELL46	Computer Methods for Circuit Simulation Lab	-	-	2	-	-	1	1		
		Examination Scheme								
		ISE			ESE			Total		
		40			--	20	60			

Pre-requisite Course Codes	Programming in C BS31 (Mathematics) EL32 (Circuit theory)
----------------------------	---

After successful completion of the course, student will be able to

Course Outcomes	CO1	Illustrate a network in terms algebraic equations
	CO2	Apply Numerical techniques to solve linear and non linear algebraic equations
	CO3	Perform DC and Transient analysis on Electrical networks
	CO4	Analyze the given circuit using Monte Carlo

Exp. No.	Experiment Details	Ref.	Marks
1	Formulation of Linear algebraic Equations for Network using Modified Nodal Analysis and Apply Gaussian Elimination and L U decomposition methods for Solution	1,3,4	5
2	Apply Indirect methods (Gauss-Seidel and Gauss Jacobi) to find Solution of Linear algebraic Circuit Equation	1,3,4	5
3	Formulation of Non-Linear algebraic Equations for Network and Applying Newton – Raphson method to solve them	2,3,4	5
4	Applying Newton – Raphson method for solving a MOSFET based Non-Linear algebraic Circuit Equations	1,3,4	5
5	Transient simulation using Forward Euler, Backward Euler and Trapezoidal method. Verification of Stability in each method.	2,3,4	5
6	Solution of differential circuit equations using linear multistep methods	1,3,4	5
7	Solution of differential circuit equations using trapezoidal ringing	1,3,4	5
8	Perform Monte-Carlo Analysis on given circuit	1,2,3,4	5
Total Marks			40





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### References:

- [1] F. N. Najm, *Circuit Simulation*, Wiley-IEEE Press, 2010
- [2] M.B. Patil, V. Ramanarayanan, V. T. Ranganathan, *Simulation of Power Electronic Circuits*, Narosa
- [3] E. Balagurusamy, *Numerical Methods*, TATA McGRAW HILL.
- [4] R. Raghuram, *Computer Simulation of Electronic Circuits*, New Age International



*J. L. Patel 13*



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### 'Activity Based Learning'

#### **ABL1: Building Automation, Fire Safety and Electronic Security**

This is non-credit activity conducted in semester III for all the branches of engineering. It is compulsory for all the students to appear for this activity.

This is one day event involving following activities:

1. Invited Talks on the related topics
2. Poster Presentation
3. Fire/Safety Drills
4. Design competition in building automation, fire safety and security.

This event shall be conducted in association with Fire and Security Association of India (FSAI).

#### **ABL2: OCCUPATIONAL SAFETY & LEGAL STUDIES FOR ENGINEERS**

*Engineering is the branch of science and technology concerned with design, building and the use of engine, machines and structures. In this fast moving world scenario, it is seen that the field of Engineering has travelled a very long distance of time space. In the modern parlance, this field must be properly knitted with the other two important dimensions—SAFETY & LAW. An Engineer must have adequate knowledge of these vital subject if he ever wishes to establish himself in this Industrial world.*

*The following activities have been designed to meet up with the growing expectations with the concerned topic. Students are requested to actively participate in those activities based learning to catch up with the realities of the industrial world.*

*Hence, the activities are divided into 5 parts—MOOT COURT, DEBATE, ELOCUTION, PRESENTATION & ROLE PLAY*

##### **1) MOOT COURT:**

*It is a process in which participants take part in simulated court proceedings, usually involving drafting memorials or memoranda and participating in oral argument. It is just a dummy*



*Benzil* ✓ R ✓



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presentation of the actual court proceedings. It will have a pair of counsel from the defendant as well as the prosecution side. The case write up will be given to both the sides well in advance. They need to study the case along the lines of actual law pertaining to the case which will be more or less company law, intellectual property laws, banking laws, insurance laws or negotiable instrument laws. Both sides will have a researcher who will work along with his respective team to unearth any backdated supportive cases. The sides has to come in common consensus to work on issues which should not be more than five. Based on those issues both sides will present their case turn by turn with the permission of the judge. Judge can consist of persons ranging from 1 to 3. The issues should be dealt with in the book called memorial which should be prepared by both the sides. The prosecution will start the case followed by the defendants. Nobody can criss-cross each other's time of presentation. The judge/s have to control the whole proceedings properly. The judge has the power to give permission for rebuttal as per his own whims. In the end he will pass the judgment based on law.

### 2) DEBATE:

Debates will have topics based on safety and law based and the pair of participants need to stand for or against the motion.

### 3) ELOCUTION:

Same will be the case with elocution but it will be extempore and the participants will have to present their insights on the topic given on the spot.

### 4) PRESENTATION:

A PPT presentation will have topics based on legal laws and students need to prepare the same.

The list of topics are:

*Sale deed, WILL, Gift Deed, Agreement, Power of attorney, MOU(Memorandum of Understanding), Non-Disclosure agreements, Affidavit, Charter, Partnership deed, Copyrights Transfer Agreement, Franchise Termination, Lease purchase contract, Letters Patent, Legal Threat, Promissory Note, Share Certificate, Share transmission.*

### 5) ROLE PLAY:

This activity is a group activity whereby they have to work as a team and enact some situation pertaining to law or safety in the Industrial premises. It's a fun activity whereby they camouflage themselves stepping into the shoes of the role that they will be performing to create an awareness amongst the audience of what to do in case they find themselves in same situations in near future.



*Honey Singh*



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
LAI	Yoga-Vidya	1	-	-	Non-Credits			
		Examination Scheme						
		ISE1		ISE2	Attendance		Total	
		20		20	10		50	
Student will be evaluated after six sessions for 20 Marks (ISE1) and at the end of last session for 20 Marks (ISE2). Grade equivalent to 'D' (50%-59.99% Marks) or above is considered as 'Satisfactory'. If any of the tasks given is not completed/submitted/shown/evaluated then the corresponding lower grade will be given. Although the grades are given they will not mentioned in final grade card but they are necessary to declare the successful completion of the Non-Credit course.								

Pre-requisite Course Codes	---	
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Student will be able to perform various techniques of Yoga
	CO2	Student will be able to follow healthy habits to improve immune system
	CO3	Student will be able to describe the importance of Yoga in one's life
	CO4	Student will be able to make resolution to practice techniques of Yoga

Through this course, students will get an all-round experience of how Yoga can benefit their body, breath, emotions along with relaxation techniques to maintain a calm and balanced state of mind.

Day No.	Topics	Hrs.
1	What is Yoga, why Yoga? Techniques: warm up stretches for hands, legs, neck; Sukhasana, Padmasana	1
2	Introduction to Ashtanga Yoga Techniques: Tadasana, Utkatasana, Konasana 2	1
3	Asana classification and importance of different types of Asanas Techniques: Sthita-prarthanasana, Ekapadasana, Garudasana	1
4	Yogendra rhythm- breathing pattern Techniques: Parvatasana, Yashikasana	1
5	Forward bending and abdominal compression Techniques: Konasana 3, Yogamudra	1
6	Shuddhi Kriyas- Prevention of diseases by improving immune system Techniques: Jalaneti, Kapalabhati	1



*[Handwritten signatures/initials over the stamp]*



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7	Yogic Aahar Techniques: Vajrasana, Pavanmuktasana	1
8	Relaxation and it's importance Techniques: Shavasana	1
9	Spine and it's importance in Yoga Techniques: Bhujangasana, Makarasana, Vakrasana	1
10	Pranayama Techniques: Basic techniques	1
11	Attitude training Techniques: connecting techniques to concepts,	1
12	Pranayama Techniques: Traditional Pranayama	1
13	Yogachara- The Yoga way of living Techniques: Games	1
14	Revision	1

### Books Recommended:

- [1] Sadashiv Nimbalkar, "Yoga for Health & Practices", Yoga Vidya Niketan,Mumbai.
- [2] Swami Satyananda Saraswati, "Asana Pranayama Mudra Bandha", Yoga Publications Trust, Munger, Bihar, 2008
- [3] Dr.H.R.Nagendra, Dr.R.Nagarathna, "New Perspectives in Stress Management", Vivekananda Yoga Research Foundation, Bangalore
- [4] Books from The Yoga Institute, Santacruz:
  - a) Yoga Encyclopedia Vol 11
  - b) Yoga of caring
  - c) Insights through Yoga
  - d) Growing with Yoga



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
LA2	Music Appreciation	1	-	-	Non-Credits			
		Examination Scheme						
		ISE1		ISE2	Attendance		Total	
		20		20	10		50	
Student will be evaluated after six sessions for 20 Marks (ISE1) and at the end of last session for 20 Marks (ISE2). Grade equivalent to 'D' (50%-59.99% Marks) or above is considered as 'Satisfactory'. If any of the tasks given is not completed/submitted/shown/evaluated then the corresponding lower grade will be given. Although the grades are given they will not mentioned in final grade card but they are necessary to declare the successful completion of the Non-Credit course.								

### Pre-requisite Course Codes ---

After successful completion of the course, student will be able to

Course Outcomes	CO1	Appreciate North Indian Hindustani Music
	CO2	Appreciate the classical music in films

Topics	Hrs.
1. Broad perspective of North Indian of Hindustani Music i.e. a - Classical Vocal b - Semi-Classical Vocal, c - Instrumental - Plucked, Bowed & Wind d - Percussion, e - Families of Musical Instruments.	14
2. Performance scenario of vocal, instrumental and percussion	
3. Film Music where classical music is used	



*Final* ~~*Final*~~

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
LA3	Dramatics	1	-	-	Non-Credits			
		Examination Scheme						
		ISE1		ISE2	Attendance		Total	
		20		20	10		50	
Student will be evaluated after six sessions for 20 Marks (ISE1) and at the end of last session for 20 Marks (ISE2). Grade equivalent to 'D' (50%-59.99% Marks) or above is considered as 'Satisfactory'. If any of the tasks given is not completed/submitted/shown/evaluated then the corresponding lower grade will be given. Although the grades are given they will not be mentioned in final grade card but they are necessary to declare the successful completion of the Non-Credit course.								

Pre-requisite Course Codes	---	
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Understand an Art of Theatre.
	CO2	Express their thoughts.
	CO3	Create and visualize new ideas.
	CO4	Perform impressively.

Day No.	Topics	Hrs.
1	Lalitkala ( Forms of Art)	1
2	Drama – Show and Text	1
3	Techniques – Abhinay (Acting)	1
4	1. Vachik Abhinay ( Reading)	1
5	2. Angik Abhinay (Expressions)	1
6	3. Satvik Abhinay	1
7	Digdarshan ( Direction)	1
8	Nepathya ( Settings)	1
9	Veshbhusha ( Drapery)	1
10	Natyabhasha ( Dialogs and Language)	1
11	Kaal and Avakash ( Time and Space)	1
12	Natya Rasa ( Theory of Rasa)	1
13	Natya Rasa ( Theory of Rasa)	1
14	Aswad prakriya	1
	Total	14



*Patelji* *B*



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### References:

- [1] An Actors prepare – Stanislavsky ( English )
- [2] A building a Character – Stanislavsky( English )
- [3] Natyashastra – Bharatmuni ( English And Marathi )
- [4] Abhinaysadhana- K. Narayan Kale (Marathi)
- [5] Natyavimarshe-K. Narayan Kale (Marathi)
- [6] Jagatik Rangabhumicha Itihas – Kra. Ra. Sawant (Marathi)
- [7] Marathi Rangabhumicha Itihas - Shri. Na. Banuhatti ( Marathi )
- [8] Lalitkalamimansa- Go. Chi. Bhate( Marathi )
- [9] Sahitya Adhyapan Ani Prakar- va. la. Kulakarni Gauravgranth( Marathi )
- [10] Vachik Abhinay- Dr. Shriram Lagoo ( Marathi )
- [11] Rangnayak- Arwind Deshpande



*S. S. Deshpande*





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS32	Human Health Systems Approach	2	-	-	Non-Credits			
		ISE1		ISE2	Attendance		Total	
		20		20		10		50
Student will be evaluated after completion of 50% syllabus for 20 Marks (ISE1) and at the end of course for 20 Marks (ISE2). Grade equivalent to 'D' (50%-59.99% Marks) or above is considered as 'Satisfactory'. If any of the tasks given is not completed/submitted/shown/evaluated then the corresponding lower grade will be given. Although the grades are given they will not mentioned in final grade card but they are necessary to declare the successful completion of the Non-Credit course.								

Pre-requisite Course Codes	--		
After successful completion of the course, student will be able to understand			
Course Outcomes	CO1	Physiology as integrated interdisciplinary Science	
	CO2	Physiological significance of balanced diet and exercise in health	
	CO3	Significance of cleanliness and hygiene in daily routine	
	CO4	Dynamics and homeostasis of human health	

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Levels of Organizational Systems</b>	1	2
	1.1	Molecular, Cellular and Organ Systems		
	1.2	Biological Molecules		2
	1.3	Biochemistry, Biophysics, Molecular Biology and Bioengineering		
2		<b>Energy and Molecular Supply Chain Management</b>	1	7
	2.1	Digestive System: Nutrient supply and Balanced Diet		2
	2.2	Respiratory System and effects of Pollution		2
	2.3	Cardiovascular System, Blood Pressure, ECG and Blood Report		2
	2.4	Musculo-skeletal System and exercise Physiology		1
3		<b>Body Fluid Dynamics</b>	1	4
	3.1	Body fluids		2
	3.2	Kidneys as Filtration Units and their Physiological Functions		
	3.3	Urinary System		1
	3.4	Kidney and Urinary Stones, and Dialysis		1
4		<b>Control, Coordination and Regulatory Systems</b>	1	4
	4.1	Sense Organs		1





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	4.2	Nervous systems		2
	4.3	Endocrine Systems (Pancreas and Diabetes, Thyroid and its functions)		1
5	<b>Defense Systems</b>		1	3
	5.1	Integumentary System		1
	5.2	Immune System		2
6	<b>Molecular Biology and Genetical Information</b>		2	6
	6.1	Hereditary Molecules: DNA RNA		2
	6.2	Horizontal flow of Genetic Information		2
	6.3	Vertical flow of Genetic Information		2
			<b>Total</b>	<b>26</b>

### References:

- [1] Text book of Anatomy and Physiology for Nurses and allied Health Sciences by Indu Khurana & Arushi
- [2] Simplified Course in Molecular Biology by V. K. Agarwal - S. Chand Publication



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File No. 87



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ELL63	Fundamentals of Operating System Lab	--	1	2	--	1	1	2	
		Examination Scheme							
		ISE		MSE		ESE	Total		
		40		--		--	40		

Pre-requisite Course Codes	ESL14: Programming Methodology and Data Structures Lab ELL36: Object Oriented Programming Lab EL43: Computer Organization and Architecture
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 To understand OS and install, configure the system
	CO2 To explain memory management and Scheduling algorithms
	CO3 To discuss File and Disk Management
	CO4 To create user and set user policy and to install software packages
	CO5 To outline Kernel Services and Synchronization
	CO6 To configure network and server and write shell scripts

Module No.	Unit No.	Suggested List of Experiments	Ref.	Hrs.
1	1.1	<b>OS Fundamentals</b> Operating system objectives and functions, Evolution of OS, Characteristics of modern OS, Basic concepts: Processes, Files, System calls, Shell, Kernel architectures: Monolithic, Micro-kernel, Layered, Kernel mode of operations.	1,4,6	2
2	2.1	<b>Booting Process</b> Using the System(Booting and login ), User Management	4	2
3	3.1	<b>Memory Management</b> Memory Management Requirements, Memory Partitioning, Virtual memory: Paging; Segmentation; Page replacement policies, page faults	4,5,6	2
4	4.1	<b>Multiprocessor and Real-Time Scheduling:</b> Multiprocessor Scheduling, Real-Time Scheduling, Linux Scheduling, UNIX process Scheduling	1,5	2
5	5.1	<b>File System Management</b> Files-System Structure, File System implementation, Directory implementation, Allocation Methods contiguous allocation, linked list allocation, indexed allocations, Free space management.	1,5	2



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6	6.1	Disk Management Disks Scheduling Algorithm: FCFS, SSTF, SCAN, CSCAN, LOOK, Disk Management	1.5	2
7	7.1	Kernel Services and Compilations Kernel Synchronization, Kernel Service Requests, Synchronization Primitives, Kernel Data Structures, Race Condition Prevention, Kernel Wrapper Routines	6	2
<b>Total</b>				<b>14</b>

## References:

- [1] William Stallings, Operating Systems: Internals and Design Principles, 8th edition, Pearson Education Limited, 2014
- [2] John Muster, "Introduction to Unix and Linux", Tata McGraw Hill
- [3] Roderick W. Smith, "LPIC-1"
- [4] Andrew S. Tanenbaum, Herbert Bos, "Modern Operating System", 4<sup>th</sup> edition, Pearson
- [5] Silberschatz, Galvin, Gagne, "Operating System Concepts", 8 Edition, Wiley Student Edition
- [6] Daniel Bovet, Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, O'Reilly Publication
- [7] Sumitabha Das, "UNIX, concepts and applications", 4th edition, Tata McGraw Hill
- [8] Michael Palmer, "Guide to UNIX Using Linux", Fourth Edition, Cengage Learning
- [9] William E. Shotts Jr, "The Linux Command Line: A Complete Introduction", 1st Edition, No Starch Press, Inc



*Shankar*





## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics Engineering

Undergraduate Program

2017-18 to 2022-23 Revision

Program Code	Program Name	Year of Introduction	Year of Revision	Revision of course carried out in last 5 years Percentage of content added/replaced
Electronics and Telecommunication	Electronics and Telecommunication	2012-17	2017-2018	26.47
			2018-2019	62.5
			2019-2020	38.88
			2020-2021	21.34
			2021-2022	26.28
			2022-2023	57.14



*B. D. Patel* →



## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

### Department of Electronics and Telecommunication Engineering Undergraduate Program

2022-23

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
Image and Video Processing	IT21	2022-23	60
Power Electronic Converters	IX		100
Networking fundamentals	PE1X		100
Embedded System Design for Power Converter App	IY		100
Energy Storage Systems in EV Applications	IP		100
Power Electronic Converters in EV Applications	IQ		100
Consumer Electronics	OEET3		100
Robotic & Machine Vision Intelligence	OEET4		100
Power Electronic Converters in EV Applications	ET483		100

B✓

*Shivaji* ✓





22-33  
Image &  
video  
processing

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## ELECTRONICS ENGINEERING

Academic Year: 20 – 20

### Theory Course Revision Report

Course Name: Image & video processing 2022-23  
Course Code Old (2020-21):

Course Code New (Autonomy 20 - ):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Video Processing (Video formation & Representation)	Syllabus Revised	40%
2	Motion estimation		
3	Image Restoration		20%
4			60%
			→

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.





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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	K. T. Talek	EECE	K. Talek
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





NFS

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## ELECTRONICS ENGINEERING

Academic Year: 2020-2021

### Theory Course Revision Report

Course Name: Power Electronic Converters

Course Code Old (2020-21): —

Course Code New (Autonomy 2021-22): —

Class and Semester in Old Syllabus: —

Class and Semesters in New Syllabus: Sem VI CE-XTC

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced	Need to introduce power related issues.	100 %
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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## Sardar Patel Institute of Technology

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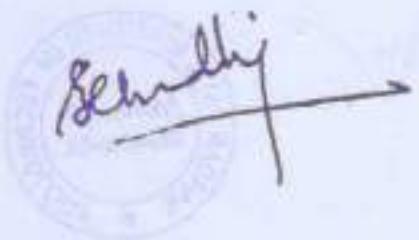
### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. R.G. Sutw	ETRX	<u>R.G.Sutw</u>
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (%) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





# Sardar Patel Institute of Technology

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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2022-2023

### Theory Course Revision Report

Course Name: Networking Fundamentals

Course Code New (Autonomy 2018-19): PE -1X (General Thread)

Class and Semesters in New Syllabus: TE, BTech- SEM VI, VIII

Change/Addition in the Syllabus:

Sr. No.	Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Topologies, LAN, MAN, WAN Introduction to networking devices Transmission Medias: Wired and Wireless network	Newly Introduced Programme Elective with 3 credits only	28/28*100 = 100%
2	Defining Networks with the OSI and TCP/IP Model		
3.	Working with IPv4: IP addressing, Subnet Masks, Subnetting, Introduction to IPv6		
4.	Introduction to Core Security Principles: Confidentiality, Integrity, Availability, Authentication. Cryptography Threats: Malware Attacks, Social Engineering Attacks, Networking-based and Server based Attacks		
5.	Self-Study (not included in total hours): Fairness algorithms, Congestion Control mechanisms		



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Laboratory Component, if any. (Minimum 10 Laboratory experiments are expected)

Sr. No	Title of the Experiment
1.	Identify and observe the behaviour of networking command line tools in Ubuntu/Windows OS environment.
2.	To build and test straight through UTP ethernet network cables.
3.	Write a program in C/C++/Python/Java/Scilab to identify the IP address, Subnet mask, DNS server address and Hardware address of the client device.
4.	Write a program in C/C++/Python/Java/Scilab to determine the administrators requirement to define the number of subnets, host/subnet, customized subnet masks and valid subnet ranges for a class C IP addressing scheme.
5.	Examine Data Breaches and Scan for Malware Using the Microsoft Safety Scanner
6.	Handson experience on how to Write-Protect and Disable a USB Flash Drive
7.	Protocol Visualization with open source tools
8.	Network Reconnaissance using open source tools
9.	Web Reconnaissance Using a Web Browser/open source tools
10.	Cryptography using open source tools/Crypt tools and open SSL
11.	Install and configure application based server

## Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Data Communication and Networking	4 <sup>th</sup>	B.A.Forouzan	McGraw Hill	2017
2	Data and Computer Communications	10 <sup>th</sup>	William Stallings	Pearson Education	2013
3	Information Security:Principles and Practice	1 <sup>st</sup>	Deven Shah	Wiley	2007

## Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Computer Networking: A Top-Down Approach	5 <sup>th</sup>	J.F.Kurose and K.W.Ross	Pearson Education	2009
2	Computer Networks	5 <sup>th</sup>	A.Tanenbaum	Pearson Education	2013
3	Computer Networks: Protocols, Standards and Interface	2 <sup>nd</sup>	Uyless Black	Prentice Hall	1993



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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2022-2023

### Theory Course Revision Report

Course Name: *Embedded System Design for Power converter Applications*  
Course Code Old (2020-21):

Course Code New (Autonomy 20 - ): 1 Y

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

B.Tech Sem VII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced	Recent Trends & Research	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. R. R. Sawant		
2	Dr. R. G. Sutar		
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 20 - 20

### Theory Course Revision Report

Course Name: Energy Storage Systems in EV Applications

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ): 1P

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: BTech Semester VII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly introduced	Recent trends & Research.	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.





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**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Dr. R. R. Sawant		
2	Dr. R. G. Sutar		
3			
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

<sup>\*\*</sup>Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2022-2023

### Theory Course Revision Report

Course Name: Power Electronic Converters in EV Application

Course Code Old (2020-21):

Course Code New (Autonomy 2022-23) : 0.

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

B.Tech Sem VIII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly Introduced	Recent trends & Research	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
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 (Autonomous Institute Affiliated to University of Mumbai)

### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. R. R. Sawant		
2	Dr. Rajendra Gutai		
3	Dr. B. N. Chandhari		
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2022-2023

### Theory Course Revision Report

Course Name: Consumer Electronics

Course Code Old (2020-21):

Course Code New (Autonomy 2022-23) OEEET3

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: B-Tech Sem VII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly introduced	Recent trends in industry & research.	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
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- 3.
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**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Gavind T. Haldankar	ETRX	<u>Qawi</u>
2	Dr. S. S. Rathod	ETRX	-
3	Prof. Kumar Khandagale	ETRX	-
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\* Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 20 - 20

### Theory Course Revision Report

Course Name: *Robotic & Machine Vision Intelligence*

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ): DEETH4

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: B Tech Sem VIII

Change/Addition in the Syllabus:

St. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Electric Drives & Sensors (4 hrs)	Up gradation of Syllabus	+ or - 9%
2	Design of Vision Guided System	Application Developmt	
3		New Course Introduced	
4			

Referred syllabus links (URL): (IIT/NTT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



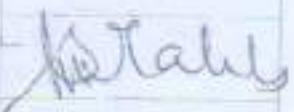
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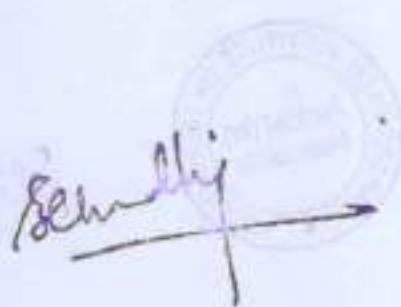
### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	K. T. Talele	EXTC	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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### B. Tech. ETRX

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		2	-	2	5	8	2	-	1	3
Examination Scheme										
PE- III  ET423 (1T23)	Image and Video Processing	Component		ISE		MSE		ESE		Total
		Theory		50		50		100		200
		Laboratory		50		-		50		100

Pre-requisite Course Codes, if any.

EC207: Signals and Systems

EC303: Digital Signal Processing

**Course Objective:** To study the image and video fundamentals and mathematical transforms necessary for processing and enhancement techniques. To study image restoration procedures and compression procedures for different applications.

**Course Outcomes (CO):** At the end of the course students will be able to

- ET423.1 Apply the image fundamentals and mathematical models for digital image and video processing.
- ET423.2 Analyze time and frequency domain techniques for image enhancement.
- ET423.3 Apply segmentation and compression techniques.
- ET423.4 Develop image and video processing applications.

#### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ET423.1	3	3										
ET423.2			3	2	3							2
ET423.3					3							
ET423.4	2	2			3	2			3	3		3

#### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
ET423.1		2					
ET423.2					3		
ET423.3			2				
ET423.4			2			3	



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**B. Tech. ETRX**

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	Apply	Analyze	Evaluate	Create
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**Theory Component**

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Fundamental of Image and Video</b>	1,6	04
	1.1	Structure of the Human Eye, Light, Brightness adaption and discrimination, Pixels, coordinate conventions,		
	1.2	Imaging Geometry, Image acquisition, sampling and quantization, image resolution, basic relationship between pixels, colour images, RGB, HSI and other models		
2	Title	<b>Two Dimensional Transforms and Image Enhancement</b>	1,5	06
	2.1	Discrete Fourier Transform, Discrete Cosine Transform, KL Transform, and Discrete Wavelet Transform		
	2.2	Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution, smoothing filters, sharpening filters, gradient and Laplacian, Frequency domain filtering.		
3	Title	<b>Image Segmentation and Compression</b>	1,5	05
	3.1	Point, line and edge detection, edge linking using Hough transform and graph theoretic approach, thresholding, and region-based segmentation, Morphological operations.		
	3.2	JPEG and MPEG compression standard, H.265 video compression standard		
4	Title	<b>Image Restoration</b>	1,6	04
	4.1	Basic Framework, Image degradation model, Noise characterization, Noise restoration filters,		
	4.2	Adaptive filters, and Estimation of Degradation functions, Restoration Techniques.		
5	Title	<b>Video Formation and Representation</b>	2,3	05
	5.1	Digital Video Sampling, Video Frame classifications, I, P and B frames, Notation		
	5.2	Video Capture and display: Principle of color video camera, video camera, digital video Sampling of video Signals: Required sampling rates, sampling in two dimensions and three dimensions, progressive virus interlaced scans		
6	Title	<b>Motion Estimation</b>	2,3	04
	6.1	Optical Flow: Motion Vs optical flow, optical flow equations, motion representation, motion estimation criteria, optimization		



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B. Tech. ETRX

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
PE	Power Electronic Converters (@)	2	0	2	5	10	3	0	1	3
		Examination Scheme								
		Component		ISE		MSE		ESE	Total	
		Theory		50		50		100	200	
ET331		Laboratory		50		-		50	100	

*(\*) Not to be repeated if already studied as a Program Core i.e. Power Electronics*

<b>Pre-requisite Course Codes, if any.</b>	Basic Electrical Engineering
<b>Course Objective:</b> To impart knowledge on the basic topology, operation and analysis using performance parameters of power electronic converters.	
<b>Course Outcomes (CO):</b> <i>At the end of the course students will be able to</i>	
ET331.1	Understand the operation of power semiconductor switches.
ET331.2	Analyze various single and three phase AC-DC power converter circuits
ET331.3	Illustrate the operating principle and construct a various types of DC-DC converters.
ET331.4	Analyze various single and three phase DC-AC power converter circuits
ET331.5	Understand the operation of AC-AC voltage converters by means of circuit topology and waveforms.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
ET331.1	2	1					
ET331.2	2				2		
ET331.3	2				2		
ET331.4	2				2		
ET331.5							

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

**Remember**   **Understand ✓**   **Apply ✓**   **Analyze ✓**   **Evaluate**   **Create**



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**B. Tech. ETRX**

**Theory Component**

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Power Semiconductor Devices</b>		
	1.1	Principle of operation, constructional features, characteristics of: SCR, GTO, MOSFET and IGBT, Si-Carbide-MOSFET and IGBT, Ga-Ni Power devices, Common type of Power Modules	T1, T3	8
	1.2	Basic Gate Drive circuits for SCR, MOSFET and IGBT		
2	Title	<b>AC to DC Converters</b>		
	2.1	Operation and analysis of single-phase controlled rectifiers with R, and RL load, freewheeling effect. Operation and analysis of three-phase controlled rectifiers with resistive load, effect of source inductance,	T1, T2, R4	10
	2.2	Single Phase and Three-Phase PWM Rectifier, Vienna Rectifier. Power factor improvements	T1, R4	
3	Title	<b>DC to DC Converters</b>		
	3.1	Switch Mode Power Converters, non-isolated and isolated converters, Buck, Boost and Buck-Boost converters, flyback and forward converters, Hardware design of SMPS converters and their Magnetics	T1, R4	8
	3.2	Closed loop control of Switched Mode DC-DC Converters with Constant Voltage and Constant Current mode of Operation	R5	
4	Title	<b>DC to AC Converters</b>		
	4.1	Principle of operation of Inverters, Inverter Classification.	T1,	10
	4.2	Voltage source inverters: -Principle of operation and analysis of: Single phase Half bridge, full bridge, and three-phase bridge inverters, six step operation (R-Load), PWM control of Voltage source converters. Introduction to Space Vector Modulation	T2, R4	
5	Title	<b>AC-AC converters</b>		
	5.1	Principle of on-off and phase control – single-phase half and full wave AC voltage controller, three-phase AC voltage controller. Single Phase Bidirectional AC switches using MOSFETs, IGBTs, Single-phase Bidirectional AC-AC converters	T2 R6	6
6	Self Study	Exercise on minimum of 4 to 6 Simulations		6*
<b>Total (*not included)</b>				<b>42</b>

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Course Code	Course Name	Teaching Scheme			Credits
		L	T	P	
ET332	Embedded System Design for Power Converter Applications	2	0	2	3

### Embedded System Design for Power Converter Applications

#### Coursecontent

Digital Signal Controller (DSC: A micro-controller with a DSP engine): Architecture and real-time programming in Assembly and Embedded C. Introduction to Fixed Point Arithmetic. Understanding the constraints of program memory and execution time. Programming peripherals including GPIO, TIMERS etc. On Chip FLASH and EEPROM programming. Field Programmable Gate Array (FPGA): Architecture and programming of digital circuits including Finite State Machines (FSM) in Verilog HDL. Understanding the CAD tool and various timing issues. Communication-Chip level: AXI, Board level: SPI, I2C, System level: RS 232, CAN, MODBUS RTU on RS 485. Developing a GUI for supervisory control and monitoring. Introduction to different semiconductor memories: RAM, ROM, NVRAM etc. and their applications. Analog sensing: Anti-aliasing filter design, scaling, online calibration and biasing. Continuous time feedback controller design and its discrete time implementation, D/A and A/D converters, effects of sampling, modeling the Pulse Width Modulator (PWM) etc. Co-design: How to optimally implement an embedded task using a programmable processor (DSC) and a re-configurable hardware (FPGA). Embedded design of a typical Power Conversion System, including: process control, protection, monitoring, real-time feedback control etc.

Concept of Hardware-in-the loop simulation in Power converters. Case-study: Design of Embedded system controller for (a) Induction Heating System (b) Three Phase Active Rectifier for PF Correction

#### Prerequisites

Under graduate level analog electronics, digital electronics and classical feedback control theory. Familiarity with micro-processor, digital signal processing and previous experience in programming will be helpful but not a necessity.

#### References

- (1) Fundamentals of Digital logic with Verilog Design, S Brown and Z Vranesic, McGraw Hill Education; 2nd edition (2017).
- (2) PIC Micro-controllers and Embedded Systems, Using assembly and C for PIC 18 Mazidi, McKinlay and Causey, Pearson Education India; 1st edition (2008)
- (3) Feedback Control of Dynamic Systems, GF Franklin, JD Powell and Naeini, Pearson (2008)



- (4) Microelectronic Circuits: Theory and Applications, AS Sedra and K Smith, Oxford University Press (2017)
- (5) Digital Signal Processing, JG Proakis and DK Manolakis, Pearson Education India, 4th edition (2007)
- (6) Digital Control of HighFrequency SwitchedMode Power Converters, (IEEE Press Series on Power Engineering) Lucca Corradini, Dragica Maksimovi, Paolo Mattavelli, Regan Zane, Wiley Blackwell (2015)
- (7) A Practical Introduction to Hardware/Software Co-design, Patrick R. Schaumont Springer, 2nd edition (2014)



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Course Code	Course Name	Teaching Scheme			Credits
		L	T	P	
ET433	Energy Storage Systems in EV Applications	2	0	2	3

#### Course Content:

##### Module-1 Batteries and Fuel Cells

Li-Ion Battery characterization and testing systems & Battery life cycle, Modular battery packs, design, packaging, thermal control and legislative implications, Super-capacitors : Materials and Construction, Basic Model, Specific Behavior of Supercapacitors, Hydrogen Generation and Storage of Hydrogen, Conversion from Hydrogen to Electricity, Power Needed for the Fuel Conditioning, Efficiency of the Fuel Cells, Overall Efficiency.

##### Module-2 Battery Management System:

Need of BMS, Concept of Battery Cell Balancing and strategies, Passive and Active cell Balancing circuits, BMS hardware Design, BMS hardware Protection, BMS Software Strategies, Intelligent Cell Balancing Algorithms, Monitoring and Protections, Charging and Discharging Management, Diagnostics and testing, Communication

##### Module-3: Battery Charging Standards and Protocols:

AC Charging: Bharat EV Charger AC-001, DC Charging : Bharat EV Charger DC-001, Home Charging: AC Charging with Single Phase 230V/15A supply, Public Charging AC-001: AC Charging with three Phase 415V AC supply Mains, Public Charging DC-001, Fast Charging for high voltage EVs: Combined charging system CCS-2 and CHAdeMo with ratings from 50kW to 150kW and DC voltages ranging from 400V to 950V DC.

##### Course Projects and Lab Work:

(a) battery materials; (b) novel thermal management system for maintaining temperature uniformity among the cells and restrict the rise of maximum temperature above normal conditions; (c) Digital twin based on IoT; sensors; cloud computing; multi-physics modelling and machine learning for real-time monitoring of SoC and SoH of batteries under dynamic discharge conditions; (d) aging controlled fast charging of batteries by evaluation of optimal charging current, and simultaneously optimizing charging time and capacity.

##### References:



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1. Energy Storage by Robert A. Huggins, Springer Publication
2. Energy storage (A new approach) by Ralph Zito Wiley Publication
3. Handbook of Energy Audit, Albert Thumm P.E. CEM, William J. Younger CEM, The Fairmont Press Inc., 7th Edition.
4. Energy Management Handbook, Wayne C. Turner, The Fairmont Press Inc., 5th Edition, Georgia.
5. Energy Storage Systems, Alfred Rufer, CRC Press

**Additional References:**

1. Z. Zhang, H. Gui, D. Gu, Y. Yang and X. Ren, "A Hierarchical Active Balancing Architecture for Lithium-Ion Batteries," in *IEEE Transactions on Power Electronics*, vol. 32, no. 4, pp. 2757-2768, April 2017.
2. M. Daoud, N. Omar, P. Van Den Bossche and J. Van Mierlo, "Passive and active battery balancing comparison based on MATLAB simulation," *2011 IEEE Vehicle Power and Propulsion Conference*, Chicago, IL, 2011, pp. 1-7.
3. M. Caspar, T. Eiler and S. Hohmann, "Systematic Comparison of Active Balancing: A Model-Based Quantitative Analysis," in *IEEE Transactions on Vehicular Technology*, vol. 67, no. 2, pp. 920-934, Feb. 2018.
4. Xiaoqiang Zhang†, Weiping Zhang, and Geyang Lei, "A Review of Li-Ion Battery Equivalent Circuit Models," in *TRANSACTIONS ON ELECTRICAL AND ELECTRONIC MATERIALS*, Vol. 17, No. 6, pp. 311-316, December 25, 2016
5. Min Chen, Student Member, IEEE, and Gabriel A. Rincon-Mora, Senior Member, IEEE, "Accurate Electrical Battery Model Capable of Predicting Runtime and I-V Performance", in *IEEE TRANSACTIONS ON ENERGY CONVERSION*, VOL. 21, NO. 2, JUNE 2006
6. Jian Cao, Nigel Schofield and Ali Emadi, "Battery Balancing Methods: A Comprehensive Review", in *IEEE Vehicle Power and Propulsion Conference (VPPC)*, September 3-5, 2008

Course Code	Course Name	Teaching Scheme			Credits
		L	T	P	
ET433	Power Electronic Converters in EV Applications	2	0	2	3



*Semester* →

*B*

## **Course Content:**

### **Module-1 Battery Chargers**

Types of EV Chargers, On board Chargers, DC Fast Chargers, PF Improvement strategies and Control, DC-DC Converter design and Control Scheme. Topology Selection, Control Method for Fast Charger, Charger Converter Hardware Design, Magnetics Design and Selection, Charger Converter Software Design, Enclosure and Connectors, Thermal Engineering.

### **Module-2 EV Traction Drive and Control**

Motor Selection and types, Torque/Speed curve of different motor types and their comparison, Motor Inverter hardware Design, MOSFET/IGBT Selection, Gate Driver Circuit Design, Power Supply and Controller Hardware, Motor Inverter Software Strategies for control of BLDC Motor Drive and Induction Motor Drive., Motor Inverter Thermal Engineering, Connectors and Wiring, Active and Passive Discharge (in case of DC Bus > 60V). EMI/EMC Standards Introductions

### **Module-3: DC-DC converter Unit for EV Ancillary Power System**

Power Converter Topology Selection, Control Method for DC-DC converter, Hardware Design, Magnetics Design and Selection, DC-DC Converter Software Design, Enclosure and Connectors, Thermal Engineering, Active and Passive Discharge, EMI/EMC Standards Introductions

### **Case Studies: (To be covered in Practical Session)**

Design and development of high-power density power electronics converters, onboard chargers, machines for electric vehicles, power train technology and various controllers for drives and converters. Development of various novel control algorithms for converters and motor drives

### **References:**

1. Chang Liang Xia, "Permanent Magnet Brushless Dc Motor Drives and Controls" Wiley 2012.
2. Rashid M.H., "Power Electronics Circuits, Devices and Applications", Prentice Hall India, Third Edition, New Delhi, 2011.
3. Bimal K Bose, "Modern Power Electronics and AC Drives", Pearson Education, second Edition, 2003.
4. Dubey, G.K., "Thyristorised power controllers", New age International, New Delhi, 2002.
5. Bhambhra P.S., "Power Electronics", Khanna Publishers, New Delhi, 2005
6. Miller, T. J. E., "Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon Press, Oxford, 1989.
7. Kenjo, T and Nagamori, S, "Permanent Magnet and Brushless DC Motors", Clarendon Press, Oxford, 1989.
8. Kenjo, T, "Stepping Motors and their Microprocessor Control", Clarendon Press, Oxford,
9. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education, 9th edition, 2009.
10. David A Bell, "Fundamentals of Electronic Devices and Circuits", Oxford University Press, 2009.
11. Roy Choudhury and Shail Jain, "Linear Integrated Circuits", 2nd Edition, New Age International Publishers, 2003



A handwritten signature in blue ink, appearing to read "Bhavna", is written over a blue arrow pointing towards the right.



BHARATIYA VIDYA BHAVAN'S  
SARDAR PATEL INSTITUTE OF TECHNOLOGY  
MUNSHI NAGAR, ANDHERI (W), MUMBAI 400058

Electronics Department

**Subject:** Consumer Electronics  
**Class:** Third Year Engineering, Sem. - VI, Academic Year: - 2021-2022

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(OE1-A)	Consumer Electronics	2	-	2	3	7	2	-	1	3
		Examination Scheme								
		Component	ISE		MSE		ESE		Total	
		Theory	50		50		100		200	
		Laboratory	50		--		50		100	

Pre-requisite Course Codes	Basics of Electrical and Electronics Engineering
	At the end of the successful completion of the course students will be able to
Course Outcomes	<p>CO1 List and classify devices used in consumer products based on their specifications, identify sub-systems of consumer electronic products, also choose and use proper interface standard for a given consumer electronic product</p> <p>CO2 Illustrate working principle of consumer electronic products and carry out basic tests to identify their correct operation</p> <p>CO3 Experiment with Haptics, Multitouch devices, Device interconnects and peripherals and also suggest modification in consumer electronic product using modern tools to enhance user experience</p> <p>CO4 Assemble subsystem of Television set and analyze technology used in audio systems.</p>
	CO5 Demonstrate working principle of Healthcare and home electronics consumer products.
	CO6 Demonstrate working principle consumer electronic products used in Occupational safety.

Module No.	Unit No.	Topics	CO	Ref.	Total Hrs.
1	1.1	Introduction to consumer Electronic Haptics and Multi-touch Devices: Introduction to Touch panel, Capacitive Touch screen, Light pen.	CO1, CO3	4	04
	1.2	Displays for Consumer Electronics: OLED Display,			



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		Alphanumeric Display, LED Display, LCD Display.			
2	2.1 2.2	<b>Device Interconnects and Peripherals</b> Introduction to Serial Interfaces, RS-232, I2C, SPI, USB.  <b>Introduction to ZIG-BEE Standards, WI-FI, Bluetooth, Thunderbolt, JTAG and various Interconnection standards</b>	CO3	3	04
3	3.1 3.2	<b>Interactive and Immersive TV</b>  Introduction to PAL TV System, NTSC TV System, SECAM TV System.  <b>Advanced Television System: High Definition TV, 3D TV.</b>	CO4	1	04
4	4.1 4.2	<b>Audio System Technologies and Home electronics</b>  Introduction to Audio system and major components of Audio System.  <b>Introduction to Home Electronics, Microwave Oven, Refrigerator, AirConditioning System, Washing Machine.</b>	CO2, CO4	1	04
5	5.1 5.2 5.3	<b>Healthcare Electronics</b>  Wearable Devices: Activity Trackers Smart Watch, Smart Glass. Fitness Devices: Blood Pressure Monitor, Digital Weighing Scale, Digital Glucometer.  <b>Biomedical Devices: ECG Sensor, EKG Sensor, EMG Sensor, Respirators.</b>	CO5	5	06
6	6.1 6.2 6.3	<b>Consumer Electronics used in Occupational Safety</b>  Printers, Scanners, Projection System.  <b>Bio-metric Devices: Finger Print Scanner, IRIS Scanner.</b>  <b>Security Devices: CCTV, Electronics Lock, Video Intercom System, Doorbell.</b>	CO6	2	06
	*Self study	<b>Study of Virtual Reality, Digital Satellite TV, 4K TV, Microphone, Loudspeaker, Noise Cancelling Headphones.</b>			
Total (*Not included)					28

#### Teaching Learning Methodology in Laboratory: Role Play Model



*Sunday*

**a) Instructor:**

Responsibilities:      Explanation of theoretical background  
                             To provide required sample formats  
                             To guide students in identification of appropriate online material.  
                             Supervision and assessment of the overall activity

**b) First Group of students : Customer**

Responsibilities:      To finalize specifications of instrument to be purchased Prepare request for quotations  
                             Prepare the comparative statement  
                             Preparation for purchase order

**c) Second Group of students: Manufacturer/Vendor**

Responsibilities:      To maintain the specifications of the manufactured instruments To submit quotations including all applicable taxes  
                             To prepare invoice as per purchase order

**a) Third Group of Students: Sales/Service Engineer**

Responsibilities:      To demonstrate capabilities of various instruments and convince customer to purchase a particular instrument  
                             To prepare Delivery Challan  
                             Install the instruments and prepare Installation Report, Demonstrate all the functions and uses of the instrument

Expt. No.	Suggested list of Experiments
1	Experiment on Haptics and Multi-touch devices.
2	Experiment on Device interconnects and Peripherals (USB and Bluetooth).
3	Experiment on assembly of parts used in Television set.
4	Experiment on Audio system technology.
5	Experiment on Home electronics Consumer products.
6	Experiment on Wearable and fitness devices.
7	Experiment on Biomedical data acquisition devices.
8	Experiment on occupational safety in electronic devices.



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**References:**

1. S. P. Bali, "Consumer Electronics", Pearson Education, 1<sup>st</sup> Edition, 2005.
2. Peter H. Gregory, "Biometrics for Dummies", Wiley Publishing Inc., 2008.
1. N. Mathivanan, "PC Based Instrumentation: Concepts and Practices", Prentice HallLearning India Pvt. Ltd., 1<sup>st</sup> Edition, 2007.
2. Deborah Morley, "Understanding Computers: Today and Tomorrow", Course Technology, 16<sup>th</sup> Edition, 2016.
3. Sanjay Mishra, "Wearable Android: Android Wear and Google FIT App Development", Wiley Blackwell publication, 1<sup>st</sup> Edition, 2015.



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
Open Elective		2	0	2	4	8	2	0	1	3
Examination Scheme										
OEET4	Robotics & Machine Vision Intelligence	Component	ISE		MSE		ESE		Total	
		Theory	50		50		100		200	
		Laboratory	50		-		50		100	

Pre-requisite Course Codes, if any.	Microprocessor
<b>Course Outcomes (CO): At the End of the course students will be able to</b>	
OEET4.1	Classify different types of robot and evaluate coordinate frame transformation
OEET4.2	Perform direct kinematics analysis of Robot Systems.
OEET4.3	Relate the electric drive system and smart sensors.
OEET4.4	Extract object features for Representation& Description
OEET4.5	Demonstrate Vision Guided System

## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Fundamentals of Robotics	1	04
	1.1	Robot Classification, Robot Components, Degrees of freedom		
	1.2	Coordinate frames Fundamental rotation Matrices, Coordinate Frames Transformation, Screw Transformation		
2	Title	Direct Kinematics Analysis	1	08
	2.1	Description of links and joints, Link co-ordinates, Kinematic Modeling of the manipulator, Denavit- Hartenberg Parameters, Manipulator Transformation Matrix : The Arm Matrix,		
	2.2	Direct kinematic analysis of Two axis, Three axis and Four Axis articulated Robots.		
3	Title	Electric Drives and Sensors	1	04
	3.1	Electric Drives: Introduction, Types, DC electric motor, AC electric motor, stepper motors, half step mode operation, micro step mode. Types of stepper motors, Direct drive actuation.		
	3.2	Sensors: Introduction: An Introduction to sensors and transducers, Need of sensors in Robotics, Position sensors - optical, non-optical, Velocity sensors, Accelerometers, Proximity Sensors - Contact, non-		



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		contact, Range Sensing, touch and Slip Sensors, Force and Torque Sensors.		
4	Title	Image Formation and Camera Models	2	04
	4.1	Pinhole camera model, Perspective projection, Camera model, Camera Calibration, Stereo Vision.		
	4.2	3D reconstruction: Active Method, Passive Method, Stereo vision, Epipolar geometry.		
5	Title	Object Representation and Description	2	04
	5.1	Feature Extraction from images. Interest points * Harris detector, Hessian detector, Histogram of Gradient (LoG), Local Binary Pattern(LBP).		
	5.2	Projection vectors, Edge features, Boundary detection, Boundary Descriptors, Regional Descriptors, Chain Code, Fourier descriptors, Statistical Features.		
6	Title	Design of Vision Guided System	2	04
	6.1	Industrial applications of Vision-controlled robotic systems.		
	6.2	Object Detection, Object Classification, Object Recognition, Surveillance, Real Time Monitoring, Human Motion Recognition and Tracking.		
7	Self Study	Direct Kinematics of SCARA Robot, Inverse Kinematics, Robotic operating System (ROS)		
			Total	28

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

OEET4	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
OEET4.1	2	2										
OEET4.2	3	3										
OEET4.3					2							
OEET4.4	3	3								2	2	1
OEET4.5			3									

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

OEET4	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
OEET4.1							
OEET4.2							
OEET4.3							
OEET4.4							
OEET4.5							





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**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	<input checked="" type="checkbox"/> Apply	<input checked="" type="checkbox"/> Analyze	<input checked="" type="checkbox"/> Evaluate	Create
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## Laboratory Component

Sr. No.	Title of the Experiment
1	Coordinate frame transformation
2	Obstacle detection and avoidance*
3	Direct Kinematics
4	Motion Planning*
5	Boundary feature descriptors
6	Hybrid Feature Descriptor : HOG, LBP
7	Sensor based robot system development*
8	Object Detection & Recognition*
9	Object Classification*
10	Guided Vision System Development*

\*Real time implementation using Microcontroller Based System/ TI DSP Boards/Raspberry Pi Boards/ e-Yantra Boards.

## Text Books :

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Fundamentals of Robotics Analysis and Control	1 <sup>st</sup>	Robert J. Schilling	PHI Learning	1990
2	Computer Vision Algorithm and Applications	1 <sup>st</sup>	Richard Szeliski	Springer	2010

## Reference Books :

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Robotics Engineering an Integrated Approach	1 <sup>st</sup>	Richard D. Klafter, Thomas. A. Chmielewski, Michael Negan	Prentice Hall of India Pvt. Ltd.,	1989
2	Engineering foundation of Robotics	1 <sup>st</sup>	D Francis N-Nagy Andras Siegler	Prentice Hall Inc.	1987
3	Robotics and Image Processing an Introduction	1 <sup>st</sup>	P.A. Janaki Raman	Tata McGraw Hill Publishing company Ltd.	1995
4	Robot Operating System for Absolute Beginners: Robotics Programming Made Easy	1 <sup>st</sup>	Lentin Joseph	Apress	2018



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**B. Tech. ETRX**

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
PE	Power Electronic Converters in EV Applications	2	-	2	3	7	2	-	1	3
Examination Scheme										
ET434		Component		ISF		MSE		ESE		Total
		Theory		50		50		100		200
		Laboratory		50		-		50		100

**Course Content:**

**Module-1 Battery Chargers**

Types of EV Chargers, On board Chargers, DC Fast Chargers, PF Improvement strategies and Control, DC-DC Converter design and Control Scheme, Topology Selection, Control Method for Fast Charger, Charger Converter Hardware Design, Magnetics Design and Selection, Charger Converter Software Design, Enclosure and Connectors, Thermal Engineering.

**Module-2 EV Traction Drive and Control**

Motor Selection and types, Torque/Speed curve of different motor types and their comparison, Motor Inverter hardware Design, MOSFET/IGBT Selection, Gate Driver Circuit Design, Power Supply and Controller Hardware, Motor Inverter Software Strategies for control of BLDC Motor Drive and Induction Motor Drive, Motor Inverter Thermal Engineering, Connectors and Wiring, Active and Passive Discharge (in case of DC Bus > 60V), EMI/EMC Standards Introductions

**Module-3: DC-DC converter Unit for EV Ancillary Power System**

Power Converter Topology Selection, Control Method for DC-DC converter, Hardware Design, Magnetics Design and Selection, DC-DC Converter Software Design, Enclosure and Connectors, Thermal Engineering, Active and Passive Discharge, EMI/EMC Standards Introductions

**Case Studies: (To be covered in Practical Session)**

Design and development of high-power density power electronics converters, onboard chargers, machines for electric vehicles, power train technology and various controllers for drives and converters. Development of various novel control algorithms for converters and motor drives

**References:**

- Chang Liang Xie, "Permanent Magnet Brushless Dc Motor Drives and Controls" Wiley 2012.
- Rashid M.H., "Power Electronics Circuits, Devices and Applications", Prentice Hall India, Third Edition, New Delhi, 2011.
- Bimal K Bose, "Modern Power Electronics and AC Drives", Pearson Education, second Edition, 2003.
- Dubey G.K., "Thyristorised power controllers", New age International, New Delhi, 2002.
- Bhimberi P.S., "Power Electronics", Khanna Publishers, New Delhi, 2005
- Miller T. J. E., "Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon

SPI/UG Syllabus/2020-21/ver-12





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## Sardar Patel Institute of Technology

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### B. Tech. ETRX

- Press, Oxford, 1989.
- 7. Kenjo, T and Nagamori, S, "Permanent Magnet and Brushless DC Motors", Clarendon Press, Oxford, 1989.
  - 8. Kenjo, T, "Stepping Motors and their Microprocessor Control", Clarendon Press, Oxford,
  - 9. Robert L. Boylestad and Luis Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education, 9th edition, 2009.
  - 10. David A Bell, "Fundamentals of Electronic Devices and Circuits", Oxford University Press, 2009.
  - 11. Roy Choudhury and Shail Jain, "Linear Integrated Circuits", 2nd Edition, New Age International Publishers, 2003



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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

### Department of Electronics and Telecommunication Engineering Undergraduate Program

2021-22

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
Electromagnetic Waves	ET304		68
Java Programming Lab	ET305		50
Real Time Operating Systems	IT13		100
Speech and Audio Processing	IT21	2021-22	100



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## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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### ELECTRONICS ENGINEERING

Academic Year: 2020 – 2021

#### Theory Course Revision Report

Course Name: Electromagnetic Waves

Course Code Old (2019-20): Electromagnetic Engineering (EL54)

Course Code New (Autonomy 2019-20): ET304

Class and Semester in Old Syllabus: TE ETRX SEM V

Class and Semesters in New Syllabus: TE ETRX SEM V

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly introduced	Reason	Overall Percentage Change in syllabus (X)
1	<b>Module 4: Waveguide</b> Wave propagation in parallel plane waveguide (No derivation expected), Analysis of waveguide general approach (No derivation expected). In waveguide. Rectangular waveguide, Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization, Attenuation	In the discussion it was found that the topic is very important considering the name of the subject Electromagnetic Waves which was previously Electromagnetic Engineering. It is also there in the GATE syllabus.	66% Change in syllabus. (Practical 20 hours included hence 42/62)
2	<b>Module 6: (Self Study) Applications of Electromagnetics</b> Xerography, Laser printer, Faraday's cage, lightning, RF MEMS, Magnetic levitation, Meta materials, RFID, Stealth aircraft, remote sensing, radio astronomy, EMI and Electromagnetic Compatibility, Different types of antenna	In the discussion it was suggested that the "Applications of Electromagnetic Waves" should be known to the students and hence should be given as a self-study.	
3	Laboratory experiments are also included in the syllabus.	Lab experiment decided to include. Using simulation experiments it will become easy to understand the concept.	

Text Books :



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S. N.	Title	Edition	Authors	Publisher	Year
1	Electromagnetic Waves	Third	R.K. Shegaonkar	Tata McGraw Hill	2009
2	Principles of Electromagnetics	Sixth	Matthew N.O. Sadiku	Oxford International Student	2015

### Reference Books :

S. N.	Title	Edition	Authors	Publisher	Year
1	Engineering Electromagnetics	Third	W.H. Hayt, and J.A. Buck	McGraw Hill	2006
2	Electromagnetic Waves and Radiating Systems	Second	Edward C. Jordan and Keith G. Balmain	Pearson Publications	2006
3	Engineering Electromagnetics	Third	Nathan Ida	Springer Publications	2015
4	Antennas & Wave Propagation	Fourth	J.D. Kraus, R.J. Marhefka, and A.S. Khan	McGraw Hill	2011

### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department
1	Dr. Deepak Karia	Electronics
2	Dr. Sukanya Kulkarni	Electronics and Telecommunication
3	Prof. Pallavi Malme	Electronics and Telecommunication
4	Prof. G. T. Haldankar	Electronics

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Java  
programming  
lab  
21-22

## ELECTRONICS ENGINEERING

Academic Year: 2021-2022

### Lab Course Revision Report

Course Name: Java Programming Lab

Course Code Old (20 - ):

Course Code New (Autonomy 20 - ):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly introduced course in TE	As per the industry requirement.	50 %
2			
3			
4			

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1			
2			
3			
4			

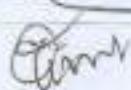
  
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## Sardar Patel Institute of Technology

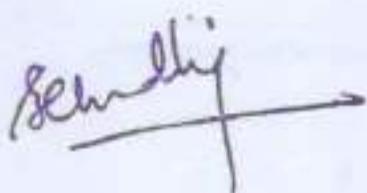
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dayanand Ambawade	EXTC	
2	G. T. Haldankar	EXTC	
3			
4			

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100





**Sardar Patel Institute of Technology**  
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**ELECTRONICS ENGINEERING DEPARTMENT**

Academic Year: 2021– 2022

**Theory Course Revision Report**

**Course Name:** Real time Operating System

**Course Code Old (2019-20):** ELL63 (Fundamentals of Operating system lab)  
 & ELE81C (Electronics System Design)

**Course Code New (Autonomy 2020-21):** IT13

**Class and Semester in Old Syllabus:** TE, SEM-VI, B.E, Sem-VIII

**Class and Semesters in New Syllabus:** BE, Sem-VII

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Task / Process Management	Task communication is required	
2	Memory Management	To write program in secure environment	100%
3	Case Studies of RTOS and its comparison	Case studies give real-time implementation of concepts	(As new subject introduced in sem VII with addition done in prerequisites and next sem subjects)

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. University of Texas: [http://users.ece.utexas.edu/~gerstl/ee445m\\_s19/syllabus.html](http://users.ece.utexas.edu/~gerstl/ee445m_s19/syllabus.html)
2. <https://www.cse.iitb.ac.in/~cs684/>
3. <https://erp.iitkgp.ac.in/ERPWebServices/curricula/CurriculaSubjectsList.jsp?stuType=PG&spjCode=AT1>
4. <https://www.udemy.com/course/introduction-to-rtos>

Committee members Name & Signature:

1. Dr. Surendra Rathod (Coordinator)
2. Prof. Priya Deshpande

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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19-20

Speech &  
audio  
process

## ELECTRONICS ENGINEERING

Academic Year: ~~2018-2019~~ 2019 - 2020

### Theory Course Revision Report

Course Name: **Speech & Audio Processing**

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	New Content introduced .	New Course .	1W 1J
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	K.T. Talele	EE&RX	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (%) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100






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Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

**B. Tech. ETRX**

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
PC	Electromagnetic Engineering	3	0	2	6	11	3	0	1	4
<b>Examination Scheme</b>										
ET304		Component	ISE		MSE		ESE		Total	
		Theory	75		75		150		300	
		Laboratory	50		--		50		100	

Pre-requisite Course Codes, if any.	MA101: Engineering Calculus MA102: Differential Equations and Complex Analysis MA201: Linear Algebra
<b>Course Objective:</b> To teach fundamentals of Electromagnetic Waves	
<b>Course Outcomes (CO):</b> At the end of the course students will be able to	
ET304.1	Apply basic laws of electromagnetic and Maxwell's equations.
ET304.2	Illustrate the behavior of EM waves and travelling of waves in free space as well as media.
ET304.3	Solve problems related to the propagation of electromagnetic waves.
ET304.4	Discuss the types of antennas and their parameters.
ET304.5	Discuss types of radio wave propagation.
ET304.6	Design applications using Electromagnetic Waves theory.

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ET304.1	1	1	2		2					3		
ET304.2	1	1	2		2							
ET304.3	1	1	2		2					3		
ET304.4	1	1	3		2					1		
ET304.5	1	1	2		2							
ET304.6	1	1	3		2					2		3

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PSO1	PSO2	PSO3
ET304.1		2			2	
ET304.2		2			2	
ET304.3		2			2	
ET304.4		2			2	
ET304.5		2			2	
ET304.6		1			1	



*Sehrai*



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### B. Tech. ETRX

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember✓	Understand✓	Apply✓	Analyze✓	Evaluate	Create
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#### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Coordinate system transformation and vector calculus		
	1.1	Cartesian, cylindrical and spherical coordinate, Differential length, area and volume, line surface and volume integrals.	2	3
	1.2	Del Operator, Gradient of scalar, Divergence of a vector and Divergence Theorem, Curl of a Vector and Stoke's Theorem, Laplacian Theorem, Classification of a Vector Field.		
2	Title	Basic Laws of Electromagnetic and Maxwells Equations	1	9
	2.1	Coulombs law, Electric fields due to continuous charge distributions, Gauss law and its applications, Electric potential (Magnetic vector potential and Electrical Scalar Potential), relationship between E and V, Poisson and Laplace equations, Bio-Savarts law, Ampere's law.		
	2.2	Boundary conditions for static electric and magnetic fields		
	2.3	Faradays Law, Displacement current, Maxwell's Equations: Integral and differential form for static and time varying fields and its interpretation		
3	Title	Electromagnetic Wave Propagation	1,2	9
	3.1	Wave equation: Derivation and its solution in Cartesian co-ordinates.		
	3.2	Solution of wave equations: Partially conducting media, perfect dielectrics and good conductors, Concept of Skin Depth.		
	3.3	Electromagnetic Power: Poynting Vector and power flow in free space and in dielectric, conducting media.		
	3.4	Polarization of wave: Linear, Circular and Elliptical.		



*Sewali*



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**B. Tech. ETRX**

3	Write a program that displays the distribution of the electric potential due to an electric dipole with a moment located at the origin of a spherical coordinate system.
4	Numerical Integration and Calculating the Electric Field from a Ring of Charge.
5	3-D and 2-D radiation patterns of a Hertzian dipole using MATLAB/Python.
6	<b>Antenna parameters</b> Visualization of a wireless system with two antennas. Radiation patterns of a small loop antenna. Radiation patterns of a quarter-wave monopole.
7	<b>Waveguide:</b> Verify the relationship between wavelength of an EM wave in air and inside a rectangular waveguide.
8	Simulating the Two-ray Propagation Model in any simulation platform or Python.
9	<b>Using Virtual Lab:</b> Introduction to Smith chart and its application for the unknown impedance measurement using virtual lab IIT K
10	Measurement of Frequency and wavelength of a waveguide using Microwave bench setup.
11	<b>Using Virtual Lab:</b> Study of field pattern of various modes inside a rectangular waveguide using virtual lab IIT K
12	<b>Case Study-</b> The student is required to develop a simple tool to carry out unit conversions that are associated with EM-related calculations.

**Text Books :**

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Electromagnetic Waves	Third	R.K. Shevgaonkar	Tata McGraw Hill	2009
2	Principles of Electromagnetics	Sixth	Matthew N.O. Sadiku	Oxford International Student	2015

**Reference Books:**

Sr. No.	Title	Edition	Authors	Publisher	Year
1	Engineering Electromagnetics	Third	W.H. Hayt, and J.A. Buck	McGrawHill	2006
2	Electromagnetic Waves and Radiating Systems	Second	Edward C. Jordan and Keith G. Balmain	Pearson Publications	2006
3	Engineering Electromagnetics	Third	Nathan Ida	Springer Publications	2015
4	Antennas & Wave Propagation	Fourth	J.D. Kraus, R.J. Marhefka, and A.S. Khan	McGrawHill	2011





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**B. Tech. ETRX**

	3.5	Propagation in different media: Behavior of waves for normal and oblique incidence in dielectrics and conducting media.		
4	Title	<b>Waveguide</b>	1,2	6
	4.1	Wave propagation in parallel plane waveguide (No derivation expected), Analysis of waveguide general approach (No derivation expected), in waveguide.		
	4.2	Rectangular waveguide, Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization, Attenuation.		
5	Title	<b>Transmission Lines</b>	1,2	9
	5.1	Power frequency lines: Representation, losses and efficiency in power lines, effect of length, calculation of inductance and capacitance.		
		Radio frequency lines: Representation, propagation constant, attenuation constant, phase constant, group velocity, input impedance, characteristic impedance, trade-off between attenuation and power transfer, reflection coefficient, standing wave ratio, VSWR, ISWR, ABCD parameters of transmission line.		
6	5.2	Smith Chart: Impedance locus diagram, impedance matching.		
	<b>Applications of Electromagnetics</b>		2,3	6
Self-Study		Xerography, Laser printer, Faraday's cage, lightning, RF MEMS, Magnetic levitation, Metamaterials, RFID, Stealth aircraft, remote sensing, radio astronomy, EMI and Electromagnetic Compatibility, Different types of antennas.	1,2,6	06
	Total			42

Laboratory Component, if any. (Minimum 10 Laboratory experiments are expected)

Sr. No	Title of the Experiment
1	<b>Basic operations on scalar and vectors</b> Working with Numbers: Scalars and Vectors using any simulation platform or Python. Working with Complex Numbers using any simulation platform or Python. Working with Matrices using any simulation platform or Python.
2	<b>Curl and Divergence</b> Numerical Computation of Divergence and Curl. Numerical Computation of Divergence and Curl for a Current Carrying Wire.



*Sehdev*



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**B. Tech. ETRX**

Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(SBC)		0	1	2	1	4	0	1	1	2
Examination Scheme										
ET305	Java Programming Lab	Component	ISE (%)			MSE (%)	ESE (%)		Total	
		Theory	100*			--	--		100	
		Laboratory	50			--	50#		100	

Pre-requisite Course Codes, if any.	CS101: Problem Solving using Imperative Programming CS102: Problem Solving using OOPs
Course Objective:	To learn Object-Oriented programming paradigm using Java programming language.
Course Outcomes (CO):	<i>At the end of the course students will be able to</i>
ET305.1	Demonstrate programming using basic constructs of JAVA.
ET305.2	Apply Inheritance and polymorphism for a given scenario.
ET305.3	Apply abstraction and exception handling to create an efficient program.
ET305.4	Use Generic classes and collection for solving problem.
ET305.5	Develop a mini project based on the real-world problem.

Note:

\*= Tutorial-50 marks and Mini Project-50 marks (Preferably based on real-world problem statement from Industry/Academia/Research)

#= oral exam-20 marks and Lab experiment-30 marks

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ET305.1	3				2							
ET305.2	2				2							2
ET305.3	2				2							2
ET305.4	2				2							2
ET305.5	2	1	1	1	2	1			2	2		2

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PSO1	PSO2	PSO3
ET305.1		2		2		
ET305.2		2		2		
ET305.3		2		2		
ET305.4		2		2		
ET305.5		2		2		



*Rajendra*  
*Sekharia*



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## B. Tech. ETRX

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Introduction to JAVA</b>	1,2,3	3
	1.1	Fundamentals of Java Programming: Classes, JDK, JRE, JVM, Unicode system, I/O using Scanner class and BufferedReader class.		
	1.2	Instance variables, Methods, Constructors.		
	1.3	Object class, Nested class, Access Specifiers, Abstract Classes and Wrapper Classes.		
2	Title	<b>OOP Concepts Mapping to JAVA</b>	1,2,3	4
	2.1	Inheritance (IS – A), Aggregation & Composition (Has – A) Method overloading & overriding, this, super, final keyword, Static.		
	2.2	Autoboxing and Unboxing, Polymorphism.		
	2.3	Packages and Interfaces: Package concept, creating user defined package, Access control protection, Interface.		
3	Title	<b>Exception Handling and Multithreading</b>	1,2,3	4
	3.1	Try and catch block, Multiple catch block, Nested try, finally block, Throw, Throws keywords, Exception propagation, Custom exception.		
	3.2	Create thread using Thread and Runnable class. Thread methods, schedule, sleep, join, Thread priority, Thread group, perform multiple tasks using multiple thread Thread synchronization.		
4	Title	<b>Generics and Collection</b>	1,2,3	3
	4.1	Creating Generic Classes, Generic Methods, Bounded Type		
	4.2	Collection's framework, methods of collection interface (ArrayList, Linked list, Queue etc.)		
				Total 14

### Laboratory Component, if any.

Sr. No	Title of the Experiment
1	Program on I/O using command line arguments, scanner class, BufferedReader etc.
2	Program on Constructor, types of constructors and constructor overloading.
3	Program on Polymorphism, Runtime polymorphism.
4	Program on Inheritance, Abstract Class, Interface.



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**B. Tech. ETRX**

5	Program on Nested Class, Aggregation, Composition.
6	Program on Multithreading.
7	Program on Exception Handling. (built in and User defined)
8	Program on Package and access modifiers.
9	Program on Generics
10	Program on Collection

**Textbooks**

Sr. No	Title	Edition	Authors	Publisher	Year
1	Java Programming From the Group Up	First	Ralph Bravaco, Shaw Simoson	Tata McGraw-Hill	2009
2	Java The Complete Reference	Eleventh	Herbert Schildt	Tata McGraw-Hill	2019

**Reference Books**

Sr. No	Title	Edition	Authors	Publisher	Year
1	An introduction to Programming and Object Oriented Design using Java	Third	Jaimie Nino, Frederick A. Hosch	Wiley Student Edition	2008
2	Java Programming A Practical Approach	First	C Xavier	Tata McGraw-Hill	2011
3	Java™ Programming Language	Fourth	Ken Arnold, James Gosling, David Holmes	The (Java Series) by Sun	2005





## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	I.	T	P	Total
PE-I	Speech and Audio Processing	2	0	2	8	8	2	0	1	3
Examination Scheme										
EC321 (IT21)	Component	ISE			MSE		ESE		Total	
		Theory	50		50		100		200	
	Laboratory	50			—		50		100	

Pre-requisite Course Codes, if any EC303: Digital Signal Processing

Course Objective: To familiarize the basic & advance mechanisms of speech and audio processing

Course Outcomes (CO): At the end of the course students will be able to

EC321.1 Apply concepts of speech coding.

EC321.2 Analyze Audio Perception& psycho-acoustic model.

EC321.3 Demonstrate parametric representation, time domain & frequency domain representation of speech.

EC321.4 Analysis of predictive methods of speech.

EC321.5 Develop systems for various applications of speech & audio processing.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC321.1	2											
EC321.2		2										
EC321.3			2									
EC321.4			2		2							
EC321.5					2							

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PSO1	PSO2	PSO3
EC321.1	2			2		
EC321.2	2			2		
EC321.3		2			2	
EC321.4		2			2	
EC321.5		2			2	

BLOOM'S Levels Targeted (Pl. Tick appropriate)





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Remember	Understand	Apply	Analyze	Evaluate	Create
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**Theory Component**

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Mechanics of speech</b>		8
	1.1	Speech production: Mechanism of speech production, Acoustic phonetics – Digital models for speech signals -Sampling speech signals, basics of quantization, delta modulation, and Differential PCM	1,2	
	1.2	Signal Processing Models of Audio Perception: Basic anatomy of hearing System. Auditory Filter Banks, Psycho-acoustic analysis: Critical Band Structure, Absolute Threshold of Hearing, Simultaneous Masking, Temporal Masking, Quantization Noise Shaping, MPEG psycho-acoustic model.	1,2	
2	Title	<b>Time domain methods for speech processing</b>		8
	2.1	Time domain parameters of Speech signal – Methods for extracting the parameters Energy, Average Magnitude, zero crossing Rate – Silence Discrimination using ZCR and energy	1,2	
	2.2	Short Time Auto Correlation Function – Pitch period estimation using Auto Correlation Function.	4	
3	Title	<b>Frequency domain method for speech processing</b>	1,2	8
	3.1	Short Time Fourier analysis: Fourier transform and linear filtering interpretations.	4	
	3.2	Sampling rates - Spectrographic displays - Pitch and formant extraction - Analysis by Synthesis - Analysis synthesis systems: Phase vocoder, Channel Vocoder	2,3	
	3.3	Homomorphic speech analysis: Cepstral analysis of Speech, Formant and Pitch Estimation, Homomorphic Vocoders, Speech coding, speech enhancement.	3,5	
4	Title	<b>Linear predictive analysis, synthesis of speech</b>	3,5	4
	4.1	Basic Principles of linear predictive analysis – Auto correlation method – Covariance method.		
	4.2	Solution of LPC equations – Cholesky method – Durbin's Recursive algorithm.		
	4.3	Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP, Speech synthesis: basics of articulatory, source-filter, and concatenative synthesis – VOIP.		
5.	Self Study	Audio compression methods, Audio quality analysis, Spatial Audio Perception and rendering, Speaker identification and verification		



*B. Patel*



# Sardar Patel Institute of Technology

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	Total      28
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## Laboratory Component

Sr No.	Experiment Title
1	Speech production
2	Analysis of speech signal
3	Short-time spectrum analysis of speech
4	Spectrographic analysis of speech
5	Linear prediction analysis of speech
6	Formant synthesis
7	Cepstral analysis of speech
8	Analysis by synthesis of speech
9	Manual speech signal-to-symbol transformation
10	Speaker Analysis /speaker recognition

## Text Books :

Sr. No	Title	Edition	Authors	Publisher	Year
1	Speech Communications: Human & Machine	Second	Douglas O'Shaughnessy	IEEE Press, Hardcover 2/e, ISBN: 0780334493.	1999
2	Discrete-Time Speech Signal Processing	First	Thomas F. Quatieri,	Prentice Hall /Pearson Education	2004

## Reference Books:

Sr. No	Title	Edition	Authors	Publisher	Year
1	Speech Processing and Synthesis Toolboxes	First	Donald G. Childers	John Wiley & Sons, September ISBN:0471349593	1999
2	Fundamentals of Speech Recognition	First	L.R. Rabiner and B. H. Juang	Prentice Hall	2009
3	Speech and Audio Signal Processing	Second	Ben Gold and Nelson Morgan	John Wiley and Sons Inc., Singapore	2011
4	Discrete Time Processing of Speech Signals	First	J.R. Deller, J.H.L. Hansen and J.G. Proakis	John Wiley, IEEE Press	1999
5	Digital Processing of Speech Signals	First	L.R.Rabiner and R.W.Schaffer .	Prentice Hall	1979



*Sehdev* →



## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

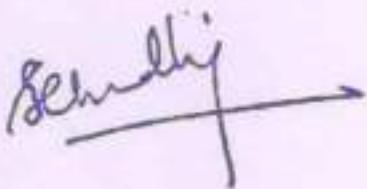
Autonomous Institute Affiliated to Mumbai university

### Department of Electronics and Telecommunication Engineering Undergraduate Program

2020-21

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
Electronic Devices	ET202	2020-21	54
Analog circuits	ET205		88.99
Microcontrollers	ET206		51.19
Signals and Systems	ET207		62



*Bhushanji* 

*AB* 

# Sardar Patel Institute of Technology

Bhavani Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS ENGINEERING

Academic Year: 2019 – 2020

### Theory Course Revision Report

#### Devices

Course Name: Electronic

Course Code Old (2018-19): EL31: Analog Electronics-I

Course Code New (Autonomy 2019-20): ET 202

Class and Semester in Old Syllabus: S.E-III

Class and Semesters in New Syllabus: S.E-III

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	DC and AC analysis of FET	Application of FET Suggestions given by stake holders to include problems solving in the syllabus along with theory	30/42*100= 71%
2	DC and AC analysis of MOSFET	Application of MOSFET Suggestions given by stake holders to include problems solving in the syllabus along with theory	
3	Frequency response and multistage amplifier	Analysis of applications of devices	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. [https://manipal.edu/content/dam/manipal/mmu/mit/documents/CQ\\_Electrical%20&%20Electronics.pdf](https://manipal.edu/content/dam/manipal/mmu/mit/documents/CQ_Electrical%20&%20Electronics.pdf)
2. [https://drive.google.com/file/d/1nqSUDmJzP\\_udGZzYX\\_NCSYFpL9O-ow/view](https://drive.google.com/file/d/1nqSUDmJzP_udGZzYX_NCSYFpL9O-ow/view)

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Manisha Bansode	ETRX	
2	Dr. Reena Sonkusare	EXTC	

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Uday Pandit	EXTC (SFIT)	

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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**ELECTRONICS ENGINEERING**

Academic Year: 2019 – 2020

Lab  
**Theory Course Revision Report**

Penclap

Course Name: Electronic Laboratory

Course Code Old (2018-19): ELL31; Analog Electronics-I Laboratory

Course Code New (Autonomy 2019-20): ELL31

Class and Semester in Old Syllabus: S.E-III

Class and Semesters in New Syllabus: S.E-III

Change/Addition in the Syllabus:

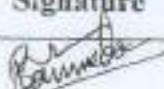
Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	AC analysis of FET/MOSFET	To validate theoretical concepts	3/8*100= 37.5%
2	Fault identification	To map PSO2	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. [https://manipal.edu/content/dam/manipal/mu/nit/documents/CO\\_Electrical%20&%20Electronics.pdf](https://manipal.edu/content/dam/manipal/mu/nit/documents/CO_Electrical%20&%20Electronics.pdf)

2. [https://drive.google.com/file/d/1noSUDmLstP\\_udGZzYX\\_NC5YFpL9O-ow/view](https://drive.google.com/file/d/1noSUDmLstP_udGZzYX_NC5YFpL9O-ow/view)

Details of Committee members Name & Signature:

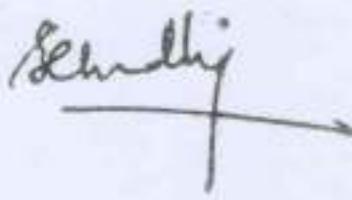
Sr. No.	Name of committee members	Department	Signature
1	Prof. Manisha Bansode	ETRX	
2	Dr. Reena Sonkusare	EXTC	

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Uday Pandit	EXTC (SFIT)	

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

$$\text{Note: } 71\% + 37.5\% = 108.5\% = 52\%$$







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## ELECTRONICS ENGINEERING

Academic Year: 2019 – 2020

### Theory Course Revision Report

#### Analog Circuits

Course Name: Electronic Circuit Design-II

Course Code Old (2018-19): EL41: Analog Electronics-II

Course Code New (Autonomy 2019-20): E **ET 205**

Class and Semester in Old Syllabus: S.E-IV

Class and Semesters in New Syllabus: S.E-IV

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	<ul style="list-style-type: none"> <li>✓ Fundamentals of Operational Amplifier</li> <li>✓ Linear Applications of Operational Amplifier</li> <li>✓ Non-Linear Applications of Operational Amplifier</li> <li>✓ Data Converters</li> <li>✓ Special Purpose Integrated Circuits</li> <li>✓ Voltage Regulators</li> </ul>	Syllabus of linear integrated circuit is included as per need of industry	38/42*100= 90.48%

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. [https://manipal.edu/content/dam/manipal/mu/mit/documents/CO\\_Electrical%20&%20Electronics.pdf](https://manipal.edu/content/dam/manipal/mu/mit/documents/CO_Electrical%20&%20Electronics.pdf)
2. [https://drive.google.com/file/d/1nqSLDmLtatP\\_udGZzYX\\_NC5YFpl9O-ow/view](https://drive.google.com/file/d/1nqSLDmLtatP_udGZzYX_NC5YFpl9O-ow/view)

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Payal Shah	ETRX	
2	Dr. Reena Sonkusare	EXTC	

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Uday Pandit	EXTC (SFIT)	

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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**ELECTRONICS ENGINEERING**

Academic Year: 2019 – 2020

Lab  
Theory Course Revision Report

Analog Circuits

Course Name: E

Course Code Old (2018-19): ELL41; Analog Electronics-II

Course Code New (Autonomy 2019-20): ET 205

Class and Semester in Old Syllabus: S.E-IV

Class and Semesters in New Syllabus: S.E-IV

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Experiments based on validation and implementation of Fundamentals of Operational Amplifier, Linear Applications of Operational Amplifier, Non-Linear Applications of Operational Amplifier, Data Converters, Special Purpose Integrated Circuits, Voltage Regulators are included	Syllabus of linear integrated circuit is included as per need of industry hence experiments are designed based on the syllabus	$7/8 * 100 = 87.5\%$

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. [https://manipal.edu/content/dam/manipal/mu/mit/documents/CO\\_Electrical%20&%20Electronics.pdf](https://manipal.edu/content/dam/manipal/mu/mit/documents/CO_Electrical%20&%20Electronics.pdf)
2. [https://drive.google.com/file/d/1nqSUDmLtatP\\_udGZzYX\\_NC5YFpl9O-ow/view](https://drive.google.com/file/d/1nqSUDmLtatP_udGZzYX_NC5YFpl9O-ow/view)

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Payal Shah	ETRX	
2	Dr. Reena Sonkusare	EXTC	

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Uday Pandit	EXTC (SFIT)	

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100

Note:  $90.48\% + 87.5\% = 177.98\% = 88.99\%$





# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

**Electronics Engineering  
And  
Electronics And Telecommunication Engineering Department  
Academic Year: 2020– 2021  
Theory Course Revision Report**

**Course Name:** Signals and Systems

**Course Code Old (2019-20):** ET207/EC207

**Course Code New (Autonomy 2020-21):** EC207

**Class and Semester in Old Syllabus:** S.E. EXTC & ETRX, Sem-IV

**Class and Semesters in New Syllabus:** S.E. EXTC & ETRX, Sem-IV

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Design of Ideal Analog filter, Butterworth Low Pass Filter (LPF) design, Butterworth High Pass Filter (HPF) design, Butterworth Band Pass Filter (BPF) and Band Reject Filter design, Pole zero plot of Butterworth filters, Magnitude Spectrum	The course covers analysis and design of continuous time signals and systems. Analysis of system using Laplace Transform was part of course which is not changed. The knowledge of filter design is introduced in new course which is a pre-requisite for digital filter design in the DSP course (of Sem V).	23.80 %
2	Equiripple Filters, Chebyshev Type-I LPF, HPF Design, Pole zero plot of Chebyshev filter, magnitude spectrum.	Two examples of analog filter are included: Butterworth filter design & Chebyshev filter design.	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. [https://www.iitbbs.ac.in/curriculum\\_doc/ece\\_bttech.pdf](https://www.iitbbs.ac.in/curriculum_doc/ece_bttech.pdf)
2. [https://www.siu.edu/~gengel/ece428WebStuff/ece428\\_syllabus.pdf](https://www.siu.edu/~gengel/ece428WebStuff/ece428_syllabus.pdf)

Dates of meeting conducted for Syllabus revision:

1. 12<sup>th</sup> July 2020
- 2.

Committee members Name & Signature:

1. Prof. K. T. Talele (Convenor)
2. Dr. Reena Sonkusare
3. Prof. Amol Deshpande

\*\*Percentage Change in Syllabus (%) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100  
=(10/42)\*100 = 23.8 %



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

Electronics Engineering  
And

Electronics And Telecommunication Engineering Department

Academic Year: 2020 – 2021

## Lab Course Revision Report

Course Name: Signals and Systems Laboratory

Course Code Old (2019-20): N.A.

Course Code New (Autonomy 2020-21): EC207

Class and Semester in Old Syllabus: S.E. EXTC & ETRX, Sem-IV

Class and Semesters in New Syllabus: S.E. EXTC & ETRX, Sem-IV

### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Representation of Signals	To understand practical aspect of the course, laboratory experiments are introduced.	100%
2	Operations on Signals		
3	Convolution on Continuous Time Signals		
4	Synthesis of signals using Fourier Series		
5	Synthesis of signals using Fourier Transform		
6	Analysis of LTI system using Laplace Transform		
7	Plotting of frequency spectrum		
8	Butterworth filter design		
9	Chebyshev filter design		
10	Miniproject: Analysis of real world signals		

### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. K. T. Talele (Convenor)	ETRX	<i>K. T. Talele</i>
2	Dr. Reena Sonkusare	EXTC	
3	Prof. Amol Deshpande	EXTC	

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100

$$\text{Note: } 23.8\% + 100\% = 123.8/2 = \underline{\underline{123.8\%}}$$





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## ELECTRONICS ENGINEERING

Academic Year: 2020-21

### Theory Course Revision Report

#### Microcontroller

Course Name:

Course Code Old (2019-20): EUL52: Micro-Architecture

Course Code New (Autonomy 2019-20): ET206

Class and Semester in Old Syllabus: TE ETRX Sem V

Class and Semesters in New Syllabus: SE ETRX Sem IV

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Fundamentals of Embedded System	As subject name suggest the fundamentals of embedded system should be added first	22/42*100 = 52.38%
2	ARM7TDMI(ARMv4T) Architecture	It was not detailed studied in electronic system design in final year. So, the detailed ARM architecture is added in the syllabus	
3	LPC2148 ARM7 Processor Programming and Interfacing	IV semester has the minor projects so students should have programming and interfacing knowledge of ARM	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. Microprocessor and Microcontroller Syllabus by IIT Kharagpur by Prof. Shantanu Chattopadhyay

#### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Priya Deshpande	ETRX	
2	Prof. M.M Parmar	EXTC	



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**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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**ELECTRONICS ENGINEERING**

Academic Year: 2020 – 2021

**Lab Course Revision Report**

Course Name: Microcontroller Laboratory

Course Code Old (2019-20): ELL52: Micro-Architecture Laboratory

Course Code New (Autonomy 2019-20): ET206

Class and Semester in Old Syllabus: TE ETRX Sem-V

Class and Semesters in New Syllabus: SE ETRX Sem-IV

**Change/Addition in the Syllabus:**

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Programming ADC with 8051	Students should know the difference between on chip and off chip interfacing with IC	4/8 *100 = 50%
2	Programming on chip Resources with LPC2148	Syllabus has theory concepts of ARM which should be learned handson during laboratory	

**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Prof. Priya Deshpande	ETRX	
2	Prof. M.M Patmar	EXTC	

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1	Mr. Govind Gaundalkar	Microdevice Technologies	

\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100

Note: 52.36% + 500 = 51.19%



Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ET202	<i>Devices</i> Electronic	03	--	--	03	--	--	03	
		Examination Scheme							
		ISE		MSE		ESE		Total	
		20		20		60		100	

Pre-requisite Course Codes		ES13 (Basic Electrical Technology) BS22 (Engineering Physics)
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Describe semiconductor devices through energy band diagrams
	CO2	Analyze the characteristics of semiconductor junctions
	CO3	Differentiate between bipolar and unipolar conduction
	CO4	Discuss working principle of semiconductor devices
	CO5	Illustrate DC and AC analysis of single stage FET and MOSFET amplifier circuits
	CO6	Analyze multistage amplifier circuits

Module No.	Unit No.	Topics	Ref.	Hr.
1	1.1	<p><b>Applications of Diode:</b> Simple diode model, Limiter circuits, Rectifiers, Clamper Circuits, Peak Detector and Voltage Doubler</p> <p><b>Metal semiconductor and Semiconductor Heterojunctions:</b> Schottkey barrier diode: qualitative characteristics, Ideal junction properties, Nonideal effects on barrier height, V-I characteristics</p> <p><b>Metal-semiconductor Ohmic Contacts:</b> Ideal Non rectifying barriers, Tunneling Barrier, Specific contact resistance</p> <p><b>Heterojunctions:</b> Heterojunction materials, Energy Band Diagrams, Two dimensional electron gas</p> <p><b>Self-Learning:(Only ISE(NO ESE)will be conducted)</b> <i>Carrier Statistics and Transport</i> Semiconductors, Electron Density, Hole Density, Temperature Dependence of intrinsic concentration, Position of Fermi Level, Computation of n and p, Drift current, Diffusion Current, Generation, Recombination and Continuity Equation</p> <p><b>Junction Analysis</b> <b>PN Junction Diode:</b> Basic Structure, Band Diagrams, Zero Applied Bias, Reverse Applied Bias, PN Junction Small</p>	1,3	6



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		<p>signal model of PN junction, Generation and recombination of currents, junction breakdown.</p> <p><b>Zener Diode:</b> Breakdown mechanisms, Characteristics, Effect of Temperature, Application as voltage regulator and backward diode</p>		
2	2.1	<p><b>Bipolar Devices</b></p> <p><b>BJT:</b> The bipolar transistor action, minority carrier distribution, low-frequency common-base current gain, non-ideal effects, Ebers-Moll Model, Gummel-Poon Model, Hybrid-Pi Model, Frequency Limitations</p> <p><b>BJT Amplifiers:</b> CE Amplifiers</p> <p><b>Self-Learning:</b>(Only ISE(NO ESE)will be conducted)</p> <p><b>HBT (Heterojunction bipolar transistor):</b> Current gain in HBT, Basic n-p-n HBT structure with band diagram</p> <p><b>BJT Amplifiers:</b> CB and CC Amplifiers</p>	1	6
3	3.1	<p><b>Field Effect Devices</b></p> <p><b>JFET:</b> Construction, operation and device characteristics, V-I relationship and transconductance, Small signal equivalent model, frequency limitation factors and cutoff frequency</p> <p><b>DC Circuit Analysis:</b></p> <p><b>Junction Field Effect Transistor (JFET):</b> Self bias, Voltage divider bias, Design and Analysis of Biasing Circuits</p> <p><b>AC Analysis:</b></p> <p><b>JFET Amplifiers:</b> Small-Signal Equivalent Circuit, Small-Signal Analysis</p> <p><b>Self-Learning:</b>(Only ISE(NO ESE)will be conducted)</p> <p><b>MODFET (i.e. HEMT):</b> Fundamentals, V-I Characteristics, Cutoff frequency</p> <p><b>MESFET:</b> Device structure, principle of operation, V-I characteristics, High frequency performance</p>	1,2,3	12
4	4.1	<p><b>Field Effect Devices</b></p> <p><b>MOSFET:</b> Two terminal MOS structure, MOSFET construction, Band diagrams under equilibrium and external bias, Threshold Voltage, V-I and CV characteristics, Channel length modulation, Short Channel effects, MOSFET Model</p> <p><b>DC Circuit Analysis:</b></p> <p><b>Metal-Oxide Field Effect Transistor (MOSFET):</b> Common-Source circuits, DC load line and region of operation, Common-MOSFETs configurations, Analysis and Design of Biasing Circuits</p> <p><b>MOSFET Amplifiers:</b> Graphical Analysis, load line and Small-Signal parameters, AC Equivalent Circuit, Small-Signal Model, Common-Source, Source Follower, Common-Gate</p>	1,2,3	12



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5	5.1	<p><b>Frequency analysis of amplifiers:</b> Effect of capacitors (coupling, bypass, load) on frequency response of JFET and MOSFET Amplifiers, High frequency hybrid-pi equivalent circuits of MOSFET, Miller Effect and Miller capacitance, unity gain bandwidth, Low and high frequency response of single stage (CS,CG, CD) and multistage (CS-CS).</p> <p><b>Multistage Amplifiers:</b> Multistage (CS-CS) amplifier</p> <p><b>Self-Learning:</b> (Only ISE (NO ESE) will be conducted)</p> <p><b>Frequency analysis of amplifiers:</b></p> <p><i>Low and high frequency response of single stage (CG, CD) and multistage (CS-CS).</i></p> <p><b>Multistage Amplifiers:</b> (CS-CE) cascode (CS-CG) Amplifiers &amp; Darlington pair.</p>	2.3	6
			<b>Total</b>	<b>42</b>

\* Only ISE (NO ESE) will be conducted for self-learning

#### References:

- [1] Donald A. Neamen, "Semiconductor Physics and Devices" Tata McGraw Hill, Third Edition
- [2] Donald A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill, Second Edition.
- [3] R.L. Boylestad and Lous Nashelsky, "Electronic Devices and Circuits" Pentice Hall, second Edition

#### Additional References for Self-learning:

- [1] Sung-Mo Kang, Yusuf Leblebici, "CMOS Digital Integrated Circuits", Tata McGraw Hill, Third Edition
- [2] S. Sivaharanan and N. Suresh Kumar, "Electronic Devices and Circuits", McGraw Hill, Third Edition
- [3] S. M. Sze, "Semiconductor Devices: Physics and Technology", Wiley, Second Edition
- [4] Mahesh B. Patil, "Basic Electronic Devices and Circuits," PHI, First Edition



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET2022	Electronic Devices Lab-I	-	-	2	-	-	1	1
Examination Scheme								
		ISE		MSE		ESE		Total
		40		-		20		60

Pre-requisite Course Codes EL31 (Electronic Circuit Design - I)

After successful completion of the course, student will be able to

Course Outcomes	CO1	Implement the given circuit on breadboard and test it with measuring instrument
	CO2	Validate characteristics of semiconductor devices.
	CO3	Implement applications of semiconductor devices.
	CO4	Examine the given circuit for the possible faults.
	CO5	Simulate the given application of semiconductor device and obtain its performance parameters.
	CO6	Record the observations of given experiment and arrive at valid conclusions to correlate with theory

Exp. No.	Suggested List of Experiments	Ref.	Mark
1	Validate characteristics of semiconductor devices using hardware implementation. (like pn junction diode, BJT, FET)	1,2	5
2	Validate characteristics of semiconductor devices using circuit simulator. (like pn junction diode, BJT, FET, MOSFET)	1,2	5
3	Implement clipper and clamper circuits	1	5
4	Implement halfwave and fullwave rectifier circuits	1	5
5	Design and implement single stage BJT/ FET/ MOSFET based amplifier for the required specifications.	1,2	5
6	Obtain frequency response of single stage BJT/ FET/ MOSFET based amplifier	1,2	5
7	Implement given multistage amplifier.	1,2	5
8	Identify the circuit and possible faults in it for the desired output.		5
Total Marks			40

#### References:

- [1] R L Boylestad and Louis Nashelsky, "Electronic Devices and Circuits" Prentice Hall, second Edition
- [2] Donald A. Neamen, "Electronic Circuit Analysis and Design", TATA McGraw Hill, 2<sup>nd</sup> Ed.
- [3] Mahesh B. Patil, "Basic Electronic Devices and Circuits," First Edition, PHI
- [4] [http://www.i-vis.co.jp/pdf/cogenda/Quick\\_Start\\_Guide.pdf](http://www.i-vis.co.jp/pdf/cogenda/Quick_Start_Guide.pdf)
- [5] Datasheets of components



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET 205	Analog Circuits	03	--	--	03	--	--	03
Examination Scheme								
ISE			MSE		ESE		Total	
20			20		60		100	

Pre-requisite Course Codes	ES13:(Basic Electrical Technology) ES22: ( Digital Circuits) EL31: (Electronic Circuit Design-I)
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After successful completion of the course, student will be able to

Course Outcomes	CO1	Describe the working and calculate parameters for different power amplifier circuits.
	CO2	Discuss fundamentals of operational amplifier IC
	CO3	Analyze the various applications and circuits based on particular linear integrated circuit
	CO4	Design linear and non-linear applications using operational amplifier IC
	CO5	Design and analysis of circuits and applications with data converter ICs, voltage regulator ICs and special purpose ICs
	CO6	Design and develop the complete block diagram and circuit diagram for typical applications using integrated circuits

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Power amplifiers: Power BJTs, Power MOSFETs, Heat Sinks, Class A, Class B, Class C and Class AB operation, Power efficiency  Self-Learning:(Only ISE(NO ESE)will be conducted) Class AB output stage with diode biasing, VBE multiplier biasing, input buffer transistors, Darlington configuration	1	04
	1.2	Fundamentals of Operational Amplifier Functional Block Diagram of op amp, DC and AC characteristics of an op-amp, Ideal op-amp Single Supply op-amp Vs Dual Supply op amp  Self-Learning:(Only ISE(NO ESE)will be conducted) Noise analysis circuits	2,4, 6	04
2	2.1	Linear Applications of Operational Amplifier Inverting and non Inverting Amplifier, Adder, subtractor, integrator, differentiator, difference amplifier, instrumentation amplifier Converters: Current to voltage converters Active Filters: First order filters, second order active finite and infinite gain low pass, high pass  Self-Learning:(Only ISE(NO ESE)will be conducted) Voltage to current converters, band pass and band reject filters	2,4, 6	07
3	3.1	Non-Linear Applications of Operational Amplifier		



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		<b>Comparators:</b> Inverting comparator, non-inverting comparator, zero crossing detector <b>Schmitt Triggers:</b> Inverting Schmitt trigger <b>Waveform Generators:</b> Square wave generator with duty cycle modulation <b>Precision Rectifiers:</b> Half and full wave precision rectifiers and their applications, sample and hold circuits, logarithmic converters <b>Sine Wave Oscillators:</b> RC phase shift oscillator	2.4, 6	07
		<b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Window detector and level detector, non-inverting Schmitt trigger with adjustable threshold level, triangular wave generator with duty cycle modulation, Peak detectors and antilog converters, Wien bridge oscillator</i>		
4		<b>Data Converters</b>		
	4.1	Performance parameters of ADC, single ramp ADC, ADC using DAC, dual-slope ADC, successive approximation ADC Performance parameters of DAC, binary weighted register DAC, R/2R ladder DAC	4,7	07
		<b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Flash ADC, inverted R/2R ladder DAC</i>		
5		<b>Special Purpose Integrated Circuits</b>		
	5.1	Functional block diagram, working, design and applications of Timer 555 Functional block diagram, working and applications of VCO 566, PLL 565	4,6	06
		<b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Functional block diagram, working and applications of multiplier 534</i>		
6		<b>Voltage Regulators</b>		
		Functional block diagram, working and design of three terminal fixed (78XX series) and three terminal adjustable LM 317 voltage regulator Functional block diagram, working and design of general purpose 723 (LVLC, LVHC, HVLC and HVHC) with current limit and current fold-back protection, Switching regulator topologies,	2.4, 6	07
		<b>Self-Learning:</b> (Only ISE(NO ESE)will be conducted) <i>Functional block diagram, working and design of three terminal fixed 79XX series, three terminal adjustable LM 337 voltage regulator, functional block diagram and working of LT1070 monolithic switching regulator</i>		
				Total 42

\* Only ISE(NO ESE) will be conducted for self-learning



**References:**

- [1] Donald A. Neamen, "Electronic Circuit Analysis and Design", TataMcGraw Hill, Second Edition.
- [2] Sergio Franco, "Design with operational amplifiers and analog integrated circuits", TataMcGraw Hill, 3rd Edition.
- [3] William D. Stanley, "Operational Amplifiers with Linear Integrated Circuits", Pearson, 4<sup>th</sup> Edition.
- [4] D. Roy Choudhury and S. B. Jain, "Linear Integrated Circuits", New Age International Publishers, 4th Edition.
- [5] David A. Bell, "Operation Amplifiers and Linear Integrated Circuits", Oxford University Press, Indian Edition.
- [6] Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Pearson Prentice Hall, 4<sup>th</sup> Edition.
- [7] R. P. Jain, "Modern Digital Electronics," Tata McGraw Hill, 3 rd Edition.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET205	Analog Circuits Lab	-	-	2	-	-	1	1
Examination Scheme								
ISE			MSE		ESE		Total	
40			-		20		60	

Pre-requisite Course Codes	ES13:(Basic Electrical Technology) ES22: ( Digital Circuits) EL31: (Electronic Circuit Design-I)					
	After successful completion of the course, student will be able to					
	CO1	Validate electrical characteristics of given ICs.				
	CO2	Design, debug and test electronic circuit using ICs like op-amp 741, IC 555, IC 566, IC723, etc.				
	CO3	Validate the simulation results with experimental results for the given circuit using Analog System Trainer Kit by Texas Instruments.				
	CO4	Validate circuits by simulation using modern tools available like ngspice and LTspice, TINA, Multisim.				
	CO5	Design, develop and troubleshoot the complete electronic system for typical applications like speed control of DC Motor, Temperature control, development of signal conditioning circuits for various transducers.				
	CO6	Infer data sheet of the given IC.				

Exp. No.	Suggested List of Experiments	Ref.	Marks
1	To measure (a) Input bias current, (b) Input offset current,(c)Input offset voltage & (d) Slew rate of the given Op-Amp IC 741.	1,2,3	5
2	Design, Implement and analyze Schmitt Trigger Circuit using Op-Amp IC 741.	1,2	5
3	Design, Implement and analyze Square Wave Generator Circuit using Op-Amp IC 741.	1,2	5
4	Design, Implement and analyze Monostable Multivibrator Circuit using IC 555 and its operation as divide by N frequency.	1,2	5
5	Design, Implement and analyze Inverting Adder Circuit using Op-Amp IC 741.	1,2	5
6	Design, Implement and analyze Voltage Regulator Circuit using IC 723.	1,2	5
7	a) Design, Simulate and analyze the given problem statement (circuit/Power Amplifier) using Circuit Simulation S/W preferably NI-Multisim/ TINA/ SPICE. b) Implement and analyze this Circuit using Op-Amp (TL802): Analog System Trainer Kit - TEXAS INSTRUMENTS.	1,2,5,6	5



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8	TSC: Trouble Shooting Competition	TSC Man ual	5
		Total	40

**References:**

- [1] Electronic Circuit Design-II Laboratory Manual
- [2] D. Roy Choudhury and S. B. Jain, "Linear Integrated Circuits", New Age International Publishers, 4th Edition.
- [3] David A. Bell, "Operation Amplifiers and Linear Integrated Circuits", Oxford University Press, Indian Edition,
- [4] Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Pearson Prentice Hall, 4<sup>th</sup> Edition.
- [5] Analog System Trainer, Texas Instruments Laboratory Manual
- [6] Donald A. Neamen, "Electronic Circuit Analysis and Design", TataMcGraw Hill, Second Edition.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET206	Microcontrollers	03	01	-	03	01	-	04
<b>Examination Scheme</b>								
		ISE	MSE	ESE	<b>Total</b>			
		20	20	60	100			

Pre-requisite Course Codes		DS12: Digital Circuits EI32: Computer Organization and Architecture
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Get insight of design metrics of Embedded system to design real time applications to match recent trends in technology
	CO2	Explain the architectural features of 8-bit microcontroller, ARM/TDMI and compare with other microcontrollers.
	CO3	Apply addressing modes and write assembly as well as C program for the given task.
	CO4	Effectively utilize the on chip and off chip hardware resources to microcontroller

Module No.	Unit No.	Topics	Ref.	Hrs.
1	<b>Fundamentals of Embedded System</b>			
	1.1	Introduction to Embedded Systems, Characteristics of Embedded System, Design Process, Design Metrics and optimization of various parameters of embedded system. Real time System's requirements, real time issues, interrupt latency	1	4
	1.2	Embedded Product development lifecycle, Program Modelling concepts: DFG, FSM, Petri-net, UML	1	
	<i>Self Learning (Only ISE will be conducted, No ESE) - 'C' Programming Exercises for creating header files and hex files (Modular Style)</i>			5
2	<b>8051 Architecture</b>			4
	2.1	Overview of 8051 Family	2	
	2.2	8051 block diagram, 8051 Port Structure	2	
3	2.3	Pin Description of 8051	2	
	<b>8051 Programming in C</b>			12
	3.1	Addressing Modes, Data Types, Time Delay, Logic	2	



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	Operations and Data Conversion	
3.2	I/O Programming	2
3.3	Timer Programming	2
3.4	Interrupt Programming	2
3.5	Serial Port Programming	2
3.6	<i>Self Learning (Only ISE will be conducted. No ESE): Programming Exercises on I/O, Timer, Serial Port and Interrupt Programming. Conversion of Assembly Language to Embedded C program and vice versa</i>	2
4	<b>8051 Interfacing</b>	4
4.1	LCD and Keyboard Interfacing	2
4.2	ADC and Sensor Interfacing	2
4.3	Motor Control: Relay, PWM, DC motor	2
4.4	<i>Self Learning (Only ISE will be conducted. No ESE): Programming the 8051 microcontroller for DAC Interfacing, ADC Interfacing, LCD and Keyboard Interfacing, Servo Motor, Stepper Motor</i>	2
5	<b>ARM7TDMI(ARMv4T) Architecture</b>	10
5.1	Features and advantages, ARM versions	3.4
5.2	Processor operating states, memory formats, data types, operating modes, registers, program status registers, exceptions, interrupt latencies, and pipelined architecture advantage	3.4
5.3	Introduction to parallel processing concepts, Flynn's classifications, pipeline processing, Pipeline stages, Pipeline Hazards	3.4
6	<b>LPC2148 ARM7 Processor Programming and Interfacing</b>	08
6.1	Processor state changing (ARM $\leftarrow\rightarrow$ THUMB), Exceptions, interrupts and its handling,	3.4
6.2	Timer Programming, Watchdog Timer	3.4
6.3	ADC and Sensor Interfacing	3.4
6.4	SPI and I2C Peripheral Interface	3.4
	<i>Self Learning (Only ISE will be conducted. No ESE): Comparative study of following microcontrollers, compare the architecture features of the given microcontroller and select according to the application</i> (a) Intel, Atmel (AVR), TI (MSP430), Microchip (PIC) NXP (LPC 2148) and Cypress Semiconductor (PSOC). (b) Single board microcontrollers: Arduino, Raspberry Pi and Intel Galileo. (c) Mixed Signal Microcontrollers from Silicon Labs 8-bit 8031F02 and EFM32 (Gum, Gecko, CC Series) 32-bit microcontroller	6
	Total	42



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# Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET205	Micro controllers	-	--	2	--	--	2	1
Examination Scheme								
		ISE		MSE		ESE		Total
		40		--		--		40

Pre-requisite Course Codes		EL43: Embedded System Design
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Interface peripherals effectively to ports of 8-bit microcontroller
	CO2	Program on chip resources of 8-bit microcontroller
	CO3	Interface on chip and off chip ADC to ARM based processor and 8-bit microcontroller.
	CO4	Program on chip Timer and Serial Port of ARM based processor

Exp No.	Experiment Details	Ref.	Marks
1.	Programming the I/O Port of 8-bit 8051 Microcontroller (e.g. 89851/52) and effectively interface the LED and switch.	1	5
2.	Programming and Interfacing DC motor, stepper motor and servo motor to 8-bit 8051 Microcontroller	1	5
3.	Programming and Interfacing for utilization of on-chip resources like Timers and Serial Communication of 8-bit 8051 Microcontroller.	1	5
4.	Demonstrate the External and Internal Interrupt handling in 8-bit 8051 Microcontroller	1	5
5.	Programming and Interfacing sensor using ADC with 8-bit 8051 Microcontroller	1	5
6.	Programming and Interfacing of sensors using on chip ADC in ARM based Processor (Eg: LPC2148)	2,3	5
7.	Programming and Interfacing on chip timer to ARM based Processor	2,3	5
8.	Programming and Interfacing on chip Serial Port to ARM based Processor	2,3	5
	Total		40

### Recommended Books:

- [1] Muhammad Ali Mazidi, Janice G. Mazidi and R. D. McKinlay "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", 2nd Edition,
- [2] David Seal, "ARM Architecture", Reference Manual (2nd Edition)
- [3] ARM System-on-Chip Architecture, Steve Furber





## Sardar Patel Institute of Technology

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Name & Sign of the Expert1:

*Blumurthy  
(Prinay Deshpande)*

Name & Sign of the Expert2:

*R.  
(M. M. Parmar)*

Name & Sign of the Expert3:



*Seenuj* →

*J. J. Deshpande*



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## Recommended Books:

- [1] Embedded System: Architecture, Programming and Design, Rajkamal, Tata McGraw-Hill Education, 2011
- [2] Muhammad Ali Mazidi, Junice G. Mazidi and R. D. McKinlay "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", 2nd Edition,
- [3] David Seal, "ARM Architecture", Reference Manual (2nd Edition)
- [4] ARM System-on-Chip Architecture, Steve Furber

## Material for Self Learning: (Only ISE will be conducted, No ESE)

- [5] Dennis Ritchie, "The C Programming Language", 2<sup>nd</sup> Edition (Chapter 4)
- [6] Handouts and weblinks.

Name & Sign of the Expert1:

Rishabh  
(Priya Dalpande)

Name & Sign of the Expert2:

Ritika  
(M. M. Parmar)

Name & Sign of the Expert3:



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# Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET205	Micro controllers Laboratory	—	—	2	—	—	2	1
Examination Scheme								
		ISE	MSE		ESE		Total	
		40	—		—		40	

**Pre-requisite Course Codes** EL43: Embedded System Design

After successful completion of the course, student will be able to

Course Outcomes	CO1	Interface peripherals effectively to ports of 8-bit microcontroller
	CO2	Program on chip resources of 8-bit microcontroller
	CO3	Interface on chip and off chip ADC to ARM based processor and 8-bit microcontroller
	CO4	Program on chip Timer and Serial Port of ARM based processor

Exp No.	Experiment Details	Ref.	Marks
1.	Programming the I/O Port of 8-bit 8051 Microcontroller (e.g. 89851/52) and effectively interface the LED and switch.	1	5
2.	Programming and Interfacing DC motor, stepper motor and servo motor to 8-bit 8051 Microcontroller	1	5
3.	Programming and Interfacing for utilization of on-chip resources like Timers and Serial Communication of 8-bit 8051 Microcontroller.	1	5
4.	Demonstrate the External and Internal Interrupt handling in 8-bit 8051 Microcontroller	1	5
5.	Programming and Interfacing sensor using ADC with 8-bit 8051 Microcontroller	1	5
6.	Programming and Interfacing of sensors using on chip ADC in ARM based Processor (Eg: LPC2148)	2,3	5
7.	Programming and Interfacing on chip timer to ARM based Processor	2,3	5
8.	Programming and Interfacing on chip Serial Port to ARM based Processor	2,3	5
	Total		40

### Recommended Books:

- [1] Muhammad Ali Mazidi, Janice G. Mazidi and R. D. McKinlay "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", 2nd Edition.
- [2] David Seal, "ARM Architecture", Reference Manual (2nd Edition)
- [3] ARM System-on-Chip Architecture, Steve Furber

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## Sardar Patel Institute of Technology

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Name & Sign of the Expert1:

*Blumuker  
(Prinay Deshpande)*

Name & Sign of the Expert2:

*M.M. Pawar  
(M. M. Pawar)*

Name & Sign of the Expert3:



*[Signature]*

*Shinde*



*[Signature]*



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(PC)  ET207/EC207	Signals and Systems	3	0	2	6	11	3	0	1	4
		Examination Scheme								
		Component	ISE		MSE		ESE		Total	
		Theory	75		75		150		300	
		Laboratory	50		—		50		100	

Pre-requisite Course Codes, if any.	MA101, MA102
Course Objective: To develop strong foundation of continuous time signals and systems	
Course Outcomes (CO): At the End of the course students will be able to	
XX207.1	Classify and illustrate various operations on signals and systems.
XX207.2	Analyze the properties of a continuous time signal in frequency domain and observe the spectrum.
XX207.3	Apply Laplace Transform on continuous time signals
XX207.4	Evaluate Linear Time Invariant system response using Laplace Transform
XX207.5	Design analog Butterworth and Chebyshev filter
XX207.6	Interpret system using state space model

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
XX207.1												
XX207.2												
XX207.3												
XX207.4												
XX207.5												
XX207.6												

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
XX207.1							
XX207.2							
XX207.3							
XX207.4							
XX207.5							
XX207.6							



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BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	<input checked="" type="checkbox"/> Apply	<input checked="" type="checkbox"/> Analyze	Evaluate	Create
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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Overview of Continuous Time Signals and Systems	1,2	08
	1.1	Introduction: Signals, systems, elementary signals, exponential, sine, step, impulse, ramp, rectangular, triangular and operations on signals		
	1.2	Classification of signals: Continuous Signals, deterministic and non-deterministic, periodic and aperiodic, symmetric (even) and asymmetric (odd), energy and power, causal and anti-causal signals.		
	1.3	Operations of Signals: Shifting, Scaling, Time Reversal, Addition and Multiplication, Convolution, Correlation		
2	Title	Fourier Series and Fourier Transform	1,2	10
	2.1	Fourier series: Orthogonal representation of signals, Continuous Time Fourier Series (CTFS), magnitude and phase spectra, Gibbs phenomenon, Parsevel's relation,		
	2.2	Fourier Transform: Fourier Transform and Inverse Fourier Transform on periodic and non-periodic signals, Limitations of Fourier Transform and need for Laplace Transform, Properties of Fourier Transform, Parsevel's relation, Energy and Power Spectral Density and Bandwidth.		
3	Title	Laplace Transform	1,2	04
	3.1	Laplace Transform, Properties of Laplace Transform, Relation between Laplace Transform and Fourier Transform,		
	3.2	Inverse Laplace Transform using Partial Fraction method		
4	Title	Linear Time Invariant (LTI) Systems	1,2	08
	4.1	Classification of systems: Static and dynamic, time variant and time invariant, linear and nonlinear, causal and non-causal, stable and unstable systems.		



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	4.2	Impulse Response, Transfer Function, Differential Equation, Stability of Systems, Frequency Response, Solution of Differential Equation using Laplace Transform		
5	Title	Analog Filter Design	1.2	12
	5.1	Design of Ideal Analog filter, Butterworth Low Pass Filter (LPF) design, Butterworth High Pass Filter (HPF) design, Butterworth Band Pass Filter (BPF) and Band Reject Filter design, Pole zero plot of Butterworth filters, Magnitude Spectrum		
	5.2	Equiripple Filters, Chebyshev Type-I LPF, HPF Design, Polezero plot of Chebyshev filter, magnitude spectrum.		
	5.3	Realization diagram (Form I and II)		
6	Self Study	State Space Model: Procedure to determine state equations, State equations from transfer function, Laplace transform solution of state equations		6*
Total (*Not included)				42

### Laboratory Component

Sr. No	Title of the Experiment
1	Representation of Signals
2	Operations on Signals
3	Convolution on Continuous Time Signals
4	Synthesis of signals using Fourier Series
5	Synthesis of signals using Fourier Transform
6	Analysis of LTI system using Laplace Transform
7	Plotting of frequency spectrum
8	Butterworth filter design
9	Chebyshev filter design
10	Mini-project: Analysis of real world signals



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### Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Signals and Systems	3 <sup>rd</sup>	Nagoor Kani	Tata McGraw Hill	2011
2	Digital Signal Processing	4 <sup>th</sup>	Ramesh Babu	Scitech	2014

### Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Signals and Systems	2 <sup>nd</sup>	Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab	Pearson	2002
2	Signals and Systems	3 <sup>rd</sup>	Simon Haykin and Barry Van Veen	John Wiley & Sons	2002
3	Linear Systems and Signals	4 <sup>th</sup>	B. P. Lathi	Oxford University Press	2005
4	Signals and Systems	2 <sup>nd</sup>	H. P Hsu, R. Ranjan	Schaum's outlines	2006



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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics and Telecommunication Engineering

Undergraduate Program

2019-20

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
Technology Entrepreneurship Lab	HSS81	2019-20	100
Wireless Network planning and Design	ETE81B		100
Space Communication Technologie	ETE82A		100
Cloud Computing and Analytics	ETE82B		100
Wireless Network planning and Design Lab	ETEL81		100
Space Communication Technologie Lab	ETEL81		100
Cloud Computing and Analytics Lab	ETEL81		100



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Bew. Dr. Jitendra Patel

# Sardar Patel Institute of Technology

Bhavani's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

19-7-2019

## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2019–2020

### Theory Course Revision Report

Course Name: Wireless Network Planning & Design

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ): ETE 81B

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: BTech Sem VII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly Introduced	Recent Trends & Research	100 %
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



Details of Committee members Name & Signature:

S. M. J.

# Sardar Patel Institute of Technology

Bhavani's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 Autonomous Institute Affiliated to University of Mumbai)

Sr. No.	Name of committee members	Department	Signature
1	Anand Mane	EXTC	M
2	Dr. Sukanaya Kulkarni	EXTC	SK
3			
4			

Details of Experts Name & Signature (if any);

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		3	1	--	3	1	--	4
ETE81B	Wireless Network Planning and Design	Examination Scheme						
		ISE	MSE	ESE		Total		
		20	20	60		100		

Pre-requisite Course Codes			
After successful completion of the course, student will be able to			
Course Outcomes	CO1	Understand RF planning basics and DAS .	
	CO2	Design indoor DAS planning solutions and Tunnel Radio Planning	
	CO3	Analyze performance of the various indoor planning aspects	
	CO4	Evaluate the various aspects of wireless network planning	

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Indoor Radio Planning	1.2	
	1.1	Indoor Coverage from the Macro Layer,The Indoor 3G/HSPA Challenge.		
	1.2	The Basics of Indoor RF Planning,RF Metrics Basics		7
2		Distributed Antenna System	1.2	
	2.1	Passive Components,The Passive DAS, Active DAS		8
	2.2	Hybrid Active DAS solution,Indoor DAS for MIMO Application		
	2.3	Using repeaters for Indoor DAS coverage, Active DAS data.		
3		Designing Indoor DAS Solution	1.3	
	3.1	Indoor Planning procedure,RF design process,Designing Optimum Indoor solution,		8
	3.2	Indoor Design Strategy, Handover considerations,Elevator coverage		
	3.3	Multioperator Systems, Co-existance issues for 2G/3G,Multi-operator requirements.		
4		Traffic Dimensioning and Noise	1.4	
	4.1	Erlang the traffic measurement, 2G, 3G channel and Erlang.		9
	4.2	Trunking Gain, Resource sharing, cell configuration in Indoor projects		
	4.3	Noise fundamentals, cascaded noise, noise power, noise control,		



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5	Tunnel Radio Planning and Link Budget	1	10
	5.1 Tunnel HO zone,Tunnel Solutions cascaded BDSa and T-Systems, Handover design inside tunnel, RF test specifications of tunnel projects.		
	5.2 Covering Indoor users from the outdoor network,Micro cell capacity, Digital distribution of DAS, High speed rail solutions.		
	5.3 Components and calculation of RF Link,4G Link Budget		
Total			42

### Recommended Books:

- [1] Indoor Radio Planning A Practical Guide for 2G,3G and 4G- Morten Tolstrup- Wiley Publication.
- [2] Theodore S. Rappaport , —Wireless Communications , Prentice Hall of India, PTR publication
- [3] Andreas Molisch , —Wireless Communications , Wiley, Student second Edition.
- [4] Vijay Garg , —Wireless Network Evolution 2G-3G , Pearson Education.
- [5] Young Kyun Kim and Ramjee Prasad, —4 G Roadmap and Emerging Communication Technologies —, Artech house.
- [6] C.Y Lee , —Mobile Communication , Wiley



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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2019-2020

### Theory Course Revision Report

Course Name: *Space Communication Technologies*

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ): *ETE82-A*

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

*BTech Sem VII*

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	<i>Newly Introduced</i>	<i>Recent Trends &amp; research</i>	<i>100%</i>
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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**Sardar Patel Institute of Technology**  
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Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. Reena Sonkusare	EXTC	RS
2	Dr. Sukanya Kulkarni	EXTC	SK
3	Pallavi Malame	EXTC	PM
4			

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (%) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		3	1	-	3	1	--	4
ETE 82A	Space Communication Technologies	Examination Scheme						
		ISE		MSE	ESE		Total	
		20		20	60		100	

### Pre-requisite Course Codes

After successful completion of the course, student will be able to

Course Outcomes	CO1	To understand the basics of satellites and orbits.
	CO2	To understand the satellite segment and earth segment.
	CO3	To analyze the various methods of satellite access.
	CO4	To understand the applications of satellites.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>SATELLITE ORBITS</b>	1,2	7
	1.1	Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits		
	1.2	Look Angle Determination- Limits of visibility -eclipse-Sub satellite point -Sun transit outage-Launching Procedures - launch vehicles and propulsion.		
2		<b>SPACE SEGMENT AND SATELLITE LINK DESIGN</b>	1,2	8
	2.1	Spacecraft Technology- Structure, Primary power, Attitude and Orbit control.		
	2.2	Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command		
	2.3	Satellite uplink and downlink Analysis and Design, link budget, E/N calculation- performance impairments-system noise, inter modulation and interference		
	2.4	Propagation Characteristics and Frequency considerations-		



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	System reliability and design lifetime.		
3	<b>EARTH SEGMENT</b>	1.3	
3.1	Introduction – Receive – Only home TV systems – Outdoor unit – Indoor unit for analog (FM) TV – Master antenna TV system – Community antenna TV system – Transmit – Receive earth stations – Problems –		8
3.2	Equivalent isotropic radiated power – Transmission losses – Free-space transmission – Feeder losses – Antenna misalignment losses – Fixed atmospheric and ionospheric losses – Link power budget equation –		
3.3	System noise – Antenna noise – Amplifier noise temperature – Amplifiers in cascade – Noise factor – Noise temperature of absorptive networks – Overall system noise temperature – Carrier-to-Noise ratio –		
3.4	Uplink – Saturation flux density – Input back off – The earth station – HPA – Downlink – Output back off – Satellite TWTAs output – Effects of rain – Uplink rain – Fade margin – Downlink rain – Fade margin – Combined uplink and downlink C/N ratio – Inter modulation noise		
4	<b>SATELLITE ACCESS</b>	1.4	
4.1	Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system,		9
4.2	Digital video Broadcast, multiple access: FDMA, TDMA, CDMA,		
4.3	Assignment Methods, Spread Spectrum communication, compression – encryption.		
5	<b>SATELLITE APPLICATIONS</b>	1	
5.1	INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS (United States (GPS) Japan (QZSS) Russia (GLONASS) China Peoples Republic of China (BeiDou Navigation Satellite System) European Union (Galileo) India (IRNSS), INMARSAT, LEO, MEO		10
5.2	Satellite Navigational System, Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH)		
5.3	Digital audio broadcast (DAB)- Worldspace services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet,		
Total			42



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### Recommended Books:

- 1] Dennis Roddy, Satellite Communication, McGraw Hill, 4<sup>th</sup> edition, 2006.
- 2] Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, "Satellite Communication Systems Engineering", Prentice Hall/Pearson, 2007.
- 3] N.Agarwal, "Design of Geosynchronous Space Craft", Prentice Hall, 1985.
- 4] Bruce R. Elbert, "The Satellite Communication Applications", Hand Book, Artech House Boston London, 1997.
- 5] Tr: T. Ha, "Digital Satellite Communication", II nd edition, 1990.
- 6] Emanuel Fthenakis, "Manual of Satellite Communications", Mc Graw Hill Book Co., 1984,



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# Sardar Patel Institute of Technology

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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2019-2020

### Theory Course Revision Report

Course Name: *Cloud Computing and Analysis*

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ): ETG 82.B

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: BTech Sem VIII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	100% change	New course introduced as per the requirement of IITs in India, IIT Ropar	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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**Sardar Patel Institute of Technology**  
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Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Deependra Patel	E-XIC	
2			
3			
4			

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





## Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		3	1	--	3	1	--	4
ETE82B	Cloud Computing and Analytics	Examination Scheme						
		ISE	MSE	ESE		Total		
		20	20	60		100		

### Pre-requisite Course Codes

After successful completion of the course, student will be able to

Course Outcomes	CO1	Define and explain cloud computing services and models.
	CO2	Compare and select cloud service providers/software.
	CO3	Implement open source cloud and administration.
	CO4	Describe the risks associated in cloud computing environment.

Module No.	Unit No.	Topics	Ref.	Hrs
1	Introduction to Cloud Computing			10
	1.1	What's Cloud Computing, NIST Definition, properties and Service Model, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others		
	1.2	Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS.		
	1.3	Cloud computing platforms: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing.		
2	Cloud Technologies			08



*S. Patel*



## Sardar Patel Institute of Technology

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	2.1	Web services, AJAX and mashups: Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces		
	2.2	Mashups: user interface services Virtualization Technology: Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization.		
	2.3	Multitenant software: Multi-entity support, Multi-schema approach, Multitenance using cloud data stores, Data access control for enterprise application.		
3		Issues in cloud Computing		06
	3.1	Implementing real time application over cloud platform, Issues in intercloud environments, QoS Issues in cloud, Dependability, data Migration, streaming in cloud, QoS monitoring in cloud computing environment.		
	3.2	Cloud Middleware, A grid of clouds, Load Balancing in cloud		
	3.3	Resource optimization, resource dynamic reconfiguration		
4		Security architecture and Challenges		08
	4.1	Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures		
	4.2	Identity Management and Access control-Identity management, Access control, Autonomic Security.		
	4.3	Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.		
5		Programming support of Google App Engine and Amazons		10





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	AWS	
5.1	Programming the Google App Engine, Google file system(GFS), Bigtable Google NOSQL system	
5.2	Programming on Amazon EC2, Amazon simple storage service(S3), Amazon Elastic block store(EBS), and SimpleDB.	
5.3	Data Analytics and Cloud Computing: Big data concept, Hadoop and Apache spark stream engine.	
Total		42

### Recommended Books:

- [1] Distributed and Cloud Computing From parallel processing to the internet of things, Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, ISBN : 9780123858801, ELSEVIER MK publishers, 2011.
- [2] Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kaufman, F.Halper, Wiley India Edition.
- [3] Cloud Security & Privacy by Tim Maher, S.Kumaraswamy, S.Latif, SPD, O'REILLY.
- [4] Cloud Computing: A Practical Approach by J.Vette, Toby J. Vette, Robert Elsenpeter, Tata McGraw Hill.
- [5] Google Apps", by Scott Granneman,Pearson.

Course	Course Name	Teaching Scheme	Credits Assigned
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2019- 2020

### Lab Course Revision Report

Course Name: Wireless Network planning & Design lab

Course Code Old (20 - ):

Course Code New (Autonomy 20 - ): ETEL&L8

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: B.Tech Sem VIII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced	Recent trends & Research	100%
2			
3			
4			

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1			
2			
3			
4			

RJ



Sundarji →



## Sardar Patel Institute of Technology

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Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Anand Mane	EXTC	
2	Dr. Reena So		
3	Dr. Sukanya Kulkarni	EXTC	
4			

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		--	--	2	--	--	1	1
ETEL81B	Wireless Network Planning and Design Lab	Examination Scheme						
		ISE	MSE		ESE		Total	
		40	--		--		60	

### Pre-requisite Course Codes

After successful completion of the course, student will be able to

Course Outcomes	CO1	Simulate various wireless network planning parameters
	CO2	Debug programs
	CO3	Analyze results of simulation
	CO4	Document Cellular and Wifi signal strength behaviour in detail

Exp No.	Experiment Details	Ref.	Marks
1.	Preparing a Survey Report on Cellular signal strength on Each floor of building. And Identify Coverage Holes.		5
2.	Preparing a Survey Report on WiFi signal strength on Each floor of building. And Identify Coverage Holes.		5
3.	Coverage Simulation Using PyLayers software		5
4.	Ray Tracing Simulation Using PyLayers software		5
5.	Handling Agent Mobility Using PyLayers Software.		5
6.	Path Gain Simulation Using PyLayers Software.		5
7.	To study High Speed Railway Communication Solutions.		5
8.	To study Tunnel HO and RF test specifications for Tunnel Projects.		5
	Total		40

Re



*Selvaraj*



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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2019-2020

### Lab Course Revision Report

Course Name: *Space Communication Technologies Lab*

Course Code Old (20 - ):

*ETEL 81B*

Course Code New (Autonomy 20 - ):

*B.Tech Sem VI/II*

Class and Semester in Old Syllabus:

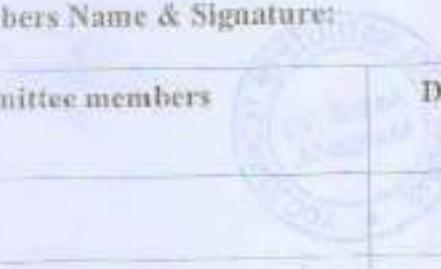
Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	<i>Newly introduced</i>	<i>Recent Trends &amp; Research</i>	100%
2			
3			
4			

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1			
2			
3			
4			



*Ry*



*Sundar*



## Sardar Patel Institute of Technology

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Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. Reena Sonkusare	EXTC	RS
2	Dr. Sukanya Kulkarni	EXTC	SK
3	Prof. Pallavi Malame	EXTC	PM
4			

\*\*Percentage Change in Syllabus (%) = (No. of experiments changed or added / Total No. of experiments) x 100



✓

Sekhariaj





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
		--	--	2	--	--	1	1	
ETEL82A		Examination Scheme							
Space Communication Laboratory		ISE		MSE		ESE		Total	
		40		--		--		40	

## Pre-requisite Course Codes

After successful completion of the course, student will be able to

Course Outcomes	CO1	Establish satellite link for communication for various data types.
	CO2	Analyze Different Orbital Parameters & link budget of satellite signal for proper communication for given data.
	CO3	Analyze the use of GPS system for the benefit of society
	CO4	Study & document different application of satellite communication

Exp No.	Experiment Details	Ref.	Marks
1.	i) To establish a direct communication link between Uplink Transmitter and Down Receiver using tone signal, Voice Signal.	1,2	5
2.	To transmit & receive function generator waveform & PC data through satellite link.	1,2	5
3.	To determine look angle (azimuth and elevation) of satellite implement code using Python or C.	1,2,4	5
4.	To find the orbital parameters of Satellite write a program using programming language(Python ,C).	1,2,4	5
5.	To study Link Budget uplink and downlink for satellite Communication given problem write a program using any programming language(Python ,C).		5
6.	To study GPS module and find the current location using latitude and longitude	1,2	5
7.	To design an Earth Station using programming language(Python ,C)	1,4	5
8.	To design an Earth Station using programming language(Python ,C)/Create a Model for (BPSK/QPSK )modulator and demodulation using any programming language.	1,4	5
		Total	40





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### Recommended Books:

- 1] Dennis Roddy, Satellite Communication, McGraw Hill, 4<sup>th</sup> edition, 2006.
- 2] Wilbur J. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, "Satellite Communication Systems Engineering", Prentice Hall/Pearson, 2007.
- 3] N. Agarwal, "Design of Geosynchronous Space Craft", Prentice Hall, 1986.
- 4] Bruce R. Elbert, "The Satellite Communication Applications", Hand Book, Artech House Boston London, 1997.
- 5] Tri T. Ha, "Digital Satellite Communication", II nd edition, 1990.
- 6] Emanuel Fthenakis, "Manual of Satellite Communications", Mc Graw Hill Book Co., 1984.



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# Sardar Patel Institute of Technology

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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2019-2020

### Lab Course Revision Report

Course Name: *Cloud Computing & Analysis lab.*

Course Code Old (20 - ):

Course Code New (Autonomy 20 - ): ETEL818

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: BTech Sem VII

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly introduced	Newly introduced Course based on	100%
2		Requirements in Ind + academic	
3			
4			

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1			
2			
3			
4			

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*Sekharia*



## Sardar Patel Institute of Technology

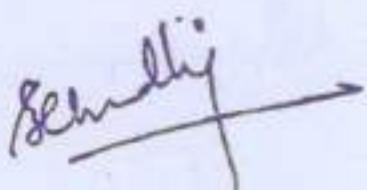
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Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dnyanand Ambawade	EXTC	
2			
3			
4			

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100







## Sardar Patel Institute of Technology

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Code		(Hrs/week)						Total		
		L	T	P	L	T	P			
		..	..	2	..	..	1	1		
		Examination Scheme								
ETEL82B		ISE			MSE		ESE		Total	
		40			..		..		40	

### Pre-requisite Course Codes

After successful completion of the course, student will be able to

Course Outcomes	CO1	Implement and describe fundamentals of cloud computing and Summarize various cloud delivery models.
	CO2	Create and run virtual machines on open source OS.
	CO3	Implement Infrastructure, Storage as a Service.
	CO4	Install and explain security features for cloud.

Exp No.	Experiment Details	Ref.	Marks
1.	Study and implementation of Infrastructure as a Service.		5
2.	Implementation of identity management.		5
3.	Study and installation of Storage as Service.		5
4.	User Management in Cloud.		5
5.	Study and implementation of Single-Sign-On		5
6.	Write a program for web feed		5
7.	AWS Cloud		5
8.	Kubernetes		5
		Total	40

### Recommended Books:

- [1] Enterprise Cloud Computing by Gautam Shroff, Cambridge, 2010.



*Sehgal*



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[2] Cloud Security by Ronald Krutz and Russell Dean Vines, " , Wiley - India, 2010, ISBN:978-0-470-58987-8.

[3] Getting Started with OwnCloud by Aditya Patowar, Packt Publishing Ltd, 2013.

[4] [www.openstack.org](http://www.openstack.org)

[5] <https://www.rss.com/>



BB

*Bhavesh*





## Sardar Patel Institute of Technology

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Autonomous Institute Affiliated to Mumbai university

### Department of Electronics and Telecommunication Engineering Undergraduate Program

2018-19

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
Statistical and Computational Lab	ETL54	2018-19	50
Action Research Project I	ELP56		100
Action Research Project II	ELP65		100
Industrial and Organizational Psychology	MEC3		100
Law for Engineers	MEC4		100
Creative Thinking, Diversity and Workplace	ABL3		100
Consumer Electronics	OE1		100
Robotic Vision	OE2		100
Cyber Security and Digital Forensics	OE3		100
Internet of Things	OE4		100
Technical Paper and Patent Drafting (Noncredit)	ABL4		100
French Language	MEC1		100
German Language	MEC2		100

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ETL54	Statistical and Computational Lab	--	--	2	--	--	1	1
Examination Scheme								
		ISE		MSE		ESE		Total
		40		--		20		60

Pre-requisite Course Codes	ET54 Random Signal Analysis	
	CO1	To handle the different data types.
	CO2	To compute the statistical parameters
Course Outcomes	CO3	To compute cdf and pdf
	CO4	To plot and interpret from data visualization
	CO5	To Analyse the data

Exp. No.	Experiment Details	Ref.	Marks
1	Computation of Statistical Parameters		5
2	Probability distributions computation (cdf and pdf)		5
3	Regression Analysis		5
4	Data Visualization		5
5	Analysis of Covariance and Time Series Analysis		5
6	Matrix Computation		5
7	Application in Signal Processing		5
8	Application in Communication Engineering		5
Total Marks			40

Note: Statistical Computational Platform: R and Python Numpy, Scipy and matplotlib



*Senthil*



## Analog VLSI Design

By

Dr. S. S. Rathod

Head of Electronic Engineering Department  
Sardar Patel Institute of Technology

Aundh (W), Maharashtra 411 008

Mahile: 9920228215

Email: rathod\_sps@yahoo.com, sureshdev\_rathod@spit.ac.in

Website: <http://srathod.co.cc>

### Why Analog?

- Digital Circuitry:
  - Cost/function decreases by 29% each year
- Analog Circuitry:
  - Cost/function may not scale very well
  - Complaints: Supply voltage is too low, device gain is low, horrible matching.....
- “Analog will die- everything will be digital!”
  - Agree!!!!!!



*Semilipi*



# Sardar Patel Institute of Technology

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22-  
Statistical &  
Computational  
Lab

## ELECTRONICS ENGINEERING

Academic Year: 2016-2019

### Theory Course Revision Report

Course Name: Statistical Computational Lab

Course Code Old (2008-09):

Course Code New (Autonomy 2016-17):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: Statistical Computational Lab

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	<u>Design and Analysis of Algorithms</u>		
2	<u>Introduced Python along with R</u>	As per current trends in programming	50 %
3			wrt old Lab course
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



*Renuka*



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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dayanand Ambawade	EXTC	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



# Sardar Patel Institute of Technology

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## Electronics Engineering Department

Academic Year: 2018 - 2019

Name of the Course Coordinator: Dr. S.S. Rathod / Prof. P.V. Karambe / Prof. Priya Deshpande / Prof. Parwan Falekar / Prof. P.H. Shah

Subject Name: Action Research Plan - I

Class: T.E. Mechanics Semester V

Sr. No.	Name of the committee members	Department	Signature
1	Prof. P.V. Karambe	Electronics	✓
2	Prof. P.H. Shah	Electronics	✓
3	Prof. Priya Deshpande	Electronics	✓
4	Prof. G.T. Haldankar	Electronics	✓

Referred syllabus links (URL\*):

- 1 [www.tiss.edu](http://www.tiss.edu)
- 2 [www.mygov.in](http://www.mygov.in)
- 3

Unit No	Inclusion	Reason
	The entire content and Name of the subject is changed.	Since action research plan is based on small research project and encourages students to solve real life problems. ✓ 100%

Unit No	Deletion	Reason
	Entire contents of the syllabus and evaluation criteria is changed.	Since in mini Project-I evaluation there was not enough motivation for students to undertake projects to solve society problems. It was just an implementation of some project idea. ✓



Please specify the link being referred.

*Blurry*

Undertake projects to solve society problems. It was just an implementation of some project idea.

, CPE



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Electronics Engineering Department

Academic Year: 2018 - 2019

Name of the Course Coordinator: Dr. S. J. Rathod / Prof. P. V. Kasarwade / Prof. Priya Deshpande / Prof. Parmanand Patelkar / Prof. P. H. Shah  
Subject Name: Action Research Plan-II  
Class: TC- Electronics Semester: VI

Sl. No.	Name of the committee members	Department	Signature
1	Prof. P. V. Kasarwade	Electronics	
2	Prof. P. H. Shah	Electronics	for Shah
3	Prof. Priya Deshpande	Electronics	for Deshpande
4	Prof. G. T. Holdarkar	Electronics	

Referred syllabus links (URI\*):

1. [www.tiess.edu](http://www.tiess.edu)

2. [www.mg.gov.in](http://www.mg.gov.in)

Unit No	Inclusion	Reason
	The entire content and Name of the subject is changed.	Since action research plan is based on small research project and encourages students to solve real life problems. 100%

Unit No	Deletion	Reason
	Entire content of syllabus evaluation criteria is changed.	Since mini Project II evaluation criterias were not enough to motivate students to undertake projects to solve society/real life problems. It was just an implementation of some project idea <del>idea</del> in most of the cases.

\* Please specify the link here if referred.

*Below by*  
*P.V.Kasarwade*  
*, prof.*





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**ELECTRONICS ENGINEERING DEPARTMENT**

**Academic Year: 2017 – 2018**

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Industrial and Organizational Psychology

Class: TE

Semester: V

**Comments:**

This course is introduced to impart knowledge and understanding of the basic concepts in and various facets of Industrial and Organizational Psychology. Students should be aware about the role and importance of Psychological factors and processes in the world of work. This course is also introduced to create a foundation for higher education and a professional career in Industrial Psychology and Organizational Behavior.



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Signature of Domain Expert: Dr. Surendra Rathod

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Criteria  
1.2.1  
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change  
Proof

## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 - 2018

Name of the Domain Expert: Dr. Surendra Rathod

t/o

Subject Name: Law for Engineers

Class: TE

Semester: V

### Comments:

This course is a survey of legal topics relevant to engineers, including basic of legal system, labor law, intellectual property, torts, and contracts. This is an introductory course, emphasizes on legal principles that can provide engineers with the ability to recognize legal issues that are likely to arise in the engineering profession.

In this course student will be able to recognize the importance of the legal system, and the controls it exerts on the activities of engineers in practice. Also student will be able to express the details of what the individual's responsibilities are to ensure legal behaviour in engineering practice.

Signature of Domain Expert: Dr. Surendra Rathod



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Surendra  
Rathod



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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Creative Thinking, Diversity and Workplace Etiquette

Class: TE

Semester: V

### Comments:

This is activity based course on creative thinking, diversity and workplace etiquette. Organizations thrive on innovative ideas and new answers to old problems. To become successful not only these approaches be fresh, they must also be sound. This activity shall inspire students to push them for critical thinking and decision-making. Students may be asked to provide innovative solutions to specific issues within the organization to meet business needs. Through this activity students shall learn how to step out of their comfort zone, able to isolate problems, recognize differences between left brain and right brain thinking, and apply creative thinking techniques to business problems.

Nowadays students are becoming global and degree from an accredited institute is considered as 'Educational Passport' hence it is necessary to include training on diversity. Training on working in a culturally diverse team to prepare students for an international work is required. A better understanding of others can improve communication, encourage engagement, reduce inappropriate behavior and increase the strength of a team. A strategy of inclusion can also help employees realize their full workplace potential. Activities shall be planned for diversity awareness, unconscious bias, generational differences, communicational style preferences and tactics for managing heterogeneous teams. Igniting thought provoking questions and conversations related to diversity in race, gender, culture, age and other observable differences shall be fundamental to this activity. Activity shall also address cognitive biases which are influences that cause us to make decisions based on information outside of logic and rational thinking for example behavioral partiality and social favoritism.

Organizations expect that employees are aware of workplace expectations and etiquette. While the use of good business etiquette will not make up for technical knowledge in the workplace but bad manners and poor etiquette can cost both employees and organizations for which they work. This activity shall focus on ins and outs of business etiquette by



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managing technology and social media effectively. Activity shall be based on Cell phone etiquette, Email etiquette, social media etiquette, board meeting etiquette, sales meeting etiquette, business dressing and dining skills, international manners along with exceptional etiquette like hosting corporate guests, interacting with public or customers and business networking.

Signature of Domain Expert: Dr. Surendra Rathod





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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Prof. Kumar Khandagale

Subject Name: Consumer Electronics

Class: TE

Semester: VI

### Comments:

Consumer electronics is a very big market in the world. Today's engineers are expected to know working details of consumer electronic products. One of the expected outcome of this course is student will be able to list and classify devices used in consumer products based on their specifications, identify sub-systems of consumer electronic products and choose and use proper interface standard for a given consumer electronic product.

This course will introduce students to working principle of consumer electronic products and carry out basic tests to identify their correct operation. In this course students will be able to experiment with Haptics, Multitouch devices, Device interconnects and peripherals and also suggest modification in consumer electronic product using modern tools to enhance user experience. In this course student will be able to assemble subsystems of Television set, analyze technology used in audio systems, demonstrate working principal of Healthcare and home electronics consumer products. Also student will be able to demonstrate working principal consumer electronic products used in Occupational safety.

Signature of Domain Expert: Prof. Kumar Khandagale

Dr. S.S. Rethal  
P.N. Karanambe





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**ELECTRONICS ENGINEERING DEPARTMENT**

**Academic Year: 2015–2016**

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Technical Paper and Patent Drafting

Class: TE

Semester: VI

**Comments:**

This course aims to encourage students to study advancement in engineering developments, prepare a technical paper based on the research topic and give holistic insight on the various aspects of patents that would be relevant to them.

Invited talks and workshop on latex shall be conducted to impart the knowledge in technical paper drafting and presentation. The primary learning outcomes expected are:

- Knowledge about importance of paper publication
- Key parts of a technical paper and drafting related issues
- Submission and review process of paper
- Paper presentation related issues
- Ethical issues

Invited talks and workshop shall be conducted to impart the knowledge in patent drafting. The primary learning outcomes expected are:

- Knowledge about Intellectual Property & Patents
- Patent Searching
- Patent Drafting
- Patent Commercialization & Case Studies

Signature of Domain Expert: Dr. Surendra Rathod



*Surendra*



**Sardar Patel Institute of Technology**  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

**ELECTRONICS ENGINEERING DEPARTMENT**

Academic Year: 2015– 2016

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: French Language

Class: TE

Semester: VI

**Comments:**

Nowadays students are becoming global and degree from an accredited institute is considered as 'Educational Passport' hence it is necessary to include training on foreign languages. French language is introduced by looking at the demand of foreign language in market.

One of the outcome expected in this course is student will be able to introduce themselves in a meeting and converse with people from different countries. Speak about themselves, their professions, their family, family names, first names, nationalities, ages. Have a discussion on the whereabouts and identities of people they interact with such as their nationalities, the countries they come from, the languages they speak Greet people and take leave.

Also student will be able to Count numbers from 0 to 69, to know how to talk about dates, seasons, time of the day, days of the week and months of the year. Know how to describe a noun using qualitative adjectives. Student will be able to communicate in class and understand instructions such as repeat/answer/listen/look/tick the right answer/write/underline/close/how is it pronounced/how is it written/how does one say/work in groups/I don't know/I do not understand/request for directions using interrogatives like where/who speaks/to whom/why/share /to give personal information: telephone numbers/ date of birth/ postal address/filling out documents and ability to comprehend the details on important identity papers such as passports or registration forms.

Signature of Domain Expert: Dr. Surendra Rathod



*Surinder*



**Sardar Patel Institute of Technology**  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India  
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**ELECTRONICS ENGINEERING DEPARTMENT**

Academic Year: 2018 – 2019

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: German Language

Class: TE

Semester: VI

Comments:

Nowadays students are becoming global and degree from an accredited institute is considered as 'Educational Passport' hence it is necessary to include training on foreign languages. German language is introduced by looking at the demand of foreign language in market.

One of the outcome expected will be to develop ability in a student to greet the other person, say good bye, introduce oneself and the partner, to be able to talk about the others, to be able to count upto 20, make use of knowledge of numbers as regards understanding telephone numbers, to be able to recognize alphabets, speak about countries and languages

Also student will be able to speak about hobbies, take leave of someone, name the days of the week, to be able to talk about work, jobs, and office timings, to be able to count beyond 20, to be able to talk about seasons, to be able to register own data on internet site. Student will be able to name places and important buildings like the marketplace, to be able to ask questions regarding places, to be able to relate texts to a picture story, ask for things, name the means of public transport, ask for directions Student will be able to identify food items and to talk about them, to be able to write a shopping list, understand conversations in a supermarket, understand W-questions. Student will be able to understand time, plan time table as per required time, to be able to speak about family, to excuse oneself for being late, to be able to fix an appointment telephonically. Student will be able to plan something together, to be able to speak about birthday, to understand and draft an invitation, to be able to order and pay food items in a restaurant, to be able to talk about routine events, understand event information on radio.



Signature of Domain Expert: Dr. Surendra Rathod



**Sardar Patel Institute of Technology**  
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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ELP56	Action Research Project-I	-	-	2	--	-	2	2
<b>Examination Scheme</b>								
ISE			MSE			ESE	Total	
Phase-I:10			--			50	100	
Phase-II:10			--			--	--	
Phase-III:10			--			--	--	
Phase-IV:20			--			--	--	

**Pre-requisite Course Codes** / All the Courses till Vth Semester.

Action research is an opportunity to make a difference in the experience of education in its own way. It is an attempt of scientific study of the problem in surrounding in order to guide, correct and evaluate the actions and decisions about it. Action research is based on small research project correlating scientific knowledge and day to day experience which encourages development of scientific attitude to solve real life problems among students.

The Objectives of Action Research are:

- ✓ To make students sensitive towards societal issues
- ✓ To learn scientific principles from day-to-day experiences
- ✓ To develop psychotechnological skills through observation, classification, statement of hypothesis etc.
- ✓ Development of communication, organizational skills and maturity through discussion, presentation etc.
- ✓ To develop ability to correlate science, technology and society
- ✓ To apply engineering knowledge and propose innovative, sustainable solutions to the real life challenges

Steps of action research:

- ✓ Keen observation of the surrounding/society
- ✓ Identification of the problem
- ✓ Analysis of the problem
- ✓ Collection of relevant information by formulating research questions
- ✓ Suggesting plan of action
- ✓ Conducting experiments
- ✓ To draw conclusion
- ✓ To find the possible solution to rectify the problem
- ✓ To execute experiments and remedial measures wherever possible

Students can seek guidance from teachers, other experts and make effective use of other sources of information available around them.



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Students must ensure that problem to be solved in manageable in one semester.  
Teachers must follow the below mentioned principles:

- ✓ Make student confront problem solving
- ✓ Develop methods and techniques of handling problems. Teach how to use the methods and not directly give solution to the problem.
- ✓ Emphasize positive thinking
- ✓ Lead the students to the peak of their powers for improvement of better learning.

### Criteria of a good project:

- ✓ Appropriate idea, clear understanding and proper presentation of the concept
- ✓ Quality of work
- ✓ Project plan and its execution
- ✓ Credibility of the work
- ✓ Probable impact of the work on the attitude of students and society
- ✓ Scientific attitude, creativity and novelty reflected in project work and analysis of the situation
- ✓ Utility and innovation of the remedial measures
- ✓ Efforts taken towards implementation
- ✓ Desirability, Feasibility and Viability in real life

The H/W and S/W resources required to complete the Action Research Project I may be beyond the scope of curriculum of courses taken or may be based on the courses but thrust should be on • Learning additional skills • Development of ability to define and design the problem and lead to its accomplishment with proper planning • Learn the behavioral discipline by working in a team. The team may be maximum three (03) students.

### Evaluation:

Project report should be submitted on A-4 size pages. Use both printing. Report must carry project title, student details, certificate and acknowledgements. Other sections of the report shall be decided by the department based on projects. But it must have introduction, necessity of project, objectives, hypothesis ("If I do...then I may get..."), plan, observations, analysis of results, conclusion and references along with other sections related to technology.

The ISE and ESE evaluation will be carried out based on the rubrics framed by the Department. ISE marks will be based on the performance of the individual student in four phases of evaluation. The evaluation of the Phase-I will be based on presentation of the market/literature survey, problem definition and project title finalization. Evaluation of Phase-II will be based on circuit/algorithm design, purchase of H/W and S/W resources, simulation/testing of circuit/algorithm. Phase-III evaluation will consist of PCD design, PCB making/verification of algorithm and testing of circuit/algorithm. Phase-IV evaluation is based on demonstration, poster presentation, technical report and paper writing during Action Research Project I contest.

The ESE marks will be based on demonstration in front of the expert appointed by the Department. In the ESE examination each individual student would be assessed for his/her contribution in selecting the originality of the problem statement, understanding and knowledge gained about the task completed



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through presentation/demonstration, work done, and preparing the technical report/poster/technical paper of the project in the standard format provided by the Department.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		--	--	2	--	--	2	2
Examination Scheme								
EXL504	Mini Project-I	ISE		Practical		Oral		Total
		Phase-I:10		--		50		100
		Phase-II:10						
		Phase-III:10						
		Phase-IV:20						

### ISE:

The main intention of Mini Project is to make student enable to apply the knowledge and skills learned out of courses studied to solve/implement predefined practical problem. The students undergo various Laboratory/ tutorial/ simulation laboratory/work shop courses in which they do experimentation based on the curriculum requirement. The Mini Project may be beyond the scope of curriculum of courses taken or may be based on the courses but thrust should be on

- Learning additional skills
- Development of ability to define and design the problem and lead to its accomplishment with proper planning
- Learn the behavioral science by working in a group

The group may be maximum four (04) students. Each group will be assigned one faculty as a supervisor. The college should keep proper assessment record of progress of the project and at the end of the semester it should be assessed for awarding TW marks. The TW may be examined by approved internal faculty appointed by the head of the institute. The final examination will be based on demonstration in front of internal and external examiner. In the examination each individual student should be assessed for his/her contribution, understanding and knowledge gained about the task completed. The students may use this opportunity to learn different computational techniques as well as some model development. This they can achieve by making proper selection of Mini Projects.



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# Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
EI.P56	Action Research Project-II	--	--	2	--	--	2	2
Examination Scheme								
ISE			MSE		ESE		Total	
Phase-I:10			--		50		100	
Phase-II:10								
Phase-III:10								
Phase-IV:20								

Pre-requisite Course Codes

All the Courses till Vth Semester.

Action research is an opportunity to make a difference in the experience of education in its own way. It is an attempt of scientific study of the problem in surrounding in order to guide, correct and evaluate the actions and decisions about it. Action research is based on small research project correlating scientific knowledge and day to day experience which encourages development of scientific attitude to solve real life problems among students.

The Objectives of Action Research are:

- ✓ To make students sensitive towards societal issues
- ✓ To learn scientific principles from day-to-day experiences
- ✓ To develop psychotechnological skills through observation, classification, statement of hypothesis etc,
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- ✓ To develop ability to correlate science, technology and society
- ✓ To apply engineering knowledge and propose innovative, sustainable solutions to the real life challenges

Steps of action research:

- ✓ Keen observation of the surrounding/society
- ✓ Identification of the problem
- ✓ Analysis of the problem
- ✓ Collection of relevant information by formulating research questions
- ✓ Suggesting plan of action
- ✓ Conducting experiments



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- ✓ To draw conclusion
- ✓ To find the possible solution to rectify the problem
- ✓ To execute experiments and remedial measures wherever possible

Students can seek guidance from teachers, other experts and make effective use of other sources information available around them.

Students must ensure that problem to be solved is manageable in one semester.  
Teachers must follow the below mentioned principles:

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- ✓ Develop methods and techniques of handling problems. Teach how to use the methods and not directly give solution to the problem.
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The H/W and S/W resources required to complete the Action Research Project I may be beyond the scope of curriculum of courses taken or may be based on the courses but thrust should be on • Learning additional skills • Development of ability to define and design the problem and lead to its accomplishment with proper planning • Learn the behavioral discipline by working in a team. The team may be maximum three (03) students.

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		-	-	2	--	-	2	2
Examination Scheme								
EXL604	Mini Project II	ISE		Practical		Oral	Total	
		Phase-I:10		--		50	100	
		Phase-II:10						
		Phase-III:10						
		Phase-IV:20						

### ISE:

The main intention of Mini Project is to make student enable to apply the knowledge and skills learned out of courses studied to solve/implement predefined practical problem. The students undergo various laboratory/tutorial/simulation laboratory/work shop courses in which they do experimentation based on the curriculum requirement. The mini Project may be beyond the scope of curriculum of courses taken or may be based on the courses but thrust should be on

- Learning additional skills
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- Learn the behavioral science by working in a group

The group may be maximum four (04) students. Each group will be assigned one faculty as a supervisor. The college should keep proper assessment record of progress of the project and at the end of the semester it should be assessed for awarding TW marks. The TW may be examined by approved internal faculty appointed by the head of the institute. The final examination will be based on demonstration in front of internal and external examiner. In the examination each individual student should be assessed for his/her contribution, understanding and knowledge gained about the task completed.

The topic of Mini Project I and II may be different and / or may be advancement in the same topic. The students may use this opportunity to learn different computational techniques as well as some model development. This they can achieve by making proper selection of Mini Projects.





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
OE3	Cyber Security and Digital Forensics	1	-	2	1	-	1	2
Examination Scheme								
		ISE	MSE		ESE		Total	
		40	10		20		70	

Pre-requisite Course Codes	Computer Basics, Networking basics
Course Outcomes	CO1 Identify and classify various cybercrimes with respect to organizational weaknesses in order to mitigate the security risk and estimate the impact on society and world
	CO2 Analyze the results of vulnerability scans of vulnerability assessment and generate report with penetration testing
	CO3 Apply Information Security Standards compliance during software design and development
	CO4 Interpret and apply Indian IT laws in various legal issues
	CO5 Describe the concept of Digital forensics and use various tools and techniques used for digital forensics investigations
	CO6 Integrate advanced security solutions and manage, provide policies, standards, procedures, guidelines, policy framework, assess and mitigate risk

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Introduction to Cyber Security	1,2	1
	1.2	Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime,	1,2	1
	1.3	Cybercrime and the Indian ITA 2000, A global Perspective on cybercrimes.	1,2	1



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2	2.1	<b>Cyber offenses &amp; Cybercrimes:</b>  How criminal plan the attacks, Social Engg, Cyber stalking, Cyber café and Cybercrimes, Botnets, Attack vector,Credit Card Frauds in Mobile and Wireless Computing Era, Security,Challenges Posed by Mobile Devices	1.2	1
	2.2	<b>Tools and Methods Used in Cybercrime:</b>  Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Identity Theft (ID Theft)	1.2	1
3	3.1	<b>Security Risk Assessment and Risk Analysis:</b>  Risk Terminology, Laws, Mandates, and Regulations, Risk Assessment Best Practices, The Goals and Objectives of a Risk Assessment, Best Practices for Quantitative and Qualitative Risk Assessment.	7.8, 10	1
	3.2	<b>Vulnerability Assessment and Penetration Testing (VAPT):</b>  VAPT An Overview, Goals and Objectives of a Risk and Vulnerability Assessment.	7.8, 10	1
	3.3	<b>Vulnerability Assessment Phases-Discovery,Exploitation/Analysis . Reporting</b>  Penetration Testing Phases-Discover/Map, Penetrate Perimeter, Attack Resources, Network and Web VAPT Process	7.8, 10	1
4	4.1	<b>Cyber Security Laws and Legal Perspectives</b>	1.2, 4.6	1
	4.2	<b>Cyber Crime and Criminal Justice: Penalties, Adjudication and</b>	1.2, 4.6	1





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		Appeals Under the IT Act, 2000, IT Act. 2008 and its Amendments		
	4.3	Information Security Standard compliances; SOX, GLBA, HIPAA, ISO, FISMA, NERC, PCI-DSS	1,2, 4,6	1
5	5.1	Digital Forensics:  Need for forensics, Cyberforensics and Digital Evidence	1,2	1
	5.2	Digital Forensics Life cycle, Computer forensics investigation, setting-up forensics laboratory, Special Tools and Techniques, Forensics Auditing and Compliance Requirements, Antiforensics	1,2	1
	5.3	Forensics of Hand-held devices, Tool-kits for Hand-held device forensics, Techno-Legal Challenges with Evidence from Hand-held Devices	1,2	1
			Total	14

### Teaching Learning Methodology in Laboratory: Role Play Model

#### a) Instructor:

- Responsibilities: Explanation of theoretical background
- To provide required course material
- To guide students in identification of appropriate online material.
- Supervision and assessment of the overall activity

#### b) First Group of students : Offensive and Defensive

- Responsibilities: To define cybercrime and classification of cybercrimes
- List the tools and methods used in cybercrimes
- Prepare the list best cybersecurity practices

#### c) Second Group of students: Vulnerability Assessor and Penetration Tester (VAPT)

- Responsibilities: To assess the vulnerabilities of systems (OS, Network infrastructure etc)
- To carry out penetration testing and reporting
- To abide by regulatory compliance and security standards

#### d) Third Group of Students: Forensic Investigator (FI)

- Responsibilities: To setup laboratory for forensics
- To use tools and techniques of digital forensics
- To preserve the evidence
- Demonstrate the forensic investigation process



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		Appeals Under the IT Act, 2000, IT Act, 2008 and its Amendments		
	4.3	Information Security Standard compliances: SOX, GLBA, HIPAA, ISO, FISMA, NERC, PCI-DSS	1,2, 4,6	1
5	5.1	Digital Forensics:  Need for forensics, Cyberforensics and Digital Evidence	1,2	1
	5.2	Digital Forensics Life cycle, Computer forensics investigation, setting-up forensics laboratory, Special Tools and Techniques, Forensics Auditing and Compliance Requirements, Antiforensics	1,2	1
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To abide by regulatory compliance and security standards

#### d) Third Group of Students: Forensic Investigator (FI)

Responsibilities: To setup laboratory for forensics

To use tools and techniques of digital forensics

To preserve the evidence

Demonstrate the forensic investigation process



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Exp. No	Experiment Details	Refer	Marks
1	Network commands and utilities	13,15	5
2	Install and configure Virtual Environment	14	5
3	Information Gathering, Sniffing and scanning	13,15	5
4	Vulnerability Scanning and Vulnerability Assessment	13,15	5
5	Penetration Testing using Metasploit	16	5
6	Firewalls and Intrusion Detection System (IDS)	13	5
7	Encryption Tools	13	5
8	Forensics Tools and Utilities	13	5
<b>Assessment Marks</b>			<b>40</b>

**ISE Evaluation:** Continuous evaluation of experiments for 40 Marks

**MSE Evaluation:** Subjective evaluation for 10 Marks based on theory for one hour duration

**ESE Evaluation:** Subjective evaluation for 20 Marks based on theory for one hour duration

### Recommended Books:

- [1] Nina Godbole, Sunit Belapure, Cyber Security, Wiley India, New Delhi.
- [2] The Indian Cyber Law by Suresh T. Vishwanathan, Bharat Law House New Delhi
- [3] The Information technology Act, 2000, Bmc Act- Professional Book Publishers, New Delhi.
- [4] Cyber Law & Cyber Crimes By Advocate Prashant Mali, Snow White Publications, Mumbai
- [5] Nina Godbole, Information Systems Security, Wiley India, New Delhi
- [6] Kenneth J. Knapp, Cyber Security & Global Information Assurance Information Science Publishing.
- [7] Michael Gregg & David Kim, Inside Network Security Assessment: Guarding Your IT Infrastructure, Pearson Publication
- [8] M. L. Srinivasan, CISSP in 21 Days - Second Edition PACT Publication

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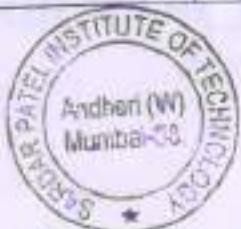
## Sardar Patel Institute of Technology

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1.1.2. The programmes offered by the institution focus on employability/ entrepreneurship/ skill development and their course syllabi are adequately revised to incorporate contemporary requirements(30M)

Sr. No.	Program name	Name of the Course	Course Code	Name of Activity	Date and Year of Activity	Resource Person /Expert
1	Electronics Engineering	Law for Engineer	MEC4	Induction talk on Law for Engineers	26 March 2018	Adv. Nisar Ghatte
2	Electronics Engineering	Controls system	EL42	Expert talk on "Advances in control system"	27th February 2019	Prof. D. S. Sawant Assistant Professor, EXTC department, MPSTME, Mumbai
3	Electronics Engineering	Robotic Vision	OE2	Expert talk on "Automation Glimpse and Technoxian Championship Highlights"	18th March 2019	Mr. Ambrish K. Chaturvedi Mr. Alister R. Savio D'Silva Business Development Manager and Director, Absolute Motion Pvt. Ltd., Mumbai  Mrs. Mahak Somani District Coordinator, All India Council for Robotics & Automation, Mumbai
4	Electronics Engineering	Digital Communication	EL63	Expert talk on "Modern Digital Communication Technology"	8th April 2019	Dr. Mani Roja Thadomal Shahani College of Engineering, Bandra, Mumbai

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# Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MEC3	Industrial and Organizational Psychology	2	-	-	2	-	-	2
		Examination Scheme						
		ISE1	ISE2	Attendance	Total Marks			
		20	20	10	50			

## Pre-requisite Course Codes

		---
Course Objectives	CO1	To impart knowledge and understanding of the basic concepts in and various facets of Industrial and Organizational Psychology
	CO2	To create awareness about the role and importance of Psychological factors and processes in the world of work
	CO3	To create a foundation for higher education and a professional career in Industrial Psychology and Organizational Behavior

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Theories of Employee Motivation	1,2	05
	1.1	What is motivation? Work motivation theories, need theories		
	1.2	Other Theories - Reinforcement theory, expectancy theory and self-efficacy theory; Justice theories, goal-setting theory, control theory and action theory		
2		Feelings about Work: Job Attitudes and Emotions	1,2	07
	2.1	The nature of job satisfaction; how people feel about their jobs; the assessment and antecedents of job satisfaction		
	2.2	Potential effects of job satisfaction; organizational commitment and emotions at work		
3.		Productive and Counterproductive Work Behavior	1,2	05
	3.1	Productive work behavior: ability, motivation, personal characteristics and task performance; environmental conditions and task performance; organizational constraints; organizational citizenship behavior (OCB)		
	3.2	Counterproductive work behavior: withdrawal – absence, lateness, turnover, aggression, sabotage, and theft; labor unrest and strikes.		
4.		Leadership and Power in Organizations	1,2	06
	4.1	What is leadership? Sources of influence and power; abuse of supervisory power: sexual and ethnic harassment		
	4.2	Approaches to the understanding of leadership; women in leadership positions; cross-cultural issues in leadership		
5.		Organizational Development and Theory	1,2	05
	5.1	Organizational Development		
	5.2	Organizational Theories		





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ELL46	Computer Methods for Circuit Simulation Lab	-	-	2	--	--	1	1
<b>Examination Scheme</b>								
ISE	ESE			Total				
	Practical			Oral				
		40			--			20
					60			

Pre-requisite Course Codes		Programming in C BS31 (Mathematics) EL32 (Circuit theory)						
After successful completion of the course, student will be able to								
Course Outcomes	CO1	Illustrate a network in terms algebraic equations						
	CO2	Apply Numerical techniques to solve linear and non linear algebraic equations						
	CO3	Perform DC and Transient analysis on Electrical networks						
	CO4	Analyze the given circuit using Monte Carlo						

Exp. No.	Experiment Details	Ref.	Marks
1	Formulation of Linear algebraic Equations for Network using Modified Nodal Analysis and Apply Gaussian Elimination and L U decomposition methods for Solution	1,3,4	5
2	Apply Indirect methods (Gauss-Seidel and Gauss Jacobi) to find Solution of Linear algebraic Circuit Equation	1,3,4	5
3	Formulation of Non-Linear algebraic Equations for Network and Applying Newton – Raphson method to solve them	2,3,4	5
4	Applying Newton – Raphson method for solving a MOSFET based Non-Linear algebraic Circuit Equations	1,3,4	5
5	Transient simulation using Forward Euler, Backward Euler and Trapezoidal method. Verification of Stability in each method.	2,3,4	5
6	Solution of differential circuit equations using linear multistep methods	1,3,4	5
7	Solution of differential circuit equations using trapezoidal ringing	1,3,4	5
8	Perform Monte-Carlo Analysis on given circuit	1,2,3,4	5
Total Marks			40





# Sardar Patel Institute of Technology

Munshi's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Total 28

## Books Recommended:

1. Spector, P. E. (2012). Industrial and Organizational Psychology: Research and Practice. Singapore: John Wiley & Sons Pte, Ltd. (Indian reprint 2015)
2. Schultz, D., & Schultz, S. E. (2010). Psychology and Work Today. ( 10<sup>th</sup> ed.). Pearson Prentice Hall



Serial No. /



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MEC4	Law for Engineers	2	-	-	2	-	-	2
		Examination Scheme						
		ISE1	ISE2	Attendance	Total Marks			
		20	20	10	50			

Pre-requisite Course Codes		---
Course Outcomes	CO1	Student will be able to recognize the importance of the legal system, and the controls it exerts on the activities of engineers in practice.
	CO2	Student will be able to express the details of what the individual's responsibilities are to ensure legal behaviour in engineering practice.

This course is a survey of legal topics relevant to engineers, including basic of legal system, labor law, intellectual property, torts, and contracts. This is an introductory course, emphasizes on legal principles that can provide engineers with the ability to recognize legal issues that are likely to arise in the engineering profession.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	General Principles of Contract under Indian Contract Act, 1872.	1	4
	1.2	<b>Introduction to Human Rights.</b> Enforcement of Human Rights in India including Supreme Court, High Courts, Statutory Commissions— NHRC, NCW, NCM, NC-SC/ST etc.		
2	2.1	<b>Right to Information Act, 2005:</b> Evolution and concept; Practice and procedures; Official Secret Act, 1923; Indian Evidence Act, 1872.	1	4
	2.2	<b>Information Technology—</b> legislation and procedures, Cyber crimes – issues and investigations.		
3	3.1	<b>Labor Laws:</b> Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmens Compensation Act, 1923.	1	12
	3.2	Apprentices Act, 1961. Bonded Labor System (Abolition) Act, 1976. Child Labor (Prohibition and Regulation) Act, 1986. Contract Labor (Regulation and Abolition) Act, 1970.		2,3
	3.3	Employees' Provident Funds and [Miscellaneous Provisions] Act,		



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		1952. Employees' State Insurance Act, 1948. Equal Remuneration Act, 1976. Factories Act, 1948. Fatal Accidents Act, 1855. Industries (Development and Regulation) Act, 1951. Maternity Benefit Act, 1961. Minimum Wages Act, 1948. Payment of Bonus Act, 1965. Payment of Gratuity Act, 1972. Payment of Wages Act, 1936. Trade Unions Act, 1926.		
4	4.1	Law relating to Intellectual property Law relating to Copyright in India. Law relating to Trademarks under Trademark Act, 1999. Law relating to Patents under Patents Act, 1970.	1	4
5	5.1	<b>Corporate Law:</b> Meaning of corporation; Law relating to companies, public and private (Companies Act, 1956) general provisions; Law and multinational companies – International norms for control, FEMA 1999, Corporate liability, civil and criminal. Election provisions under Indian Constitution (Art.324–329); Representation of Peoples Act and Prevention of Corruption Act, 1988;	1	4
				Total 28

### Books Recommended:

- [1] Nikita Agarawal and Rishi Kumar, "Laws for Engineers," Genius Publications.
- [2] P. L. Malik Handbook of Labour and Industrial Law, Eastern Book Company
- [3] Industrial labour and general laws, The Institute of Company Secretaries of India





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## ABL3: Creative Thinking, Diversity and Workplace Etiquette

### I. Creative Thinking:

Organizations thrive on innovative ideas and new answers to old problems. To become successful not only these approaches be fresh, they must also be sound. This activity shall inspire students to push them for critical thinking and decision making. Students may be asked to provide innovative solutions to specific issues within the organization to meet business needs. Through this activity students shall learn how to step out of their comfort zone, able to isolate problems, recognize differences between left brain and right brain thinking, and apply creative thinking techniques to business problems.

### II. Diversity:

Nowadays students are becoming global and degree from an accredited institute is considered as 'Educational Passport' hence it is necessary to include training on diversity. Training on working in a culturally diverse team to prepare students for an international work is required. A better understanding of others can improve communication, encourage engagement, reduce inappropriate behavior and increase the strength of a team. A strategy of inclusion can also help employees realize their full workplace potential. Activities shall be planned for diversity awareness, unconscious bias, generational differences, communicational style preferences and tactics for managing heterogeneous teams. Igniting thought provoking questions and conversations related to diversity in race, gender, culture, age and other observable differences shall be fundamental to this activity. Activity shall also address cognitive biases which are influences that cause us to make decisions based on information outside of logic and rational thinking for example behavioral partiality and social favoritism.

### III. Workplace Etiquette:

Organizations expect that employees are aware of workplace expectations and etiquette. While the use of good business etiquette will not make up for technical knowledge in the workplace but bad manners and poor etiquette can cost both employees and organizations for which they work. This activity shall focus on ins and outs of business etiquette by managing technology and social media effectively. Activity shall be based on Cell phone etiquette, Email etiquette, social media etiquette, board meeting etiquette, sales meeting etiquette, business dressing and dining skills, international manners along with exceptional etiquette like hosting corporate guests, interacting with public or customers and business networking.



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### Methodology:

Guest lectures by professionals shall be arranged on Creative Thinking, Diversity and Workplace Etiquette. At least one lecture on each topic shall be taken. Assessment shall be based on performance in following activities:

1. Short Film Making
2. Skit Performance
3. Poster Presentation
4. Project Presentation
5. Physical Model Presentation
6. Scientific Case Study



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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai University

### Department of Electronics and Telecommunication Engineering Undergraduate Program

2017-18

Name of the Course	Course Code	Year of introduction (during the last five years)	Percentage
HDL Programming Lab*	ETL33	2017-18	100
Computer Methods for Circuit Simulation Lab	ELL46		100
Building Automation, Fire Safety and Electronic	ABL1		100
Liberal Arts (Non credit)	LA^		100
Yoga Vidya	LA1		100
Music Appreciation	LA2		100
Dramatics	LA3		100
Operating Systems	ETC605		100
Occupational safety and legal studies for engineers	ABL2		100
Human Health Systems Approach (Noncredit)	HSS		100



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ETC 2017H8

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## ELECTRONICS ENGINEERING

Academic Year: 2017-2018

2017-2018

### Lab Course Revision Report

Course Name: VHDL Programming Lab

Course Code Old (2016-17): NA

Course Code New (Autonomy 2017-18): ELL35

Class and Semester in Old Syllabus: NA

Class and Semesters in New Syllabus: S-E (Sem III)

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Addition of VHDL Programming Language	Introduction to FPGA Programming	
2	Design of combinational, sequential (LUT on FPGA)	Implementation of System on FPGA	100%
3	Interfacing of ADC/DAC with FPGA	Building Device driver for Hardware	
4			



*Shubhaji*

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1			
2			
3			
4			



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Details of Experts Name & Signature (if any):

Sr. No.	Name of Expert	Department	Signature
1	Prof. Kunwar Khandagje	EIRX	Xmm 19/03/19
2			
3			
4			

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100

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## ELECTRONICS ENGINEERING

Academic Year: 2016-17  
2018-2019

### Lab Course Revision Report

Course Name: Computer Methods for Circuit Simulation Lab

Course Code Old (2016-17): -

Course Code New (Autonomy 2018-19): EEE 46

Class and Semester in Old Syllabus: -

Class and Semesters in New Syllabus: S.E. SEM IV Electronics

#### Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	All the topics in this Lab	Instead of performing actual experiments	100%
2	course are newly added.	simulation experiments using circuit simulation soft	
3		this lab enable students to understand and develop programs which are required to build any circuit simulation software package.	
4			

#### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. P. V. Desai	Electronics	
2	Prof. Ganpat Patelkar	Electronics & Telecomm.	
3			
4			



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Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1	Dr. S. S. Pathak	Electronics	
2			
3			
4			

\*\*Percentage Change in Syllabus (Y) = (No. of experiments changed or added / Total No. of experiments) x 100





# Sardar Patel Institute of Technology

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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Building Automation, Fire Safety and Electronic Security

Class: SE

Semester: III

### Comments:

Safety of human beings from fire is the burning issue in the society. Everyday some or the other incidence of fire is reported in the newspaper. Today's engineers are supposed to know how to deal with fire incidence in real life. Also there are various industrial products available in the market related to fire detection, fire suppression, building automation and electronic security.

This course shall introduce various aspects of building automation, fire safety and electronic security to the students. This is an activity based learning course related to the life skill.



Signature of Domain Expert: Dr. Surendra Rathod

*Rathod*



# Sardar Patel Institute of Technology

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## ELECTRONICS ENGINEERING DEPARTMENT

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Liberal Arts;

LA1: Yoga Vidya, LA2: Music Appreciation, LA3: Dramatics

Class: SE

Semester: IV

### Comments:

A solid liberal arts education is more necessary than ever for today's students. Liberal arts typically refer to the courses of dramatics, music appreciation and yoga vidya. True education is meant to develop the individual human being. The overall development of human being as a person can be done through liberal arts courses.

In Yoga Vidya course student will be able to perform various techniques of Yoga. Student will be able to follow healthy habits to improve immune system, describe the importance of Yoga in one's life and to make resolution to practice techniques of Yoga

Student must appreciate various processes of Music composition. Also it is important to understand the role of engineers in sound recording

Dramatics course is introduced to make students understand an Art of Theatre. It is expected that they express their thoughts, create and visualize new ideas and perform impressively.

Signature of Domain Expert: Dr. Surendra Rathod



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ELL35	HDL Programming Lab	-	-	2	--	--	1	1
<b>Examination Scheme</b>								
ISE			ESE			Total		
Practical			Oral					
40			10			10		
			60					

Pre-requisite Course Codes		EL33 (Digital Circuits)
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Write VHDL code to build the given hardware
	CO2	Verify the behavior of given hardware with VHDL simulation tool
	CO3	Write synthesizable VHDL code and perform physical verification on FPGA and CPLD device
	CO4	Write, simulate, synthesize and implement VHDL code with behavioral, dataflow and structural modeling style
	CO5	Interface the external peripherals with FPGA and design a hardware to create an application.
	CO6	Interpret the RTL, synthesis, Floorplan report and optimally utilize the internal resources of given FPGA

Exp. No.	Experiment Details	Ref.	Marks
1	Design, simulate and synthesize 9 bit parity generator using dataflow modeling and carry out physical verification on given FPGA.	1,2,3	5
2	Design, simulate and synthesize ripple carry adder and carry-look ahead adder using structural modeling and carry out physical verification on given FPGA	1,2,3	5
3	Design, simulate and synthesize a stepper motor control hardware using Johnson counter. Use behavioral modeling for designing this hardware. Carry out physical verification on given FPGA	1,2,3	5
4	Write the testbench to verify the given IP.	1,2,3	5
5	Interface ADC/ DAC with FPGA. Give input signal to ADC, digitally amplify the input signal, give amplified data to DAC and observe the amplified output on DSO.	1,2,3	5



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6	FPGA implementation of Traffic light controller in VHDL using Finite State Machine	4	5
7	Design of Microcomputer using existing IP. Use instantiation for designing the hardware.	2	5
8	Mini project as an application of HDL	4	5
Total Marks			40

**References:**

- [1] J. Bhaskar, "VHDL Primer", Pearson Education.
- [2] Gaganpreet Kaur, "VHDL Basic to Programming", Pearson
- [3] Douglas Perry, "VHDL: Programming by Example" McGraw Hill
- [4] Application notes by Xilinx and Altera



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X 100%



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned					
		L	T	P	L	T	P	Total		
ELL46	Computer Methods for Circuit Simulation Lab	..	..	2	—	—	1	1		
		Examination Scheme								
		ISE		ESE		Total				
		Practical		Oral		40		20		60

Pre-requisite Course Codes	Programming in C BS31 (Mathematics) EL32 (Circuit theory)
After successful completion of the course, student will be able to	
Course Outcomes	CO1 Illustrate a network in terms algebraic equations
	CO2 Apply Numerical techniques to solve linear and non linear algebraic equations
	CO3 Perform DC and Transient analysis on Electrical networks
	CO4 Analyze the given circuit using Monte Carlo

Exp. No.	Experiment Details	Ref.	Marks
1	Formulation of Linear algebraic Equations for Network using Modified Nodal Analysis and Apply Gaussian Elimination and L U decomposition methods for Solution	1,3,4	5
2	Apply Indirect methods (Gauss-Seidel and Gauss Jacobi) to find Solution of Linear algebraic Circuit Equation	1,3,4	5
3	Formulation of Non-Linear algebraic Equations for Network and Applying Newton – Raphson method to solve them	2,3,4	5
4	Applying Newton – Raphson method for solving a MOSFET based Non-Linear algebraic Circuit Equations	1,3,4	5
5	Transient simulation using Forward Euler Backward Euler and Trapezoidal method. Verification of Stability in each method.	2,3,4	5
6	Solution of differential circuit equations using linear multistep methods	1,3,4	5
7	Solution of differential circuit equations using trapezoidal ringing	1,3,4	5
8	Perform Monte-Carlo Analysis on given circuit	1,2,3,4	5
Total Marks			40

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### References:

- [1] F. N. Najm, *Circuit Simulation*, Wiley-IEEE Press, 2010
- [2] M.B. Patil, V. Ramanarayanan, V. T. Ranganathan, *Simulation of Power Electronic Circuits*, Narosa
- [3] E. Balagurusamy, *Numerical Methods*, TATA McGRAW HILL.
- [4] R. Raghuvaran, *Computer Simulation of Electronic Circuits*, New Age International



*Semester*



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### 'Activity Based Learning'

#### **ABL1: Building Automation, Fire Safety and Electronic Security**

This is non-credit activity conducted in semester III for all the branches of engineering. It is compulsory for all the students to appear for this activity.

This is one day event involving following activities:

1. Invited Talks on the related topics
2. Poster Presentation
3. Fire/Safety Drills
4. Design competition in building automation, fire safety and security.

This event shall be conducted in association with Fire and Security Association of India (FSAI).

#### **ABL2: OCCUPATIONAL SAFETY & LEGAL STUDIES FOR ENGINEERS**

*Engineering is the branch of science and technology concerned with design, building and the use of engine, machines and structures. In this fast moving world scenario, it is seen that the field of Engineering has travelled a very long distance of time space. In the modern parlance, this field must be properly knitted with the other two important dimensions—SAFETY & LAW. An Engineer must have adequate knowledge of these vital subject if he ever wishes to establish himself in this Industrial world.*

*The following activities have been designed to meet up with the growing expectations with the concerned topic. Students are requested to actively participate in those activities based learning to catch up with the realities of the industrial world.*

*Hence, the activities are divided into 5 parts—MOOT COURT, DEBATE, ELOCUTION, PRESENTATION & ROLE PLAY*

##### **1) MOOT COURT:**

*It is a process in which participants take part in simulated court proceedings, usually involving drafting memorials or memoranda and participating in oral argument. It is just a dummy*



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**Sardar Patel Institute of Technology**  
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### 'Activity Based Learning'

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##### **1) MOOT COURT:**

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presentation of the actual court proceedings. It will have a pair of counsel from the defendant as well as the prosecution side. The case write up will be given to both the sides well in advance. They need to study the case along the lines of actual law pertaining to the case which will be more or less company law, intellectual property laws, banking laws, insurance laws or negotiable instrument laws. Both sides will have a researcher who will work along with his respective team to unearth any backdated supportive cases. The sides has to come in common consensus to work on issues which should not be more than five. Based on those issues both sides will present their case turn by turn with the permission of the judge. Judge can consist of persons ranging from 1 to 3. The issues should be dealt with in the book called memorial which should be prepared by both the sides. The prosecution will start the case followed by the defendants. Nobody can criss-cross each other's time of presentation. The judge/s have to control the whole proceedings properly. The judge has the power to give permission for rebuttal as per his own whims. In the end he will pass the judgment based on law.

### 2) DEBATE:

Debates will have topics based on safety and law based and the pair of participants need to stand for or against the motion.

### 3) ELOCUTION:

Same will be the case with elocution but it will be extempore and the participants will have to present their insights on the topic given on the spot.

### 4) PRESENTATION:

A PPT presentation will have topics based on legal laws and students need to prepare the same.

The list of topics are:

*Sale deed, WILL, Gift Deed, Agreement, Power of attorney, MOU/Memorandum of Understanding, Non-Disclosure agreements, Affidavit, Charter, Partnership deed, Copyrights Transfer Agreement, Franchise Termination, Lease purchase contract, Letters Patent, Legal Threat, Promissory Note, Share Certificate, Share transmission.*

### 5) ROLE PLAY:

This activity is a group activity whereby they have to work as a team and enact some situation pertaining to law or safety in the Industrial premises. It's a fun activity whereby they camouflage themselves stepping into the shoes of the role that they will be performing to create an awareness amongst the audience of what to do in case they find themselves in same situations in near future.



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7	Yogic Aahar Techniques: Vajrasana, Pavanmuktasana	1
8	Relaxation and it's importance Techniques: Shavasana	1
9	Spine and it's importance in Yoga Techniques: Bhujangasana, Makarasana, Vakrasana	1
10	Pranayama Techniques: Basic techniques	1
11	Attitude training Techniques: connecting techniques to concepts.	1
12	Pranayama Techniques: Traditional Pranayama	1
13	Yogachara- The Yoga way of living Techniques: Games	1
14	Revision	1

### Books Recommended:

- [1] Sadashiv Nimbalkar, "Yoga for Health & Practices", Yoga Vidya Niketan, Mumbai.
- [2] Swami Satyananda Saraswati, "Asana Pranayama Mudra Bandha", Yoga Publications Trust, Munger, Bihar, 2008
- [3] Dr.H.R.Nagendra, Dr.R.Nagarathna, "New Perspectives in Stress Management", Vivekananda Yoga Research Foundation, Bangalore
- [4] Books from The Yoga Institute, Santacruz:
  - a) Yoga Encyclopedia Vol 11
  - b) Yoga of caring
  - c) Insights through Yoga
  - d) Growing with Yoga



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
LA1	Yoga-Vidya	1	-	-	Non-Credits				
		Examination Scheme							
		ISE1		ISE2		Attendance		Total	
		20		20		10		50	
Student will be evaluated after six sessions for 20 Marks (ISE1) and at the end of last session for 20 Marks (ISE2). Grade equivalent to 'D' (50%-59.99% Marks) or above is considered as 'Satisfactory'. If any of the tasks given is not completed/submitted/shown/evaluated then the corresponding lower grade will be given. Although the grades are given they will not mentioned in final grade card but they are necessary to declare the successful completion of the Non-Credit course.									

Pre-requisite Course Codes		---
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Student will be able to perform various techniques of Yoga
	CO2	Student will be able to follow healthy habits to improve immune system
	CO3	Student will be able to describe the importance of Yoga in one's life
	CO4	Student will be able to make resolution to practice techniques of Yoga

Through this course, students will get an all-round experience of how Yoga can benefit their body, breath, emotions along with relaxation techniques to maintain a calm and balanced state of mind.

Day No.	Topics	Hrs.
1	What is Yoga, why Yoga? Techniques: warm up stretches for hands, legs, neck; Sukhasana, Padmasana	1
2	Introduction to Ashtanga Yoga Techniques: Tadasana, Utkatasana, Konasana 2	1
3	Asana classification and importance of different types of Asanas Techniques: Sthita-prarthanasana, Ekapadasana, Garudasana	1
4	Yogendra rhythm- breathing pattern Techniques: Parvatasana, Yashikasana	1
5	Forward bending and abdominal compression Techniques: Konasana 3, Yogamudra	1
6	Shuddhi Kriyas- Prevention of diseases by improving immune system Techniques: Jalaneti, Kapalabhati	1



Date: 10/01/2024  
*[Signature]*



## Sardar Patel Institute of Technology

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		1	-	-	Non-Credits			
LA2	Music Appreciation	Examination Scheme						
		ISE1		ISE2		Attendance		Total
		20		20		10		50

Student will be evaluated after six sessions for 20 Marks (ISE1) and at the end of last session for 20 Marks (ISE2). Grade equivalent to 'D' (50%-59.99% Marks) or above is considered as 'Satisfactory'. If any of the tasks given is not completed/submitted/shown/evaluated then the corresponding lower grade will be given. Although the grades are given they will not be mentioned in final grade card but they are necessary to declare the successful completion of the Non-Credit course.

Pre-requisite Course Codes	---
After successful completion of the course, student will be able to	
Course Outcomes	CO1
	Appreciate North Indian Hindustani Music
	CO2
	Appreciate the classical music in films

Topics	Hrs.
1. Broad perspective of North Indian of Hindustani Music i.e. a - Classical Vocal b - Semi-Classical Vocal, c - Instrumental - Plucked, Bowed & Wind d - Percussion, e - Families of Musical Instruments.	14
2. Performance scenario of vocal, instrumental and percussion	
3. Film Music where classical music is used	



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## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
LA3	Dramatics	1	-	-	Non-Credits			
		Examination Scheme			ISE1	ISE2	Attendance	Total
		20		20	10		50	

Student will be evaluated after six sessions for 20 Marks (ISE1) and at the end of last session for 20 Marks (ISE2). Grade equivalent to 'D' (50%-59.99% Marks) or above is considered as 'Satisfactory'. If any of the tasks given is not completed/submitted/shown/evaluated then the corresponding lower grade will be given. Although the grades are given they will not be mentioned in final grade card but they are necessary to declare the successful completion of the Non-Credit course.

Pre-requisite Course Codes	---
After successful completion of the course, student will be able to	
Course Outcomes	CO1 Understand an Art of Theatre.
	CO2 Express their thoughts.
	CO3 Create and visualize new ideas.
	CO4 Perform impressively.

Day No.	Topics	Hrs.
1	Lalitkala ( Forms of Art)	1
2	Drama – Show and Text	1
3	Techniques – Abhinay (Acting)	1
4	1. Vachik Abhinay ( Reading)	1
5	2. Angik Abhinay (Expressions)	1
6	3. Satvik Abhinay	1
7	Digdarshan ( Direction)	1
8	Nepathy ( Settings)	1
9	Veshbhusha ( Drapery)	1
10	Natyabhasha ( Dialogs and Language)	1
11	Kaal and Avakash ( Time and Space)	1
12	Natya Rasa ( Theory of Rasa)	1
13	Natya Rasa ( Theory of Rasa)	1
14	Aswad prakriya	1
		Total 14



*Renuka*



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### References:

- [1] An Actors prepare – Stanislavsky ( English )
- [2] A building a Character – Stanislavsky( English )
- [3] Natyashastra – Bharatmuni ( English And Marathi )
- [4] Abhinaysadhana- K. Narayan Kale (Marathi)
- [5] Natyavimash-K. Narayan Kale (Marathi)
- [6] Jagatik Rangabhumicha Itihas – Kru. Ra. Sawant (Marathi)
- [7] Marathi Rangabhumicha Itihas - Shri. Na. Banahatti ( Marathi )
- [8] Lalitkalamimansa- Go. Chi. Bhate( Marathi )
- [9] Sahitya Adhyapan Ani Prakar- va. la. Kulakarni Gauravgranth( Marathi )
- [10] Vachik Abhinay- Dr. Shriram Lagoo ( Marathi )
- [11] Rangnayak- Arwind Deshpande



*Chandni* ✓



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS32	Human Health Systems Approach	2	-	-	Non-Credits			
		Examination Scheme						
		ISE1	ISE2	Attendance	Total			
		20	20	10	50			
Student will be evaluated after completion of 50% syllabus for 20 Marks (ISE1) and at the end of course for 20 Marks (ISE2). Grade equivalent to 'D' (50%-59.99% Marks) or above is considered as 'Satisfactory'. If any of the tasks given is not completed/submitted/shown/evaluated then the corresponding lower grade will be given. Although the grades are given they will not mentioned in final grade card but they are necessary to declare the successful completion of the Non-Credit course.								

Pre-requisite Course Codes	-		
After successful completion of the course, student will be able to understand			
Course Outcomes	CO1	Physiology as integrated interdisciplinary Science	
	CO2	Physiological significance of balanced diet and exercise in health	
	CO3	Significance of cleanliness and hygiene in daily routine	
	CO4	Dynamics and homeostasis of human health	

Module No.	Unit No.	Topics	Ref.	Hrs.
1	<b>Levels of Organizational Systems</b>		1	2
	1.1	Molecular, Cellular and Organ Systems		
	1.2	Biological Molecules		
	1.3	Biochemistry, Biophysics, Molecular Biology and Bioengineering		
2	<b>Energy and Molecular Supply Chain Management</b>		1	7
	2.1	Digestive System: Nutrient supply and Balanced Diet		
	2.2	Respiratory System and effects of Pollution		
	2.3	Cardiovascular System, Blood Pressure, ECG and Blood Report		
	2.4	Musculo-skeletal System and exercise Physiology		
3	<b>Body Fluid Dynamics</b>		1	4
	3.1	Body fluids		
	3.2	Kidneys as Filtration Units and their Physiological Functions		
	3.3	Urinary System		
	3.4	Kidney and Urinary Stones, and Dialysis		1
4	<b>Control, Coordination and Regulatory Systems</b>		1	4
	4.1	Sense Organs		



*Parmiti*



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	4.2	Nervous systems		2
	4.3	Endocrine Systems (Pancreas and Diabetes, Thyroid and its functions)		1
<b>5</b>	<b>Defense Systems</b>		1	<b>3</b>
	5.1	Integumentary System		1
	5.2	Immune System		2
<b>6</b>	<b>Molecular Biology and Genetical Information</b>		2	<b>6</b>
	6.1	Hereditary Molecules: DNA RNA		2
	6.2	Horizontal flow of Genetic Information		2
	6.3	Vertical flow of Genetic Information		2
			<b>Total</b>	<b>26</b>

### References:

- [1] Text book of Anatomy and Physiology for Nurses and allied Health Sciences by Indu Khurana & Arushi
- [2] Simplified Course in Molecular Biology by V. K. Agarwal - S. Chand Publication



*Serial No. \_\_\_\_\_*



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ELL63	Fundamentals of Operating System Lab	--	1	2	--	1	1	2
<b>Examination Scheme</b>								
ISE			MSE			ESE		Total
40			--			--		40

Pre-requisite Course Codes		ESL14: Programming Methodology and Data Structures Lab ELL36: Object Oriented Programming Lab EL43: Computer Organization and Architecture					
After successful completion of the course, student will be able to:							
Course Outcomes	CO1	To understand OS and install, configure the system					
	CO2	To explain memory management and Scheduling algorithms					
	CO3	To discuss File and Disk Management					
	CO4	To create user and set user policy and to install software packages					
	CO5	To outline Kernel Services and Synchronization					
	CO6	To configure network and server and write shell scripts					

Module No.	Unit No.	Suggested List of Experiments	Ref.	Hrs.
1	1.1	<b>OS Fundamentals</b> Operating system objectives and functions, Evolution of OS, Characteristics of modern OS, Basic concepts: Processes, Files, System calls, Shell, Kernel architectures: Monolithic, Micro-kernel, Layered, Kernel mode of operations.	1,4,6	2
2	2.1	<b>Booting Process</b> Using the System(Booting and login ), User Management	4	2
3	3.1	<b>Memory Management</b> Memory Management Requirements, Memory Partitioning, Virtual memory: Paging; Segmentation; Page replacement policies, page faults	4,5,6	2
4	4.1	<b>Multiprocessor and Real-Time Scheduling:</b> Multiprocessor Scheduling, Real-Time Scheduling, Linux Scheduling, UNIX process Scheduling	1,5	2
5	5.1	<b>File System Management</b> Files-System Structure, File System implementation, Directory implementation, Allocation Methods contiguous allocation, linked list allocation, indexed allocations, Free space management.	1,5	2



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6	<b>6.1 Disk Management</b> Disks Scheduling Algorithm: FCFS, SSTF, SCAN, CSCAN, LOOK, Disk Management	1.5	2
7	<b>7.1 Kernel Services and Compilations</b> Kernel Synchronization, Kernel Service Requests, Synchronization Primitives, Kernel Data Structures, Race Condition Prevention, Kernel Wrapper Routines	6	2
<b>Total</b>			<b>14</b>

### References:

- [1] William Stallings, Operating Systems: Internals and Design Principles, 8th edition, Pearson Education Limited, 2014
- [2] John Muster, "Introduction to Unix and Linux", Tata McGraw Hill
- [3] Roderick W. Smith, "LPIC-1"
- [4] Andrew S. Tanenbaum, Herbert Bos, "Modern Operating System", 4<sup>th</sup> edition, Pearson
- [5] Silberschatz, Galvin, Gagne, "Operating System Concepts", 8 Edition, Wiley Student Edition
- [6] Daniel Bovet, Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, O'Reilly Publication
- [7] Sumitabha Das, "UNIX, concepts and applications", 4th edition, Tata McGraw Hill
- [8] Michael Palmer, "Guide to UNIX Using Linux", Fourth Edition, Cengage Learning
- [9] William E. Shotts Jr, "The Linux Command Line: A Complete Introduction", 1st Edition, No Starch Press, Inc



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Felicitation



**Sardar Patel Institute of Technology**  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India  
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**ELECTRONICS ENGINEERING DEPARTMENT**

Academic Year: 2017 – 2018

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Occupational Safety & Legal Studies for Engineers

Class: SE

Semester: IV

Comments:

Engineering is the branch of science and technology concerned with design, building and the use of engine, machines and structures. In this fast moving world scenario, it is seen that the field of Engineering has travelled a very long distance of time space. In the modern parlance, this field must be properly knitted with the other two important dimensions—SAFETY & LAW. An Engineer must have adequate knowledge of these vital subjects if he ever wishes to establish himself in this Industrial world.

This activity based learning course is introduced to impart life skills related to occupational safety and legal studies. The activities have been designed to meet up with the growing expectations with the concerned topic.



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Signature of Domain Expert: Dr. Surendra Rathod

*RJ*

*Surendra*



**Sardar Patel Institute of Technology**  
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**ELECTRONICS ENGINEERING DEPARTMENT**

**Academic Year: 2017 – 2018**

Name of the Domain Expert: Dr. Surendra Rathod

Subject Name: Human Health Systems Approach

Class: SE

Semester: III

**Comments:**

One of the necessary ingredient of an engineer is the ability to understand how things work. An engineer must know how something is supposed to work before she or he can quantitatively analyze the prospective design. The laws of physics, chemistry, mathematics, and engineering sciences are relevant, just as are the unique uses to which they are put in living things. And, to make this clear, this course deal with the entire realm of human health. This course presents biology as a set of concepts that work together.

Elementary knowledge of biology is very important for engineers from various perspectives. First of all students must understand that physiology is an integrated interdisciplinary Science. Also to remain healthy in life they must know the physiological significance of balanced diet and exercise. This course gives knowledge to the students about control mechanism and defense system of the human body. This course is introduced to make students aware of the significance of cleanliness and hygiene in daily routine. The knowledge of dynamics and homeostasis of human health will also give them edge in prospective projects in third and final year of engineering.

Signature of Domain Expert: Dr. Surendra Rathod



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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics Engineering

Postgraduate Program

2017-18 to 2020-21 Revision

Program Code	Program Name	Year of Introduction	Year of Revision	Revision of course carried out in last 5 years Percentage of content added/ replaced
Electronics and Telecommunication	Electronics and Telecommunication (Post Graduate)	2012-17	2017-2018	42.85
			2020-2021	65.62



*B. S. Patel* *Chairman*



## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics and Telecommunication Engineering

Postgraduate Program

2020-21

Name of the Course	Course Cod	Year of introduction (during the last five years)	percentage
Millimeter Wave Technology	EC511	2020-21	100
Mobile Devices Forensic and Cloud Forensic	EC533		100
Writing Skills	AS501		100
High Performance Computing Lab	EC508		100
5G Technology Lab	EC509		100
Digital Forensics and Incident Response (DFIR)	EC532		100
Applied Optimization for Wireless, Machine Learning, Big	EC513		100
Next Generation networks	EC503		100
Software Defined Radio and its Application	EC512		100
Machine Intelligence	EC522		100
Explainable AI	EC523		50



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# Sardar Patel Institute of Technology

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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2020-2021

### Theory Course Revision Report

Course Name: *Millimeter Wave Technology*

Course Code Old (~~2020-21~~):

Course Code New (Autonomy 20 - ): EC511

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: MTech Sem I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly introduced	Recent Trends & Research	100%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



*Mehdi*



**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Dr. Reena Sonkware	EXTC	RS
2	Dr. Sukanya Kulkarni	EXTC	SK
3	Pallavi Malame	EXTC	PM
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



Date: 01.01.  
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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs
1		<b>Introduction to Millimeter Wave Technology</b>	1,2	04
	1.1	Millimeter Wave Bands, Attenuation, Advantages and Disadvantages, Applications.		
	1.2	Phase and Group velocity, Slow and Fast Waves, Skin depth, Boundary Conditions, mmWave Challenges, Dielectric Properties at mmWave and terahertz frequency, material properties, losses		
2		<b>Guiding Structures</b>	1,2	06
	2.1	Guiding Structures at mmWave: Hollow waveguide (Rectangular & Circular), planar transmission line.		
	2.2	Quasiplanar transmission line, Dielectric Integrated lines, H and groove guided structures, Coupled lines, CPW, SIW wave modes, microwave connectors, rectangular cavity resonator, Multipaction Effect		
3		<b>Millimeter wave Antennas &amp; Components</b>	1,2	08
	3.1	Antenna Parameter, Printed mm Wave Antenna, Waveguide slot array, on chip antenna, Loop Antenna, Circuit Integration, Packaging, Leaky Wave Antenna, Radiation Pattern.		
	3.2	Dielectric Resonator, Filters, Determination of Q, Power Divider, Coupler, Terminators, Adaptors, Excitation of SIW.		
4		<b>Millimeter Wave Devices</b>	1,2	04
	4.1	Solid state devices and microwave tubes, HBT, Schottky Diode, P-I-N Diode, TEDs, Gunn Diode, Avalanche Transit Time Devices, Switches.		
5		<b>Millimeter Wave Systems</b>	1,2	06
	5.1	Noise & Link Budget: mmWave propagation, Friis Transmission equation, Link Budget, Digital modulation and bit error rate, channel performance, types of noise		
	5.2	Receiver Noise Temperature, Noise Bandwidth, Noise Factor, Trans receiver architecture.		
				Total 28

Sr. No	Title of the Experiment
1	Introduction to CAD
2	Design of 30 GHz planar antenna using CAD
3	Design of 30 GHz waveguide using CAD. Observe the mode.
4	Design of mmWave based SIW.
5	Design of mmWave filter.





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6	Design of Leaky Wave Antenna
7	Calculate link budget for a given system using python/Matlab
8	Study of effect of rain fade on mmwave propagation using CAD
9	Design of slot array waveguide
10	Implementation of mmwave based published paper

## Text Books

Sr. No	Title	Authors	Publisher	Year
1	Millimeter Wave Wireless Communications	Theodore S. Rappaport	Prentice Hall Communications Engineering and Emerging Technologies	2014
2	Millimeter Wave Communication Systems	Huang K	Wiley	2015



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(PE)	Millimeter Wave Technology	2	0	2	3	7	2	0	1	3
		Examination Scheme								
		Component		ISE		MSE		ESE		Total
		Theory		50		50		100		200
EC511		Laboratory		50		-		50		100

Pre-requisite Course Codes, if any.	Electromagnetic Wave Propagation
Course Objective:	
Course Outcomes (CO): At the End of the course students will be able to	
EC511.1 Calculate mmwave parameters for a system	
EC511.2 Evaluate usage of active devices as amplifiers and sources.	
EC511.3 Justify usage of system based on noise calculation and link budgeting	
EC511.4 Design guiding structures, antennas and passive components for mmWave propagation	

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC511.1	2	1	1
EC511.2	2	1	1
EC511.3	2	1	1
EC511.4	2	3	2

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2
EC511.1	1	1
EC511.2	1	1
EC511.3	1	1
EC511.4		

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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1949  
cyber security  
and digital  
forensics

## ELECTRONICS ENGINEERING

Academic Year: 2018-2019

### Theory Course Revision Report

Course Name: Cyber security & digital forensics

Course Code Old (2024-21):

Course Code New (Autonomy 2018-):

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly introduced	As per the autonomous curriculum. Looking at trends & appln.	
2			100 %
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



*Seenu Singh*



## Sardar Patel Institute of Technology

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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dayanand Ambawade	EXTC	
2			
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (%) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100









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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 20 - 20

### Theory Course Revision Report

Course Name: *Mobile Device Forensic & Cloud Forensic*

Course Code Old (2020-21):

Course Code New (Autonomy 2020-21): *EC523*

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: *M.Tech Sem - III*

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	<i>Newly introduced course</i>	<i>New trends &amp; applications</i>	<i>100 %</i>
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



*Revised by [Signature]*



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Course(Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned					
		L	T	P	O	E	L	T	P	Total		
PE3	Mobile Device Forensics & Cloud Forensics	2	0	2	3	7	2	0	1	3		
Examination Scheme												
EC533	Mobile Device Forensics & Cloud Forensics	Component			ISE		MSE		ESE		Total	
		Theory			50		50		100		200	
			Laboratory			50		--		50		100

Pre-requisite Course Codes, if any.	Cyber Security and Digital Forensics, Digital Forensics and Incident Response (DFIR)
<b>Course Objective:</b> To prepare students for cyber security and digital forensics job profiles in Cyber security Industry, Academia and Research.	
<b>Course Outcomes (CO):</b> At the End of the course students will be able to	
EC533.1 Differentiate between computer and mobile device forensics.	
EC533.2 Analyze requirements of mobile device forensics and setup mobile device forensics laboratory various tool.	
EC533.3 Demonstrate techniques and tools used for mobile device forensics investigations with documents creation and maintain chain of custody.	
EC533.4 Select appropriate tools for cloud storage forensics.	
EC533.5 Prepare and present report on mobile device and cloud forensics as per security compliance	

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC533.1			
EC533.2			
EC533.3			
EC533.4			
EC533.5			

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3
EC533.1			
EC533.2			
EC533.3			
EC533.4			
EC533.5			



BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<p><b>Introduction to Mobile Forensics :</b>            Mobile Phone Basics, Inside Mobile device: Cell Phone Crime, SIM Card, SIM Security, Mobile forensic &amp; its challenges., Mobile phone evidence extraction process, Practical mobile forensic approaches, Mobile operating systems overview, Mobile forensic tool leveling system, Data acquisition methods.</p> <p><b>Practical Exercise:</b>            Popular tools for manual extractions include: Project-A-Phone Ferno ZRT and EDEC Eclipse            The tools used for logical extraction include: XRY Logical , Oxygen Forensic Suite and Lantern</p>	6,8	6
2		<p><b>Electronics Evidences:</b>            Electronic evidence stored on mobile phone, Rules of evidence            Good forensic practices, Securing the evidence, Preserving the evidence, Documenting the evidence</p> <p><b>Practical Exercise:</b>            The common tools used for hex dump include: XACT , Cellebrite UFED Physical Analyzer And Pandora's Box            The popular tools and equipment used for chip-off include: iSeasamo Phone Opening Tool , Xytronic 988D Solder Rework Station, FEITA Digital inspection station, Chip Epoxy Glue Remover, Circuit Board Holder</p>	3,4	6
3		<p><b>The Android device model:</b>            The Linux kernel layer, Libraries, Dalvik virtual machine, The application framework layer, The applications layer, Android security, Android file hierarchy, Android file system, Viewing file systems on an Android device, Extended File System – EXT, Android Forensic Setup and Pre Data Extraction Techniques            A forensic environment setup, Screen lock bypassing techniques Gaining root access, Android Data Extraction Techniques, Imaging an Android Phone, Data extraction techniques., Android Data Recovery Techniques, Data recovery, Android App Analysis</p> <p><b>Practical Exercises:</b>            Overview of Forensic Tools, Android app analysis, Reverse engineering Android apps, Cellebrite – UFED, MOBILedit,, Autopsy, Digital Evidence from Smart band, smart watch, IoT devices</p>	10,1 1	6



15/01/2023  
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 15/01/2023

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4	<b>Introduction to Cloud Forensics:</b> Cloud Computing Basics-Cloud Architecture-SAAS,IAAS & PAAS Cloud types-Public, Private, Community and Hybrid. Usage of cloud forensics, Challenges and Issues with Cloud Forensics, The three dimensions of cloud forensics, Cloud forensic organizational structure, Chain of Dependencies, Multi-Jurisdiction and multi-tenancy, Digital forensics evidence acquisition in cloud storage service: examining and evaluating tools and techniques, <b>Standards and Policies:</b> GDPR clauses and Cloud contract (IaaS, PaaS,SaaS)	5.7, 12	<b>6</b>
5	<b>Self Study:</b> <b>Case Study:</b> 1. Forensics-as-a-Service 2. Cloud storage forensics: ownCloud as a case study <b>Practical Exercises:</b> Tools for Cloud Forensic: FROST, UFED Cloud Analyzer, diffy, MD-CLOUD, EnCase, FTK, Oxygen Forensic, SIFT	13.1 4	<b>04</b>
<b>Total</b>		<b>28</b>	

Sr. No	Title of the Laboratory Exercises
1	Setting up Mobile/Handheld Device Forensic Laboratory
2	Mobile/ Smart Phone Forensic Part-I
3	Mobile/ Smart Phone Forensic Part-II
4	Mobile/ Smart Phone Forensic Part-III
5	Handheld/Portable Device Forensics
6	Mobile Malware Analysis
7	Automated Forensic Analysis of Mobile Applications on Android Devices
8	Application Development for Mobile Forensics and Investigation
9	Tools for Cloud Forensic : FROST , UFED Cloud Analyzer, diffy, MD-CLOUD
10	Cloud storage forensics: own Cloud as a case study



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## References:

## Text Books:

Sr. No	Title	Authors	Publisher	Year
1	Crime Scene Forensics A Scientific Method Approach	Robert C Shaler	CRC Press	2011
2	Computer Forensics and Cyber Crime: An Introduction	Marjie T. Britz	Pearson	2013
3	Computer Forensics Evidence Collection & Preservation	EC-Council	Cengage Learning	2010
4	Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet	Eoghan Casey BS MA	Academic Press	2011
5	Computer Forensics: Computer Crime Scene Investigation	John R. Vacca	Charles River Media	2002
6	Malware Forensics: Investigating and Analyzing Malicious Code	Cameron H. Malin, Eoghan Casey, James M. Aquilina	Syngress	2008
7	Introduction to Network Forensics	The European Union Agency for Network and Information Security(ENISA)	ENISA	2019
8	Practical Mobile Forensics	Satish Bommisetty and Rohit Tammana	Packt Publishing Limited	2014
9	Mobile phone security and forensics: A practical approach	Iosif I. Androulidakis	Springer publications	2012
10	Android Forensics: Investigation, Analysis and Mobile Security for Google Android	Andrew Hogg	Synergy	2011
11	iPhone and iOS Forensics: Investigation, Analysis and Mobile Security for Apple iPhone, iPad and iOS Devices	Andrew Hoog and Katie Strzempka	Synergy	2011
12	Wireless Crime and Forensic Investigation	Gregory Kipper	Auerbach Publications	2007
13	Practical Cloud Security: A Guide for Secure Design and Deployment	Chris Dorson	Shroff/O'Reilly	2019



Sahyadri  
Institute of  
Technology  
and Research  
Mumbai  
2017



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

Academic Year: 2020–2021

## Theory Course Revision Report

*Writing Skills*  
Course Name (New): Communication Skills (Sem-I/Sem-II)

Course Name (Old): ----

Course Code Old (2019-20): ----

Course Code New (2020-21): EC509

Class and Semester in Old Syllabus: -----

Class and Semesters in New Syllabus: M.Tech. (Sem-I &II)

Change/Addition in the theory portion of syllabus:

Sr. No.	Topics Changed/Newly Introduced/Removed	Reason	Overall Percentage Change in syllabus **(X)
1	<b>Vocabulary Building &amp; Grammar:</b> Concept of word formation, the root words from foreign languages and their use in English, Common errors in writing, confused pair of words, redundancies, clichés (2 hrs)	To make students understand the formation of words in English thereby helping to reduce common errors in spellings	100%  New course introduced from the year 2020-21
2	<b>Writing Skills:</b> Principles of Business Writing: 7Cs of communication, sentence structure, organizing paragraph in direct and indirect style, Summarization (3 hrs)	More focus on technical writing skills and formulating summary of the content	
3	<b>Practices in Writing:</b> Business E-mail: e-mail etiquettes. Business letter: full block format, modified block format, enquiry, complaints and redressal, Job Application Letter: Cover letter, Resume Writing, Meeting: Notice, Agenda, Minutes Report Writing: Informative, Analytical report (9 hrs)	To improve business correspondence writing skills.	
4	Basic Rules Of Grammar, GRE Vocabulary, Reading a book(fiction/non-fiction) and writing a review of it (2hrs)	To refresh grammar skills and improve vocabulary through reading and writing reviews	
5	<b>Persuasive Skills in Interviews:</b> Persuasion using facial expressions, gestures, body language Persuasion using voice, verbal style, verbal content ,Interview skills (4 hrs)	To enhance interview skills in students	



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## Sardar Patel Institute of Technology

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6	<b>Creative and Critical Thinking:</b> Different Perspectives to a situation, Group Discussion Skills , Picture based group discussions (3 hrs)	To improve discussion and persuasive skills
7	<b>Research, Analysis and Presentation Skills:</b> What is research? Types of research, Citation styles – a glimpse, Basic Literature Review and Presentation (3 hrs)	To introduce research skills in students
8	<b>Data Transformation:</b> Graphics to Paragraphs and vice versa; Oral interpretation of graphics, Research Paper, News Analysis	To improve skills of data analysis and Interpretation

Committee members Name & Signature:

1. Dr. Rita Das (Coordinator)      2. Prof. Firdous Parveen

Experts Name & Signature:

1. Dr. Usha Nair

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai - 400058 - India  
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2020- 2021

### Theory Course Revision Report

Course Name: High Performance computing Lab

Course Code Old (2020-21):

Course Code New (Autonomy 2020-21) EC 508

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: M Tech Sem - I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly introduced course	New trends, applic'n in academia, industry & research	100 %
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1.

2.

3.

4.

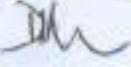


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**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

**Details of Committee members Name & Signature:**

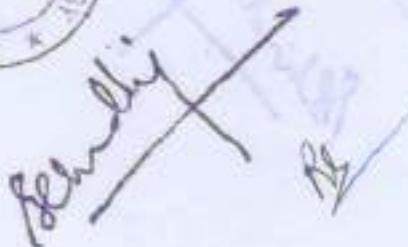
Sr. No.	Name of committee members	Department	Signature
1	Dayanand Ambawade	EXTC	
2	Dr. Sudhir. M. Dhage	COMPL	
3			
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



  
 Serial No. \_\_\_\_\_



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(SBC)	High Performance Computing Lab	0	0	4*	3	7	0	0	2	2
		Examination Scheme								
		Component	ISE	MSE	ESE	Total				
		Theory	--	--	--	--				
EC508		Laboratory	100	--	--	100				200

\*Including 1 Hour Theory

Pre-requisite Course Codes, if any.	Operating Systems Design and Analysis of Algorithms Computer Networks Programming Language Concepts
-------------------------------------	--

#### Course Objective:-

**Course Outcomes (CO):** At the End of the course students will be able to

EC508.1	Analyze a programming task and identify what portions admit a parallel implementation.
EC508.2	Apply the different parallel computing approaches using MPI and Open MP platform for achieving high performance.
EC508.3	Apply the different parallel computing approaches using Open CL platform for achieving high performance.
EC508.4	Develop well-optimized threaded applications using memory management and data transfer methodology on CUDA platform for achieving high performance.

#### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC508.1			
EC508.2			
EC508.3			
EC508.4			

#### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
EC508.1							
EC508.2							
EC508.3							
EC508.4							

#### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Analyse	Evaluate	Create
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*[Signature]*



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# Sardar Patel Institute of Technology

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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>HPC Architectures and Algorithm Design</b>	1,2	3
	1.1	<b>Standard Parallel Programming Systems:</b> MPI & Open-MP, Open-CL, CUDA, Heterogeneous Computer Memories and Data Transfer, Host Code, Applications of Heterogeneous Computing, Benchmarking CGM		
	1.2	<b>Parallel Algorithm Design:</b> Task/Channel Model, Foster's Design Methodology, Boundary Value Problem, Finding the Maximum, The n-Body Problem		
2	Title	<b>MPI and Open-MP Programming</b>	2	2
	2.1	<b>Message-Passing Programming:</b> Message-Passing Model, Message-Passing Interface, Circuit Satisfiability Problem, Collective Communication		
	2.2	<b>Shared-Memory Programming:</b> Shared-Memory Model, Parallel for Loops, Declaring Private Variables, Critical Sections, Reductions		
3	Title	<b>Open-CL Fundamentals and Programming</b>	1	3
	3.1	<b>Open-CL Overview:</b> Using Open-CL, Platforms and Devices, Open-CL Platforms C++, Open-CL Context to Manage Devices, Open-CL Context to Manage Devices using C++, Error Handling		
	3.2	<b>Work-Item and Work-Groups:</b> Command Queues, Work-items and Work-Groups, Open-CL Memory, Programming and Calling Kernels		
4	Title	<b>CUDA GPU Programming - I</b>	3	3
	4.1	<b>CUDA Basics</b> - Timing the Kernel, Timing with CPU Timer and nvpr of, Organizing Parallel Threads, Managing Devices.		
	4.2	<b>CUDA Execution Model</b> - Nature of Warp Execution, Exposing Parallelism, Checking Active Warps, Memory Operations, Avoiding Branch Divergence, Unrolling Loops, Dynamic Parallelism		
5	Title	<b>CUDA GPU Programming - II</b>	3	3
	5.1	<b>CUDA Global, Shared and Constant Memory Model:</b> Memory Management, Memory Access Patterns, Matrix Addition with Unified Memory, Data Layout of Shared Memory, Reducing and Coalescing Global Memory Accesses, Constant Memory.		
	5.2	<b>CUDA Streams and Concurrency:</b> Streams and Events, Concurrent Kernel Execution, Overlapping Kernel Execution and Data Transfer, Overlapping GPU and CPU Execution.		
6	Self Study	1) Parallel Architectures Interconnection Networks, Processor Arrays, Multiprocessor, Multicomputer, Flynn's Taxonomy. 2) Investigate the various GPU-accelerated CUDA libraries like CUSPARSE, cuBLAS, cuFFT and cuRAND library.	3	4*
Total (*Not Included)				14





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Laboratory Component (Minimum 10 Laboratory experiments are expected)

Sr. No.	Title of the Experiment
	<b>MPI Programming</b>
1	Implement Sieve of Eratosthenes with following data decomposition options: i) interleaved data decomposition and ii) block data decomposition using Parallel MPI programming and then analyze the algorithm.
2	Implement Floyd's version of All-Pair Shortest-Paths Problem through four steps of parallel algorithm design namely partitioning, communication, agglomeration and mapping decomposition using Parallel MPI programming and then analyze the algorithm.
3	Implement Matrix-Vector Multiplication using various Data Decomposition Options: i) Rowwise Block-Striped, ii) Columnwise Block-Striped Decomposition and iii) Checkboard Block Decomposition using Parallel MPI programming and then analyze the algorithm.
4	Implement Matrix Multiplication algorithm through i) Sequential Algorithm, ii) Parallel Algorithm - a) Row-wise Block-Striped Decomposition and b) Cannon's Algorithm using Parallel MPI programming and then analyze the algorithm.
5	Implement Linear Systems solution using i) Back substitution, ii) Gaussian Elimination, iii) Iterative Method and iv) Conjugate Gradient Method using Parallel MPI programming and then analyze the algorithm.
	<b>MPI and Open-MP Programming</b>
6	Implement Linear Systems solution using i) Conjugate Gradient Method and ii) Jacobi Method using Parallel MPI and OpenMP programming and then analyze the algorithm.
	<b>Open-CL Programming</b>
7	A histogram is a statistic that shows the frequency of a certain occurrence within a data set. The histogram of an image provides a frequency distribution of pixel values in the image. Write an Open-CL parallel implementation of the histogram algorithm by breaking the image into tiles, compute the histogram for each tile, and then combine the partial histograms computed for each tile into the final histogram of the image. If the image is a color image, the pixel value can be the luminosity value of each pixel or the individual R, G, and B color channels.
8	Write an Open-CL parallel implementation for Dijkstra's Single-Source Shortest-Path Graph Algorithm.
	<b>CUDA Programming</b>
9	Write a CUDA C program to find Matrix Transpose with i) shared memory, ii) padded shared memory and iii) unrolling for a large number of rows and columns of matrix.
10	Write a CUDA C program to integrate function using Trapezoidal Rule on GPU through Synchronization and concurrent execution.





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## Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Using OpenCL Programming Massively Parallel Computers	FIRST	Janusz Kowalik and Tadeusz Puzniakowski	IOS Press	2012
2	Parallel programming in C with MPI and Open MP	FIRST	Michael J Quinn	McGraw-Hill	2003
3	Professional CUDA C Programming	FIRST	John Cheng, Max Grossman, Ty McKercher	Wrox	2014

## Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	OpenCL Programming Guide	FIRST	Aaftab Munshi, Benedict R. Gaster, Timothy G. Mattson, James Fung, Dan Ginsburg	Addison-Wesley	2012
2	OpenCL Parallel Programming Development Cookbook-	FIRST	Raymond Tay	Packt Publishing	2013
3	CUDA by Example : An Introduction to General-Purpose GPU Programming	FIRST	Jason Sanders, Edward Kandrot	Addison-Wesley	2010



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Course(Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
SBC	5G Technology Lab	0	0	4	3	7	0	0	2	2
		Examination Scheme								
		Component	ISE			MSE		ESE		Total
		Theory	--			--		--		--
EC509		Laboratory	50			-		50		100

Pre-requisite Course Codes, if any.	3G, 4G Technology, C++, Python
<b>Course Objective:</b> Air Interface is one of the most important elements that differentiate between 2G, 3G, 4G and 5G. While 3G was CDMA based, 4G was OFDMA based; this course reveals the contents of air interface for 5G. While 4G brought in a deluge of infotainment services, 5G aims to provide extremely low delay services, great service in crowd, enhanced mobile broadband (virtual reality being made real), ultra reliable and secure connectivity, ubiquitous QoS, and highly energy efficient networks.	

**Course Outcomes (CO):** At the End of the course students will be able to

EC509.1	Install, configure and implement Various Open source Tools For Wireless Network Simulation.
EC509.2	Analyze and Implement Various Modulation Techniques for 5G Technology.
EC509.3	Estimate and Configure Channel Models for 5G.
EC509.4	Analyze the performance of 5G technology for Data Transmission.
EC509.5	Evaluate the Performance of various Indoor and Outdoor Propagation Models for 5G.

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC509.1	2	1	1
EC509.2	2	1	1
EC509.3	2	1	3
EC509.4	2	1	1
EC509.5	2	1	3

CO-PEO/PSO : Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2
EC509.1	1	1
EC509.2	1	1
EC509.3	1	1
EC509.4	1	1
EC509.5	1	1



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**Remember**   **Understand**   **Apply**   **Analyze**   **Evaluate**   **Create**



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2020- 2021

### Theory Course Revision Report

Course Name: *5G Technology Lab*

Course Code Old (2020-21):

Course Code New (Autonomy 2020-21): *SBL*

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: *MTech Sem II*

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	<i>Newly introduced course.</i>	<i>New Technology,</i>	
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.





## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Anand D. Mane	EXTC	b
2	Sukanya Kulkarni	EXTC	SN
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Course(Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned																			
		L	T	P	O	E	L	T	P	Total																
SBC	5G Technology Lab	0	0	4	3	7	0	0	2	2																
<b>Examination Scheme</b>																										
		Component	ISE		MSE		ESE		Total																	
		Theory	--		--		--		--																	
		Laboratory	50		--		50		100																	
<b>Pre-requisite Course Codes, if any.</b>		3G, 4G Technology, C++, Python																								
<b>Course Objective:</b> Air Interface is one of the most important elements that differentiate between 2G, 3G, 4G and 5G. While 3G was CDMA based, 4G was OFDMA based; this course reveals the contents of air interface for 5G. While 4G brought in a deluge of infotainment services, 5G aims to provide extremely low delay services, great service in crowd, enhanced mobile broadband (virtual reality being made real), ultra reliable and secure connectivity, ubiquitous QoS, and highly energy efficient networks.																										
<b>Course Outcomes (CO):</b> At the End of the course students will be able to																										
CO1	Install, configure and implement Various Open source Tools For Wireless Network Simulation.																									
CO2	Analyze and Implement Various Modulation Techniques for 5G Technology.																									
CO3	Estimate and Configure Channel Models for 5G.																									
CO4	Analyze the performance of 5G technology for Data Transmission.																									
CO5	Evaluate the Performance of various Indoor and Outdoor Propagation Models for 5G.																									

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3
CO1	2	1	1
CO2	2	1	1
CO3	2	1	3
CO4	2	1	1
CO5	2	1	3

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	Apply	Analyze	Evaluate	Create





Sardar Patel Institute of Technology

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#### Theory Component

Exp No.	Experiment Details	Ref.	Mark s
1.	Study Hardware and Software equipments and the specifications for 5G		5
2.	Software Defined Radio using GNU Radio for 5G. (NEEtus)	3	5
3.	End-to-End simulation of 5G Networks with NS3.	1	5
4.	Channel Modulation for 5G using NS3.	1	5
5.	Effect of Distance on Path-loss for Different Channel Models		5
6.	Impact of MAC Scheduling Algorithms on throughput, in Multi User Equipment scenarios. (NYUSIM)	1	5
7.	Performance analysis for Video Transmission using NS3/GNU Radio.	1,3	5
8.	Outdoor and Indoor Propagation.	1,3	5
9.	Case Study-1 (Open Ended)		5
10.	Case Study-2 (Open Ended)		5
Total	Note: Any eight lab exercises for final evaluation.	5 X 8	40

### References:

Sr. No	Title	Authors	Publisher	Year
1	NS3 Online Manual			
2	Sci-Lab Online Resources			
3	GNU Online Resources			



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2020-2021

### Theory Course Revision Report

Course Name: Digital Forensics and Incident Response

Course Code Old (2020-21):

Course Code New (Autonomy 2020-21): ~~ECS32~~ ECS32

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: M Tech Sem II

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly introduced course	As per the new requirements in domain of cybersecurity in Industry & Research	
2			100 %
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Dayanand Ambawade	EXTC	
2	Dr. Deepak Kans	EXTC	
3			
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned				
		L	T	P	O	E	L	T	P	Total	
(PE)	Digital Forensics and Incident Response (DFIR)	2	0	2	3	7	2	0	1	3	
		Examination Scheme									
		Component	ISE	MSE	ESE					Total	
PE32		Theory	50	50	100					200	
		Laboratory	50	--	50					100	

Pre-requisite Course Codes, if any.	Cyber Security and Digital Forensics
<b>Course Objective:</b> To prepare students for cyber security and digital forensics job profiles in Cyber security Industry, Academia and Research.	
<b>Course Outcomes (CO):</b> At the End of the course students will be able to	
EC532.1	To analyze the hardware, software, firmware and tools etc for forensic investigation processes.
ECS32.2	Create documents and maintain chain of custody.
EC532.3	Develop Python scripting to perform a variety of forensic collection and analysis tasks.
EC532.4	Develop digital forensics is part of the incident response (IR) capability Incident Response is an integral part of information Assurance (IA) and Forensic readiness, Create Evidence-centric procedures and processes.
EC532.5	Apply appropriate domestic and international law.

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3
EC532.1			
EC532.2			
EC532.3			
EC532.4			
EC532.5			

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3
EC532.1			
EC532.2			
EC532.3			
EC532.4			
EC532.5			

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	Apply	Analyze	Evaluate	Create
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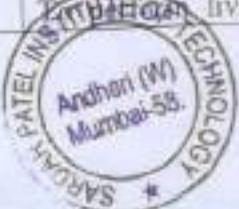


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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Introduction to Digital Forensics:</b> Cyberspace and criminal behavior, cyber crime investigation, forensics science, forensics methodologies, cyber incident handling and response, Controlling Contamination-the Chain of Custody, Legal perspectives and security compliance of digital forensics. ISO standards relating to Digital Evidence, SWDGE Model SOP for Computer Forensics, NIST Digital Evidence.	1,2	6
2		<b>Setting up an electronic evidence forensics laboratory,</b> Phases of Forensics. Grow your own tools for Computer Forensics with help Python Libraries. <b>Practical Exercises:</b> To develop Python scripting to perform a variety of forensic collection and analysis tasks. To demonstrate using Python to work with encrypted files, to extract metadata, to examine windows artifacts, to track Web and email usage, to foot print applications, to carve artifacts from volatile memory, to carve file systems, and to analyze network traffic. Implementing Python frameworks for development of further tools.	3,4	6
3		<b>Network Forensics:</b> Applying Forensic Science to Networks Preparation and Authorization, Identification Documentation, Collection, and Preservation, Filtering and Data Reduction, Class/Individual Characteristics and Evaluation of Source, Evidence Recovery, Investigative Reconstruction, Reporting Results Network Forensics Analysis Toolkit (NFAT) <b>Practical Exercises:</b> Collection of network traffic data (Live acquisition and dump) Analyzing the traffic and persevering original. Implementing network sensors. Correlate with host sensors. Develop an algorithm to filter and extract anomalous traffic. Use open source and commercial domain tools for NFA. Event reconstruction. OSINT Tools-tshark, wireshark, tcpdump & xplico <b>Windows Forensics:</b> Digital Evidence on Windows Systems, File Systems, Data Recovery, Log Files, Registry, Internet Traces, Program Analysis. Tools and methods <b>UNIX/Linux OS Forensics:</b> UNIX Evidence Acquisition Boot Disk, File Systems, Overview of Digital Evidence Processing Tools, Data Recovery, Log Files, File System Traces Internet Traces Tools and methods. <b>Practical Exercises:</b> Live analysis, capture volatile data, make images of	3,4, 5,6	6



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	media, analyze filesystems, analyze network traffic, analyze files, perform memory analysis, and analyze malware for a Windows subject on a Linux system with readily available free and open source tools. <b>Windows Registry analysis:</b> To build an in-house forensic capability via a variety of free, open-source, and commercial tools provided within the SANS Windows SIFT Workstation, NST etc		
4	<p><b>Malware Forensics, Memory Forensics and Disk Forensics:</b>  <b>File Identification and Profiling in Windows and Linux</b>    Analysis of a Suspect Program, Discovering and Extracting Malware and Associated Artifacts from Linux Systems and Windows systems, Memory Forensics: Analyzing Physical and Process, Memory Dumps for Malware Artifacts, Malware Incident Response: Volatile Data Collection and Examination on a Live Windows Systems and Linux systems. Tools and techniques of conducting runtime behavioral malware analysis and static code analysis.</p> <p><b>Practical Exercises:</b>    Collecting data from system memory (system registers, cache, RAM) in raw form and then carving the data from Raw dump. Extracting data from storage media by searching active, modified, or deleted files. OSINT tools, TCT, Autopsy, Sleuth-kit, volatility tools.</p> <p><b>Email Forensics:</b>    Broad steps in email forensics, Investigate Email Headers, Sender IP address, Verify Emails, Fake Email Investigation, Hacked, Email Scams. Tools and methods used in Email Forensics.</p> <p><b>Practical Exercises:</b>    Identification of malicious code, to study their payload, viruses, worms, etc. Recovery and analysis of emails, including deleted emails, calendars, and contacts</p>	6,7, 8	6
5	<p><b>Self-Study:</b>  <b>Anti Forensics</b>    Anti-forensics techniques, detection and countermeasures</p> <p><b>Incident Handling and Incident Response</b>    Development of Incident Handling and Response methodology (PDCAERF)    Incident Response is an integral part of information Assurance (IA) Forensic readiness. Evidence-centric procedures and processes.    Proper evidence handling and management, Determining the scope Containment strategies. Event reconstruction, Review the incident Follow up reporting.</p> <p><b>Practical Exercises:</b>    To develop digital forensics is part of the incident response (IR) capability &amp; Automated report mechanism.</p>	7,8, 9,10	4*

Total (\*Not Included) 28



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Sr. No	Title of the Laboratory Exercises
1	Setting up an electronic evidence forensics laboratory
2	Network Forensics using Open Source Tools-NFAT
3	Computer Forensics
4	To develop Python scripting to perform a variety of forensic collection and analysis tasks.
5	Memory Forensics
6	Disk Forensics & Email Forensics
7	Malware Forensics
8	Windows Forensics
9	Linux Forensics
10	To develop digital forensics is part of the incident response (IR) capability & Automated report mechanism.

## Text Books:

Sr. No	Title	Authors	Publisher	Year
1	Crime Scene Forensics A Scientific Method Approach	Robert C Shaler	CRC Press	2011
2	Computer Forensics and Cyber Crime: An Introduction	Marjie T. Britz	Pearson	2013
3	Computer Forensics Evidence Collection & Preservation	EC-Council	Cengage Learning	2010
4	Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet	Eoghan Casey BS MA	Academic Press	2011
5	Computer Forensics: Computer Crime Scene Investigation	John R. Vacca	Charles River Media	2002
6	Malware Forensics: Investigating and Analyzing Malicious Code	Cameron H. Malin Eoghan Casey, James M. Aquilina	Syngress	2008
7	Introduction to Network Forensics	The European Union Agency for Network and Information Security(ENISA)	ENISA	2019
8	Windows Forensics: The Field Guide for Corporate Computer Investigations	Chad Stroh	John Wiley & Sons	2006



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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2020–2021

### Theory Course Revision Report

Course Name: Applied Optimisation for Wireless, Machine learning

Course Code Old (2020-21):

Course Code New (Autonomy 2020-21) EC 513

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: M.Tech Sem-I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly introduced course	New trends, applic'n in Industry & research	100 %
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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(Autonomous Institute Affiliated to University of Mumbai)

**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Dayanand Antawade	EXTC	Dh
2	Dr. Anand Mane	EXTC	M
3	Dr. Sujata Kulkarni	EXTC	WJ
4	Dr. Sukanya Kulkarni	EXTC	Su

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

**\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100**



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Course(Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(PE)	Applied Optimization for Wireless, Machine Learning, Big Data	2	0	2	3	7	2	0	1	3
Examination Scheme										
		Component	ISE		MSE		ESE		Total	
EC513		Theory	50		50		100		200	
		Laboratory	50		--		50		100	

Pre-requisite Course Codes, if any.

Basic Course on Calculus, Probability, Matrices

Course Objective: To develop the fundamental tools/ techniques in modern optimization as well as illustrating their applications in diverse fields such as Wireless Communication, Signal Processing, Machine Learning, Big Data and Finance.

Course Outcomes (CO): At the End of the course students will be able to

- EC513.1 Evaluate Vectors and matrices; optimization functions
- EC513.2 Analyze and Evaluate optimization in MIMO and Wireless systems
- EC513.3 Analyze and Evaluate optimization in Machine Learning
- EC513.4 Analyze and Evaluate optimization in Big Data Analytic

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC513.1	2	1	1
EC513.2	2	1	1
EC513.3	2	1	1
EC513.4	2	3	2

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2
EC513.1	1	1
EC513.2	1	1
EC513.3	1	1
EC513.4		

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs
1		<b>Basic Calculus and Mathematical Optimization</b>	1,2	04
		Introduction to properties of Vectors, Norms, Positive Semi-Definite matrices, Gaussian Random Vectors		
		Introduction to Convex Optimization – Convex sets, Hyperplanes/Half-spaces etc. Application: Power constraints in Wireless Systems		
2	2.1	<b>Optimization Functions and Application in Wireless Systems</b>	1,2	05
		Convex/ Concave Functions, Examples, Conditions for Convexity. Application: Beamforming in Wireless Systems, Multi-User Wireless, Cognitive Radio Systems		
		Convex Optimization problems, Linear Program, Application: Power allocation in Multi-cell cooperative OFDM		
3	3.1	<b>Matrix Optimization for MIMO &amp; Wireless Systems</b>	1, 3	07
		QCQP, SOCP Problems, Application: Channel shortening for Wireless Equalization, Robust Beamforming in Wireless Systems		
		Duality Principle and KKT Framework for Optimization, Application: Water-filling power allocation, Optimization for MIMO Systems, OFDM Systems and MIMO-OFDM systems		
		Optimization for signal estimation, LS, WLS, Regularization, Application: Wireless channel estimation, Image Reconstruction-Deblurring		
4	4.1	<b>Applied Optimization for Machine Learning</b>	1,2	06
		Application: Convex optimization for Machine Learning, Principal Component Analysis (PCA), Support Vector Machines		
		Application: Cooperative Communication, Optimal Power Allocation for cooperative Communication, Geometric Program		
5	5.1	<b>Applied Optimization for Wireless &amp; Big Data,</b>	1,2,3	06
		Application: Radar for target detection, Array Processing, MUSIC, MIMO-Radar Schemes for Enhanced Target Detection		
		Application: Convex optimization for Big Data Analytics, Recommender systems, User Rating Prediction, Optimization for Finance		
				Total 28

Sr. No	Title of the Experiment
	(To be conducted in R / Python / Scilab / Matlab or any other suitable tool.)
1	Examples on Calculus, Matrices, Probability
2	Examples on Optimization functions
3	QCQP, SOCP Problems
4	Power constraints in Wireless Systems
5	Power allocation in Multi-cell cooperative OFDM

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6	Optimization for MIMO Systems, OFDM Systems
7	Optimization for signal estimation, Wireless channel estimation, Image Reconstruction-Deblurring
8	Optimization for Machine Learning, Principal Component Analysis (PCA), Support Vector Machines
9	Optimization for cooperative Communication, Geometric Program
10	Convex optimization for Big Data Analytics

### Text Books

Sr. No	Title	Authors	Publisher	Year
1	Convex Optimization	Stephen Boyd, Lieven Vandenberghe	Cambridge University Press	2009
2*	Optimization for Machine Learning	SuvritSra, Sebastian Nowozin, Stephen Wright	MIT Press, Cambridge, Massachusetts	2012
3*	Convex Optimization for Signal Processing and Communications: From Fundamentals to Applications	Chong-Yung Chi, Wei-Chiang Li, Chia-Hsiang Lin	CRC Press	2017



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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2020-2021

### Theory Course Revision Report

Course Name: Next Generation Networks

Course Code Old (2020-21): -

Course Code New (Autonomy 2020-21): EC503

Class and Semester in Old Syllabus: -

Class and Semesters in New Syllabus: MTech Sem - I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly introduced course.	Advanced Topic in Telecommunication.	100 %.
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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## Sardar Patel Institute of Technology

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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. Anand D. Mane	EXTC	
2	Dr. Sugata Kulkarni	EXTC	
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





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Course(Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		3	0	0	5	8	3	0	-	3
Examination Scheme										
(PC)	Next Generation Network	Component	ISE	MSE	ESE	Total				
		Theory	75	75	150	300				
EC503		Laboratory	-	-	-	-				

**Pre-requisite Course Codes, if any.** Computer Networks, Wireless communication

**Course Objective:** The course is designed to provide technical features, applications and design considerations of new and emerging network technologies.

**Course Outcomes (CO):** *At the End of the course students will be able to*

- EC503.1 Describe technical features and design considerations of the next generation networks.
- EC503.2 Apply the concept of convergence of service
- EC503.3 Identify the NGN services in business-oriented aspects
- EC503.4 Demonstrate technologies for next generation network
- EC503.5 Design a network with good capacity and efficiency

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3
EC503.1			
EC503.2			
EC503.3			
EC503.4			
EC503.5			

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3
EC503.1			
EC503.2			
EC503.3			
EC503.4			
EC503.5			

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	Apply	Analyze	Evaluate	Create
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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	<b>Introduction to Next generation Network and ITU standards</b>	1	6
	1.1	Introduction Evolution of public mobile services - Main drivers to Next Generation Networks – NGN, ITU NGN standards.		
	1.2	All-IP network concept for, 3 Numbering, naming and addressing for all NGN, NGN control architectures and protocols, Transport Stratum, Service Stratum , Service Management, Application Functions. Wireless NG Technologies, Bluetooth, WiFi etc.		
2	Title	<b>IMS and Convergent Management IMS Architecture -</b>	2,3	10
	2.1	IMS services, QoS Control and Authentication, Network and Service management for NGN, IMS advantages		
	2.2	Next Generation OSS Architecture - standards important to OSS architecture, Information framework, OSS interaction with IMS, NGN OSS function/ information view reference model, DMTF CIM, Push to Talk over Cellular (PoC) Service, MS-Based FMC Service.		
3	Title	<b>NGN Services: Technology, Business Aspects</b>	2	8
	3.1	VoIP, IPTV, rich multimedia, future web, Quality of Service (QoS), Quality of Experience (QoE) in NGN		
	3.2	Control and Signaling protocols for NGN, NGN security, Service convergence, Business, and regulatory aspects of NGN		
4	Title	<b>MPLS and VPN Technology</b>	5	10
	4.1	MPLS & QoS, MPLS services and components – layer 2 VPN, layer 2 Internetworking, VPN services, signaling, layer 3 VPN – Technology overview, Remote Access, and IPsec integration with MPLS VPN.		
	4.2	MPLS multicast, IPv6 and MPLS – Technology overview, Future of MPLS – Integrating IP and optical networks, Future Layer2 layer3 services		
5	Title	<b>NGN Management and future Evaluation</b>	2,3	8
	5.1	Configuration, Accounting, performance, security, case study for MPLS, Future enhancements – Adaptive self-healing networks.		
	5.2	Transition of IP networks to NGN, Future packet-based network (IPv6 NGN), NGN business challenges, NGN evaluation.		
6	Self-Study	Software Defined Networks (SDN) & NFV, Network Automation and Containerized NFV, IMS Advantages, NEXT GENERATION OSS ARCHITECTURE, Services Implemented on NGN		6*
<b>Total (*Not Included)</b>				<b>42</b>





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## Textbooks:

Sr. No	Title	Edition	Authors	Publisher	Year
1.	Next Generation Network -A Complete Guide		Gerardus Blokdyk	SSTAR Cooks	
2.	Next generation Telecommunication Networks, Services and Management		Thomas Plavyk	Wiley& IEEE Press Publications	
3.	MPLS and Next Generation Networks: Foundations for NGN and Enterprise Virtualization		Robert Wood	CISCO Press	

## Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Next Generation Network Services	--	Neill Wilkinson	John Wiley Publications	2002
2	Next Generation Networks	--	Monique J. Morrow,	CISCO Press	2007
3	IP-Based Next-Generation Wireless Networks: Systems, Architectures, and Protocols	--	Jyh- Cheng Chen and Tao Zhang-	Wiley	-
4	Next Generation Wireless Systems and Networks	--	Hsiao - Hwa Chen, Mohsen Guizani	Wiley	-



*Scanned by* *Shubhij*



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(PE)	Millimeter Wave Technology	2	0	2	3	7	2	0	1	3
		Examination Scheme								
		Component		ISE		MSE		ESE		Total
		Theory		50		50		100		200
EC511		Laboratory		50		-		50		100

Pre-requisite Course Codes, if any.	Electromagnetic Wave Propagation
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Course Objective:	
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Course Outcomes (CO): At the End of the course students will be able to	
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EC511.1	Calculate mmwave parameters for a system
EC511.2	Evaluate usage of active devices as amplifiers and sources.
EC511.3	Justify usage of system based on noise calculation and link budgeting
EC511.4	Design guiding structures, antennas and passive components for mmWave propagation

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC511.1	2	1	1
EC511.2	2	1	1
EC511.3	2	1	1
EC511.4	2	3	2

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2
EC511.1	1	1
EC511.2	1	1
EC511.3	1	1
EC511.4		

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2020-2021

### Theory Course Revision Report

Course Name: Software Defined Radio and its applications

Course Code Old (~~EC512~~):

Course Code New (Autonomy 2020-21) EC512

Class and Semester in Old Syllabus: → BTech Sem I

Class and Semesters in New Syllabus: EC512 : MTech Sem I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced	Recent Trends	100 %
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



*R. J. Patel*  
*Sandip*



**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Dr. Sukanya Kulkarni	EXTC	SK
2	Dr. Reena Sonkusare	EXTC	RS
3	Pallavi Malame	EXTC	PM
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Course(Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		2	0	2	3	7	2	0	1	3
(PE)										
EC512	Software defined radio and its applications	Examination Scheme								
		Component		ISE		MSE		ESE		Total
		Theory		50		50		100		200
		Laboratory		50		-		50		100

Pre-requisite Course Codes, if any.		Digital signal processing, wireless communication
Course Objective:		To teach Software defined radio architecture and its performance parameters.
<b>Course Outcomes (CO):</b> At the End of the course students will be able to		
CO1	Describe various architecture aspects of SDR	
CO2	Analyze the behavior, need and challenges associated with various system components	
CO3	Justify the usage of various system components	
CO4	Evaluate performance parameters of SDR subsystem.	

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC512.1	2	2	1
EC512.2	2	1	2
EC512.3	2	1	2
EC512.4	2	1	2

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2
EC512.1	1	1
EC512.2	1	2
EC512.3	1	2
EC512.4	1	2

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs
1		Introduction to software defined radio	1	04
		Introduction, networking, RF architecture, Processing architectures and software environment		
2		Signals and systems for SDR	1,2	06
	2.1	Receive techniques in SDR, Transmit techniques for SDR		

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	2.2	Digital signal processing for SDR		
3	3.1	Understanding SDR hardware components of an SDR, AD9363 Details, Zynq Details, Linux Industrial Input/Output Details, MATLAB as an IIO client	1,2	08
	3.2	Radio I/O Basics, Continuous Transmit Latency and Data Delays, Receive Spectrum, Automatic Gain Control, Common Issues, Example: Loopback with Real Data, Noise Figure		
	4.1	OFDM for SDR: Merits and Challenges Need for OFDM, spectrum sensing, spectrum shaping, MIMO, spectral allocation, Interoperability, challenges and mutual interference, multiband OFDM	2	04
5	Applications of SDR Cognitive Radio, Bumblebee Behavioral Model, Vehicular Networking			1,2 06
	Self study: Cognitive radio-Functions, Components and Design Rules, Building the CRA on SDR Architectures, SDR and Cognitive Radio Relationship			
				Total 28

Sr. No	Title of the Experiment
1	Implementation of OFDM and measurement of performance parameters
2	Study of nonlinear distortion parameters in SDR
3	Performance Analysis of SDR transceiver
4	Spectrum sensing using GNU radio and SDR
5	Understanding effect of multipath and fading channel in transceiver design
6	Transmit and receive a single tone signal using NI 2920 and Labview
7	Study of Packet transmission and reception using NI 2920 USRP and labview
8	Case study: cooperative sensing
9	Case study: cross layer optimization
10	Case study: Implementation predistortion technique for SDR

## Text Books

Sr. No	Title	Authors	Publisher	Year
1	Software-Defined Radio for Engineers	Travis F. Collins Robin Getz Di Pu Alexander M. Wyglinski	Artech	2018
2	Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems	HÜSEYİN ARSLAN	Springer	2007



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*Shubhaji*



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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 20 - 20

### Theory Course Revision Report

Course Name:

**Machine Intelligence**

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ): **EC5222\***

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: **EC522 M.Tech Sem II**

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	50% change in the course content	To cover the latest development in ML & AI	50 %,
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Dayanand Ambawade	EXTC	
2	Dr. Shajta Kulkarni	EXTC	
3			
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		2	0	2	5	9	2	0	1	3
(PE)										
EC522	Machine Intelligence	Examination Scheme			Component			MSE	ESE	Total
		Theory			ISE			50	100	200
		Laboratory			50			--	50	100

### Pre-requisite Course Codes, if any.

Course Objective: To apply skills of machine learning algorithms on real-life applications

Course Outcomes (CO): At the End of the course students will be able to

- EC522.1 To select appropriate Data Visualization techniques for a given scenario
- EC522.2 Evaluate the performance of Classification/ Clustering algorithms
- EC522.3 Apply Artificial Neural Networks on large dataset.
- EC522.4 Implement Forecasting algorithms to solve real-world problems.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC522.1			
EC522.2			
EC522.3			
EC522.4			

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
EC522.1							
EC522.2							
EC522.3							
EC522.4							

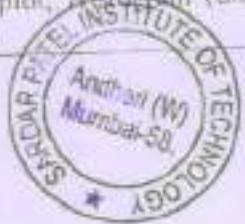
### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create

### Theory

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Visualization		
	1.1	Introduction to data visualization		
	1.2	When, Why and Where to use: Bar Graph, Pie chart, Dot plot, Line graph, Scatter plot, Histogram (uniform, non-uniform width), Box Plot, Heat Map		2

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**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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2	<b>Supervised Machine Learning</b>		6
2.1	Introduction to Machine Learning, Types- Supervised, Unsupervised, Semi-supervised	2	
2.2	Basic Concepts, Classification methods: Decision Tree Induction, Attribute Selection Measures, Tree pruning, Bayesian Classification: Naive Baye's Classifier, Support Vector Machine, Bayesian Belief Networks, Hidden Markov Model		
2.3	Ensemble Methods: Bagging, Boosting- AdaBoost, Random Forests		
3	<b>Unsupervised Machine Learning</b>		5
3.1	Cluster Analysis, Basic Concepts, Partitioning Methods: K-Means, K-Medoids. Hierarchical Methods: Agglomerative, Divisive, BIRCH	2	
3.2	Density-Based Methods: DBSCAN, OPTICS		
3.3	Outlier Detection Methods: Supervised, Semi-Supervised, Unsupervised, Proximity based, Clustering Based		
4	<b>Artificial Neural Networks</b>		8
4.1	Fundamental Concepts and Models of Artificial Neural Systems: Biological Neurons and Their Artificial Models, Models of Artificial Neural Networks, Neural Processing, Learning and Adaptation, Neural Network, Learning Rules and Comparison.	3	
4.2	Linearly and Non-Linearly Separable Pattern Classification.		
4.3	Perceptron Convergence Theorem		
4.4	Multi-layer Feed forward Network: Delta Learning Rule for Multi-Perceptron Layer, Generalized Delta Learning Rule, Feed forward, Recall and Error, Back-propagation Training, Learning Factors		
5	<b>Forecasting</b>		7
5.1	Basics of Time Series, Defining the forecasting problem , Holt-Winters' seasonal method	4	
5.2	Correlation analysis, simple linear regression, statistical tests of significance, multiple regression, causal factors in multiple regression, statistical characteristics of this method.		
5.3	Short-range forecasting, Analysis of Time Series data-plots, seasonality, Auto correlation, ARIMA Models		
6*	<b>Self Study</b>	R1	5*
	Case Studies: Pinterest – Improved Content Discovery, Twitter – Curated Timelines, HubSpot – Smarter Sales, Google, Salesforce – Intelligent CRMs, LinkedIn Deep Learning: Introduction, Convolutional Neural Network, Recurrent Neural Network, Generative Adversarial Network, Reinforcement learning (Markov Decision Processes, Value Iteration)Q-learning		
		Total	28

\*Total 28 hrs. does not include this module's hours



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## Laboratory:

Sr. No	Title of the Experiment
1	Data Visualization: Use appropriate data set and demonstrate various charts
2	Supervised Learning: Choose appropriate dataset for internet traffic analysis and apply algorithms like: naive Bayes, Support Vector Machine. Analyze and compare their performance metrics.
3	Supervised Learning: For credit card fraud detection, choose a dataset and apply Decision tree, Random Forest algorithm. Measure and evaluate model performance.
4	Unsupervised learning: Choose appropriate dataset for document classification and form appropriate clusters using partition based clustering algorithms and evaluate performance metrics.
5	Unsupervised learning: Form appropriate clusters using hierarchical clustering algorithm and density based clustering, analyze and compare their performance metrics.
6	Neural Networks: Apply neural networks for character recognition.
7	Neural Networks: Apply Multilayer Perceptron for a scenario like Autonomous Driving - Image Recognition, Object detection, Route Adjustment, and evaluate model performance.
8	Neural Networks: Apply back propagation algorithm for face recognition and evaluate model performance.
9	Time Series: Perform analysis on Covid-19 dataset with the help of Holt and Winter Model.
10	Time Series: Analyze Share Market with ARIMA Model and forecast potential good stocks.

## Text Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Storytelling with data	1 <sup>st</sup>	Cole Nussbaumer Knaflic	Wiley	2015
2	Introduction to Machine Learning with Python: A Guide for Data Scientists	1 <sup>st</sup>	Müller, Andreas C., Guido, Sarah	O'Reilly	2016
3	Introduction to Artificial Neural Systems	1 <sup>st</sup>	Jacek M. Zurada	JaiCo Publishing House	2000
4	Time series analysis and its applications	5 <sup>th</sup>	Robert H. Shumway	Springer	2000

## Reference Books

Sr. No	Title	Edition	Authors	Publisher	Year
1	Deep Learning	1 <sup>st</sup>	Ian Goodfellow, Yoshua Bengio and Aaron Courville	The MIT Press	2017





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Course Category Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
EC522	Machine Intelligence	2	0	2	5	9	2	0	1	3
Examination Scheme										
Component		ISE			MSE			ESE		Total
Theory		50			50			100		200
Laboratory		50			--			50		100

Pre-requisite Course Codes, if any.

Course Objective: To apply skills of machine learning algorithms on real-life applications

Course Outcomes (CO): At the End of the course students will be able to

- EC522.1 To select appropriate Data Visualization techniques for a given scenario.
- EC522.2 Evaluate the performance of Classification/ Clustering algorithms
- EC522.3 Apply Artificial Neural Networks on large dataset.
- EC522.4 Implement Forecasting algorithms to solve real-world problems

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC522.1			
EC522.2			
EC522.3			
EC522.4			

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
EC522.1							
EC522.2							
EC522.3							
EC522.4							

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create

## Theory

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Visualization	1	2
		Introduction to data visualization		
	1.2	When, Why and Where to use- Bar Graph, Pie chart, Dot plot, Line graph, Scatter plot, Histogram (uniform, non-uniform width), Box Plot, Heat Map		

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# Sardar Patel Institute of Technology

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(Autonomous Institute Affiliated to University of Mumbai)

## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2020- 2021

### Theory Course Revision Report

Course Name: Explainable AI

Course Code Old (2020-21):

Course Code New (Autonomy 2020-21): EC523

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus:

M.Tech Sem II

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly introduced course	Looking at current trends & Applications	100%
2	Newly introduced	Applications	
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dayanand Ambawade	EXTC	Ambawade,
2	Dr. Sujata Kulkarni	EXTC	SJ
3			
4			

Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(PE)	Explainable AI (XAI)	2	0	2	4	8	2	0	1	3
Examination Scheme										
		Component	ISE		MSE		ESE		Total	
EC523		Theory	50		50		100		200	
		Laboratory	50		--		50		100	

Pre-requisite Course Codes, if any.

Course Objective:

**Course Outcomes (CO):** At the End of the course students will be able to

EC523.1	Apply basic methods and algorithms from area of explainable artificial intelligence.
EC523.2	Demonstrate ideas behind explainable AI and its usage.
EC523.3	Formulate problems as problems from area of artificial intelligence or improve existing code using learned methods.
EC523.4	Evaluate applications and background algorithms used for their implementation through used cases.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3
EC523.1			
EC523.2			
EC523.3			
EC523.4			

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
EC523.1							
EC523.2							
EC523.3							
EC523.4							

### BLOOM'S Levels Targeted (PL Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create
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### Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Method for interpreting AI systems	1	6
	1.1	Neural Networks via feature visualization, Interpretable Text-Image synthesis, Unsupervised/Discrete Representation Learning		

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Review



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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6	Optimization for MIMO Systems, OFDM Systems
7	Optimization for signal estimation, Wireless channel estimation, Image Reconstruction-Deblurring
8	Optimization for Machine Learning, Principal Component Analysis (PCA), Support Vector Machines
9	Optimization for cooperative Communication, Geometric Program
10	Convex optimization for Big Data Analytics

## Text Books

Sr. No	Title	Authors	Publisher	Year
1	Convex Optimization	Stephen Boyd, Lieven Vandenberghe	Cambridge University Press	2009
2*	Optimization for Machine Learning	SuvritSra, Sebastian Nowozin, Stephen Wright	MIT Press, Cambridge, Massachusetts	2012
3*	Convex Optimization for Signal Processing and Communications: From Fundamentals to Applications	Chong-Yung Chi, Wei-Chiang Li, Chia-Hsiang Lin	CRC Press	2017



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## Theory Component

Module No.	Unit No.	Topics	Ref.	Hrs
1		<b>Basic Calculus and Mathematical Optimization</b>	1,2	04
		Introduction to properties of Vectors, Norms, Positive Semi-Definite matrices, Gaussian Random Vectors		
		Introduction to Convex Optimization – Convex sets, Hyperplanes/Half-spaces etc. Application: Power constraints in Wireless Systems		
2		<b>Optimization Functions and Application in Wireless Systems</b>	1,2	05
	2.1	Convex/ Concave Functions, Examples, Conditions for Convexity. Application: Beamforming in Wireless Systems, Multi-User Wireless, Cognitive Radio Systems		
	2.2	Convex Optimization problems, Linear Program, Application: Power allocation in Multi-cell cooperative OFDM		
3		<b>Matrix Optimization for MIMO &amp; Wireless Systems</b>	1, 3	07
	3.1	QCQP, SOCP Problems, Application: Channel shortening for Wireless Equalization, Robust Beamforming in Wireless Systems		
	3.2	Duality Principle and KKT Framework for Optimization, Application: Water-filling power allocation, Optimization for MIMO Systems, OFDM Systems and MIMO-OFDM systems		
	3.3	Optimization for signal estimation, LS, WLS, Regularization, Application: Wireless channel estimation, Image Reconstruction-Deblurring		
4		<b>Applied Optimization for Machine Learning</b>	1,2	06
	4.1	Application: Convex optimization for Machine Learning, Principal Component Analysis (PCA), Support Vector Machines		
	4.2	Application: Cooperative Communication, Optimal Power Allocation for cooperative Communication, Geometric Program		
5		<b>Applied Optimization for Wireless &amp; Big Data,</b>	1,2,3	06
	5.1	Application: Radar for target detection, Array Processing, MUSIC, MIMO-Radar Schemes for Enhanced Target Detection		
	5.2	Application: Convex optimization for Big Data Analytics, Recommender systems, User Rating Prediction, Optimization for Finance		
				Total 28

Sr. No	Title of the Experiment
	(To be conducted in R / Python / Scilab / Matlab or any other suitable tool.)
1	Examples on Calculus, Matrices, Probability
2	Examples on Optimization functions
3	QCQP, SOCP Problems
4	Power constraints in Wireless Systems
5	Power allocation in Multi-cell cooperative OFDM

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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058

Autonomous Institute Affiliated to Mumbai university

Department of Electronics and Telecommunication Engineering

Postgraduate Program

2017-18

Name of the Course	Course Code	Year of introduction (during the last five years)	percentage
Statistical Signal Processing	ET921	2017-2018	100
Antenna Design	ET923		100
Network Architecture and Design	ETE91A		100
Computer Vision	ETE91B		100
Machine Learning and Artificial Intelligence	ETE91C		100
Internet of Things	ETE92B		100



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 20 - 20

### Theory Course Revision Report

Course Name: Statistical Signal Processing

Course Code Old (2020-21):

Course Code New (Autonomy 20 - ): ET921

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: M.Tech Sem I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced course	As per application	50% change with respect earlier course.
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Dayanand Ambawade	EXTC	DA
2	Dr. Shikanya Kulkarni	EXTC	SK
3	Dr. Amol. Deshpande	EXTC	AD
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
ET921	Statistical Signal Processing	4	-	-	4	-	--	4	
		Examination Scheme							
		Theory Marks							
		ISE		MSE		ESE			
		10		30		100 (60% Weightage)			

Pre-requisite Course Codes :-		
Course Outcomes	CO1	Generalize the properties of statistical models in the analysis of signals using Stochastic processes
	CO2	Outline various estimation methods to accomplish the signal modeling
	CO3	Principle of various estimators and choose right one for an application
	CO4	Design and development of filters using classical and adaptive algorithms.
	CO5	Differentiate the importance of various spectral estimation techniques

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Review of random variables: Distribution and density functions, moments, independent, uncorrelated and orthogonal random variables; Vector-space representation of Random variables, Schwarz Inequality Orthogonalit principle in estimation, Central Limit theorem, Random processes, wide-sense stationary processes, autocorrelation and autocovariance functions, Spectral representation of random signals, Wiener Khinchin theorem Properties of power spectral density, Gaussian Process and White noise process, Linear System with random input, Spectral factorization theorem and its importance, innovation process and whitening filter, Random signal modelling: MA(q), AR(p) , ARMA(p,q) models.		8
2		Classical Detection and Estimation Theory: Introduction, simple binary hypothesis tests, M Hypotheses, estimation theory, composite hypotheses, general Gaussian problem, performance bounds and approximations.		10
3		Detection of Signals – Estimation of Signal Parameters: Introduction, detection and estimation in white Gaussian noise, detection and estimation in nonwhite Gaussian noise, signals with unwanted parameters, multiple channels and multiple parameter estimation		10
4		Estimation of Continuous Waveforms: Introduction, derivation of estimator equations, a lower bound on the mean-square		10



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	<b>estimation error, multidimensional waveform estimation, nonrandom waveform estimation.</b>		
5	<b>Linear Estimation:</b> MA, AR, ARMA processes and their properties, MMSE linear estimate, Weiner Filter, Kalman Filter, Lattice filter structure, Levinson Durbin and innovation algorithms.		10
6	<b>Spectral analysis:</b> Estimated autocorrelation function, periodogram, Averaging the periodogram (Bartlett Method), Welch modification, Blackman and Tukey method of smoothing periodogram, Parametric method, AR spectral estimation and detection of Harmonic signals, MUSIC algorithm		10
<b>Total</b>			<b>48</b>

### References:

- [1] H. L. Van Trees. (1968). Detection, Estimation, and Modulation Theory, vol. I, John Wiley & Sons.
- [2] Steven Kay. (1993). Fundamentals of Statistical Signal Processing Volume II: Detection Theory. Prentice Hall.
- [3] M. Hays: Statistical Digital Signal Processing and Modelling, John Wiley and Sons, 1996.
- [4] S. M. Kay: Modern Spectral Estimation, Prentice Hall, 1987.
- [5] Steven Kay. (1993). Fundamentals of Statistical Signal Processing Volume I: Estimation Theory. Prentice Hall.
- [6] M.D. Srinath, P.K. Rajasekaran and R. Viswanathan, "Introduction to Statistical Signal Processing with Applications," Pearson Education (Asia) Pte. Ltd. /Prentice Hall of India, 2003.



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2017-2018

### Theory Course Revision Report

Course Name: Antenna Design

Course Code Old (2020-21) :-

Course Code New (Autonomy 2017-18) ET923

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: MTech Sem 2

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly introduced module	W.S.T Industry Syllabus modified	$\frac{30}{48} \times 100$
2	Module 3	Recent trends	62.5%
3	Module 4	Recent trends	
4	Module 5, 6.	Recent trends	

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

1. IIT Bombay
- 2.
- 3.
- 4.



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Signature



## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dr. Reena Soniklare	EXTC	RS
2	Dr. Sukanya Kulkarni	EXTC	SK
3	Prof Pallavi Malame	EXTC	PM
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\* Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
		4			4			4	
ET923	Antenna Design	Examination Scheme							
		Theory Marks							
		ISE		MSE		ESE			
		10		30		60			

Pre-requisite Course Codes	Electromagnetic Wave Propagation
Course Outcomes	The student will be able to:
	CO1 understand the fundamental principles of antenna Theory
	CO2 apply antenna theory to analyze the performance of various antenna arrays.
	CO3 design planar antennas
	CO4 evaluate and select antenna on the basis applications.

Module No.	Unit No.	Topics	Ref	Hrs.
1		Fundamentals of Antenna	1	09
	1.1	Antenna Parameters: Radiation pattern, Radiation power density, Radiation Intensity, Gain, Directivity, HPBW, FNBW, Beam efficiency, Bandwidth, Polarization, Input Impedance, Antenna Efficiency, Effective Aperture.		
	1.2	Types of Antenna: Dipole, Monopole, Loop and Slot Antennas, Helical Antennas & Horn antennas		
			1	09
2		Linear and Planar Arrays	1	09
	2.1	N element linear arrays - uniform amplitude and spacing - Directivity of Broadside and End fire arrays. Three dimensional characteristics - Pattern multiplication- Binomial arrays and Dolph-Tchebycheff arrays. Circular array. Mutual coupling in arrays, multidimensional arrays-phased arrays and array feeding techniques.		
3		Microstrip Antennas	1,2	09
	3.1	Introduction: Rectangular Patch, Circular Patch, Quality Factor, Bandwidth, and Efficiency, Input impedance, Coupling, Circular Polarization, Arrays and Feed Networks, Corporate and Series Feeds, Reflect array.		
4		Broadband microstrip antennas	2	07



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	4.1	Introduction, Mechanism of Parasitic Coupling for Broad BW, Gap-Coupled RMSAs, Radiating-Edge Gap-Coupled RMSAs, Nonradiating-Edge Gap-Coupled RMSAs, Gap and Hybrid-Coupled MSA, Multilayer Broadband MSA, Electromagnetically Coupled MSAs, stack multi resonator MSA , Design Examples.		
5		<b>Compact microstrip antennas</b>	2	07
	5.1	Introduction, Compact Shorted RMSAs, Partially Shorted RMSAs, Effect of Dimensions of RMSAs with a Single Shorting Post, Effect of the Position of the Single Shorting Post, Compact Shorted CMSA and Its Variations.		
6		<b>Planar monopole antennas</b>	2	07
		Introduction, Planar Rectangular and Square Monopole Antennas, RMSA Suspended in Air with Orthogonal Ground Plane, Calculation of the Lower Frequency of the Planar Monopole Antennas, Effect of Various Parameters of Planar Rectangular Monopole Antennas, Radiation Pattern of RM Antennas, Various Planar RMs with Equal Areas, Planar Circular Monopole Antennas.		
				Total 48

## References:

- [1] Antenna Theory- C. A. Balanis- Wiley and sons
- [2] Broadband Microstrip antennas – Girish Kumar and K.P. Ray, Artech House
- [3] Antennas – John. D. Krauss- TMH ed.
- [4] R. James and P.S. Hall, Handbook of Microstrip Antennas , Peter Peregrinus, 1989
- [5] W.L. Stutzman and G.A. Thiele, Antenna Theory and Design, John Wiley, 2012
- [6] R.C. Johnson, Antenna Engineering Handbook, McGraw Hill,1993



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# Sardar Patel Institute of Technology

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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2017-2018

### Theory Course Revision Report

Course Name: *Network Architecture and Design*

Course Code Old (2020-21):

Course Code New (Autonomy 2017): *ETE91A*

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: *M Tech Sem-I*

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	<i>Newly introduced course.</i>	<i>As per New trends in industry.</i>	<i>100%.</i>
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
- 3.
- 4.



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**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Dr. Anand D. Mane	ExTC	
2	Dayanand Ambawade	EXIC	
3			
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ETE91A	Network Architecture and Design	4	--	--	4	--	--	4
		Examination Scheme						
		Theory Marks						
		ISE	MSE		ESE			
		10	30		100 (60% Weightage)			

Pre-requisite Course Codes		Students will be
Course Outcomes	CO1	To understand emerging technologies and design advanced data and computer communications networks.
	CO2	To distinguish between various network topologies in detail.
	CO3	To analyze the networks and carry out requirement analysis
	CO4	To design the LAN and WLAN and WAN
	CO5	To choose correct technology.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Internet Protocol (Configuration of DMZ Servers): Detail Working of DNS, HTTP, FTP and SMTP/POP - Configuration of DNS, Web, FTP, Mail Server. Internet Protocol – Understanding working of TCP, UDP, IP, ARP/RARP, ICMP.		4
2		Introduction to Network analysis, Architecture and Design Process Model for Network analysis, Architecture, and Design <b>Requirement Analysis:</b> User Requirement, Device Requirement, Network Requirement, Performance Requirement, Financial Requirement, Enterprise Requirement		8
3		<b>Network Architecture:</b> Component Architecture – Routing, Network Management, Performance, Security. Architectural models: topological, And Routing flow model, Functional model Addressing Architecture, Network Management Architecture, Performance Architecture, Border-less Network Architecture		6
4		<b>Network Design:</b> Designing the network topology and solutions- Top down Approach Network Structure Model: Hierarchical Network Model, Enterprise wide network Architecture model- Enterprise Edge Area, E-commerce, Internet Connectivity, remote, enterprise branch and enterprise Data Center module High Availability Network Services- Workstation to Router redundancy and LAN High Availability protocols, Route, Server		12
5		Enterprise LAN and WAN Design: Ethernet Design Rule, 100Base-T, Fast Ethernet Design rules, gigabit		12



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	Ethernet Design Rules, 10 Gigabit Ethernet Design rules, 10GE Media types Understanding Working of Repeater, hub, Bridge, routers, Layer2/3 Switch Campus LAN Design Best Practice Server Farm Design, data centre Design Campus LAN QoS consideration Multicast Traffic Consideration, Wireless LAN Design <b>WAN Technologies:</b> WAN Transport Technologies, WAN Design Methodology, Traditional WAN Technologies, Remote Access Network Design, VPN Network Design, WAN Backup Design <b>Network Management Protocols:</b> SNMP v1,v2,v3, RMON2, Netflow, Syslog		
		Total	42

### References:

- [1] Network Analysis, Architecture, and Design 3rd Edition, Morgan Kaufman, James D.
- [2] Data Network Design, Darren L. Spohn, Tata McGraw Hill Edition.
- [3] Data Communications and Networking by Behrouz A. Forouzan, 4th Edition, Tata McGraw-Hill, 2006.
- [4] Data and Computer Communication by William Stalling, 8th Edition, Pearson Education, 2007.
- [5] Computer Networking: A Top-Down Approach Featuring the Internet" by 6. James F. Kurose, Keith W. Ross, Third Edition, Addison Wesley, 2004.
- [6] Network Management Principles and Practice, Mani Subramanian, Second Edition Pearson Education.



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# Sardar Patel Institute of Technology

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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2017-2018

### Theory Course Revision Report

Course Name: Computer Vision

Course Code Old (2020-21):

Course Code New (Autonomy 2017-18) ETE91B

Class and Semester in Old Syllabus:

Class and Semesters in New Syllabus: MTech Sem - I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly introduced course	Current trends & applications	100 %
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
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Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Dayanand Ambawade	EXTC	
2	Dr. K. T. Talele.	EXTC	
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ETE91B	Computer Vision	4	-	-	4	-	-	4
		Examination Scheme						
		Theory Marks						
		ISE	MSE		ESE			
		10	30		100 (60% Weightage)			

Pre-requisite Course Codes	Image and Video Processing		
Course Outcomes	CO1	To understand machine vision and apply the basic concepts of optics in imaging.	
	CO2	To learn the various hardware components of an imaging system for machine vision applications.	
	CO3	To understand the various image processing and image analysis algorithms and the issues involved in applying them to various machine vision applications.	
	CO4	To expose students to various applications of computer vision and challenges involved in each.	

Module No.	Unit No.	Topics	Ref.	Hrs
1	<b>Introduction to Computer Vision</b>		2	08
	1.1	Human vision – Machine vision and Computer vision – Benefits of machine vision – Block diagram and function of machine vision system implementation of industrial machine vision system – Physics of Light – Interactions of light – Refraction at a spherical surface		
2	<b>Image Formation and Filtering</b>		2	08
	2.1	Geometric primitives and transformations: Geometric primitives, 2D transformations, 3D transformations, 3D rotations, 3D to 2D projections, Lens distortions.		
	2.2	Photometric image formation: Lighting, Reflectance and shading, Optics.		
	2.3	The digital Camera: Sampling and aliasing, Color, Compression.		
	2.4	Linear Filtering, Neighborhood operators, Wiener filtering, Wavelets, Geometric transformations.		
3	<b>Feature Detection and Matching</b>		2	05
	3.1	Points and patches: Feature detectors, Feature descriptors, Feature matching, Feature tracking.		
	3.2	Edges: Edge detection, Edge linking.		
	3.3	Lines: Successive approximation, Hough transforms, Vanishing		





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	points.		
4	<b>Cameras, Multiple Views and Motion</b>	2,3,4	08
4.1	2D and 3D Feature based alignment; 2D alignment using least squares, Application-Panography, Iterative algorithms, Robust least squares and RANSAC, 3D alignment.		
4.2	Structure from motion: Triangulation, two-frame structure from motion, factorization, Bundle adjustment.		
4.3	Dense motion estimation: Translational alignment, Parametric motion		
5	<b>Machine Learning Crash Course</b>	15	08
	Supervised Learning Algorithms; Unsupervised Learning Algorithms; Building a Machine Learning Algorithm, Challenges Motivating Deep Learning.		
6	<b>Recognition</b>	2	06
6.1	Recognition Overview and Bag of Features, Large-scale, Instance Recognition, Time Warp Design Challenge, Large-scale Category Recognition and Advanced Feature Encoding, Detection with Sliding Windows, Pascal VOC and Big DataSocial Good and Dataset Bias, Feature Limitations and Attributes.		
7	<b>Introduction to Deep Learning</b>	15	05
	Neural Networks, Convolutional Networks for Recognition Neural Network Regularization, R-CNNs and FCNs, Exploring Architectures through at least 3 research papers.		
		Total	48

## Assignments/Projects:

Applications of Computer/Machine Vision will be covered through assignments or mini projects. The applications could be (but not limited to) following:

- Image filtering and Hybrid images, Local Feature Machine, Camera calibration and Fundamental Matrix Estimation with RANSAC, Scene Recognition with Bag of words, Face detection with sliding window, Convolutional neural nets.
- Machine Vision applications in manufacturing, electronics, printing, pharmaceutical, textile, applications in non-visible spectrum, metrology and gauging, OCR and OCV, vision guided robotics – Field and Service Applications – Agricultural, and Bio medical field, augmented reality, surveillance, bio-metrics.

## References:

- [1] E. R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press, 2012.





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- [2] R. Szeliski, "Computer Vision: Algorithms and Applications", Springer 2011.
- [3] Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012.
- [4] Mark Nixon and Alberto S. Aguado, "Feature Extraction & Image Processing for Computer Vision", Third Edition, Academic Press, 2012.
- [5] D. L. Baggio et al., "Mastering OpenCV with Practical Computer Vision Projects", Packt Publishing, 2012.
- [6] Jan Erik Solem, "Programming Computer Vision with Python: Tools and algorithms for analyzing images", O'Reilly Media, 2012.
- [7] Mitchell, Tom. Machine Learning. New York, NY: McGraw-Hill, 1997. ISBN:9780070428072.
- [8] Haykin, Simon S. Neural Networks and Learning Machines, 3rd edition Pearson 2008.
- [9] Sonka, Milan. Hlavac Vaclav. Boyle Roger. Image Processing, Analysis and Machine Vision, New Delhi: Thomson Learning, 2001. ISBN: 9812400613.
- [10] Rajasckaran S, Vijaylakshmi Pai G.A. Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Application. New Delhi, Prentice Hall of India.
- [11] Valluru, Sudarshan K. Rao Nageswara T., Introduction to Neural Networks, Fuzzy Logic & Genetic algorithms, Jaico Publishing House 2010.
- [12] Bishop, Christopher. Pattern recognition and machine learning, Springer Verlag, 2006.
- [13] Shinghal Rajan, Pattern Recognition Techniques and Applications. New Delhi Oxford University Press, 2011. ISBN 9780195676853.
- [14] Richards John, Jia Xiuping, Remote Sensing Digital Image Analysis, Springer 2006. ISBN : 9783540251286
- [15] Goodfellow, Bengio, and Courville, Deep Learning, An MIT Press book



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 2017- 2018

### Theory Course Revision Report

Course Name: Machine learning and Artificial Intelligence

Course Code Old (2020-21):

Course Code New (Autonomy 2017) EE91C

Class and Semester in Old Syllabus: -

Class and Semesters in New Syllabus: MTech Sem-I

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (X)
1	Newly Introduced,	New Technology .	10%
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
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## Sardar Patel Institute of Technology

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### Details of Committee members Name & Signature:

Sr. No.	Name of committee members	Department	Signature
1	Prof. Anand D. Mane	ExTC	
2	Dr. Anand Sujata Kulkarni	ExTC	
3			
4			

### Details of Experts Name & Signature (if any):

Sr. No.	Name of Experts	Department	Signature
1			
2			
3			
4			

\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100





## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ETE91C	Machine Learning and Artificial Intelligence	3	--	--	3	--	--	3
		Examination Scheme						
		Theory Marks						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	
Course Outcomes	CO1 To describe the basic concepts and techniques of Machine Learning.
	CO2 To apply knowledge representation, reasoning, and machine learning techniques to real-world problems
	CO3 To use recent machine learning software for solving practical problems.
	CO4 To know various AI algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)

Module No.	Unit No.	Topics	Ref.	Hrs.
1		INTRODUCTION: Definition of learning systems. Goals and applications of machine learning. designing a learning system: training data, concept representation, function approximation. well posed learning problems, perspective & issues in machine learning		06
2		CONCEPT LEARNING: The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypothesis. FIND-S, candidate elimination algorithm		04
3		DECISION TREE LEARNING: Introduction, Decision tree representation, appropriate problems, for decision tree learning, basic decision tree algorithm, hyper space, search in decision tree learning, issues in decision tree learning . BAYESIAN LEARNING: Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logistic regression. Bayes nets and Markov nets for representing dependencies. INSTANCE BASED LEARNING: Introduction, K-nearest neighbour learning, case based learning, radial basis functions		12
4		CLUSTERING & UNSUPERVISED LEARNING: Learning from unclassified data. Clustering. Hierarchical Agglomerative Clustering, k-means partitional clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabelled data.		06



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5	ARTIFICIAL NEURAL NETWORK: Introduction, neural network representation, problems for neural network learning, perceptrons, multilayer network & Back propagation Algorithm GENETIC ALGORITHMS: Introduction, genetic operators, genetic programming, models of evolution & learning, parallelizing genetic algorithm	12
		Total 40

### References:

- [1] Tom M. Mitchell. "Machine Learning" McGraw-Hill, 1997.
- [2] P. Langley. "Elements of Machine Learning" Morgan Kaufmann Publishers, Inc. 1996.
- [3] Ethem Alpaydin "Introduction to machine learning" 2nd ed. The MIT Press, 2010
- [4] S. Sivanandam, "Principles of Soft Computing" First Edition Wiley Publications.
- [5] Andreas C. Muller and Sarah Guido. "Introduction to Machine Learning with Python" O'reilly Publication.
- [6] Luger George F, Artificial Intelligence : Structures and Strategies for Complex Problem Solving, 6 th Edition, Addison-Wesley,2009.
- [7] Stuard Russell and Peter Norvig, "Artificial Intelligence. A Modern Approach", 3rd edition, Prentice Hall, Inc., 2010



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Academic Year: 20 - 20

### Theory Course Revision Report

Course Name: Internet of Things

Course Code Old (2020-21): —

Course Code New (Autonomy 20 - ): ETE 92 X

Class and Semester in Old Syllabus: —

Class and Semesters in New Syllabus: B Tech -

Change/Addition in the Syllabus:

Sr. No.	Topics Changed/Newly Introduced	Reason	Overall Percentage Change in syllabus (%)
1	Newly Introduced course	To keep pace with recent trends in industry.	New Syllabus (100%)
2			
3			
4			

Referred syllabus links (URL): (IIT/NIT/Foreign Universities/ other Universities)

- 1.
- 2.
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**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

**Details of Committee members Name & Signature:**

Sr. No.	Name of committee members	Department	Signature
1	Dr. Y. S. Rao	EXTC	<i>Y.S.Rao</i>
2	Prof. M.M. Parmon	EXTC	<i>MM Parmon</i>
3			
4			

**Details of Experts Name & Signature (if any):**

Sr. No.	Name of Experts	Department	Signature
1			
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\*\*Percentage Change in Syllabus (X) = (No. of hours for newly added topics / Total No. of hours for entire course) x 100



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ETE92X	Internet of Things(IOT)	3	-	-	3	-	-	3
<b>Examination Scheme</b>								
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

## Pre-requisite Course Codes

At the end of successful completion of the course, students will be able to

Course Outcomes	CO1	Define Internet of Things and its components.
	CO2	Perform IoT Systems management.
	CO3	Design IoT systems through Python, Physical Servers and Cloud Solution.
	CO4	Analyze the system through Data Analytics tools.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Introduction to IoT – Definition, Characteristics, Physical and Logical Designs, IoT Protocols, IoT Communications Models and API, IoT Enabling Technologies, IoT Levels and Deployment Templates, IoT Examples, M2M	1	3
	1.2	RFID Technology – Working of RFID, Components of an RFID system, RFID Transponder (tag) classes, Standards, System architecture, Localization and Handover Management, Technology considerations, Performance Evaluation, Applications	2	4
	1.3	Wireless Sensor Networks – History, Sensor Nodes, Connecting Nodes, Networking Nodes, Securing Communication	2	2
2	2.1	IoT System Management – SNMP, Network Operator Requirements,	1	3
	2.2	IoT System Management – NETCONF, YANG	1	2
	2.3	IoT Platform Design Specification – Requirements, Process, Domain Model, Service, IoT Level, Function, Operational view, Device and Component Integration, Application Development	1	3
3	3.1	IoT Systems Logical Design – Python Data Types, Type conversion, Control Flow	1	3
	3.2	IoT Systems Logical Design – Python Functions, Modules, File Handling, Classes, Python Packages for IoT.	1	2
	3.3	IoT Physical Servers – Cloud Storage Models, Communication APIs, WAMP, Xively Cloud, Django	1	3
4	4.1	IoT Cloud Services - RESTful Web API, Amazon Web Services for IoT	1	2
	4.2	IoT Data Analytics – Apache Hadoop, Batch Data Analysis,	1	3



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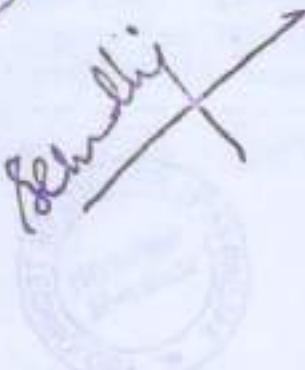
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	Hadoop YARN		
4.3	<b>IoT Data Analytics</b> – Apache Oozie, Apache Spark, Apache Storm, Chef, Chef Case Studies, Puppet, NETCONF-YANG	1	3
5	<b>Arduino Programming Building Blocks</b> – Basics, Internet Connectivity, Communication Protocols.	3	4
	<b>IoT Patterns:</b> Real-time Clients, Remote control, On-demand Clients, Web Apps.	3	3
	<b>IoT Patterns:</b> Machine to Human, Machine to Machine, Platforms	3	2
Total			42

**In-Semester Examination (ISE):** The assessment includes the submission of a term paper by each student on the contemporary work related to Internet of Things.

## References:

- [1] Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach", University Press, FIRST Edition, 2015.
- [2] Hakima Chaouchi, "The Internet of Things: Connecting Objects", Wiley-ISTE, FIRST Edition, 2010.
- [3] Adeel Javed, "Building Arduino Projects for the Internet of Things: Experiments with Real-World Applications", Apress, FIRST Edition, 2016.





## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058  
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MCA Department

### Syllabus Revision Program

Name of the course	Course Code	Year of Introduction (During Last 5 years)	Percentage	Remark
MCA44	User Experience Design	2018-19	100	Newly Added
MCA52	Data Analytics	2018-19	100	Newly Added
MCA53	Internet of Things	2018-19	100	Newly Added
MCA54B	Machine Learning	2018-19	100	Newly Added
MCA54C	Customer Relationship Management	2018-19	100	Newly Added
MCA54D	Digital Marketing	2018-19	100	Newly Added
MCA54E	Web Services	2018-19	100	Newly Added
MCAL51	Distributed Computing and Cloud Computing Lab	2018-19	100	Newly Added
MCAL52	Data Analytic Lab	2018-19	100	Newly Added
MCAL53	Animation and Graphic Design Lab	2018-19	100	Newly Added
MCAL32	Database Management System lab	2019-20	50	
MCA41	Computational Intelligence -I	2019-20	100	Newly Added
MCA45A	Information Security	2019-20	100	Newly Added
MCA45B	Natural Language Processing	2019-20	100	Newly Added
MCAL41	Computational Intelligence -I Lab	2019-20	100	Newly Added
MCAL46	Mobile programming Lab	2019-20	100	Newly Added
MA501	Linear Algebra	2020-21	100	Newly Added
MC508	Process Automation	2020-21	100	Newly Added
AS502	Communication & Presentation Skills	2020-21	60	
MCAL42	Software Testing and Quality Assurance	2020-21	50	
MCA54B	Deep Learning	2020-21	100	Newly Added
MC518	Cloud Computing	2021-22	100	Newly Added
MC521	Block Chain Technology	2021-22	100	Newly Added
MC523	Computer Graphics	2021-22	100	Newly Added
MC518	Cloud Computing	2022-23	50	

H.O.D  
MCA Department





## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058  
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### MCA Department Theory Course Revision Report

2022-23

Name of the course	Course Code	Reason	Percentage	Remark	Faculty sign
MC518	Cloud Computing	To give handson session using AWS	50	Lab syllabus modified	

H.O.D  
MCA Department





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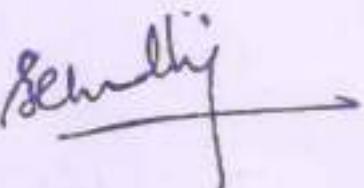
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### MCA Department Syllabus Revision Report

2022-23

Course Code	Name of the course	Year of Introduction (During Last five years)	Percentage
Cloud Computing	MC518	2022 23	100

  
H.O.D  
MCA Department







## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)						Credits Assigned			
		L	T	P	O	E	L	T	P	Total	
PE		3	-	2	4	9	3	-	1	4	
<b>Examination Scheme</b>											
MC518	Cloud Computing	Component	ISE		MSE		ESE		Total		
		Theory	75		75		150		300		
		Laboratory	50		--		50		100		

### Pre-requisite Course Codes, if any.

Course Objective: To have a comprehensive understanding of Cloud computing.

Course Outcomes (CO): At the End of the course students will be able to

MC518.1	Illustrate fundamentals of Cloud Computing.
MC518.2	Analyze different virtualization techniques and their role in enabling the cloud computing system model.
MC518.3	Categorize various Cloud architecture and Infrastructure.
MC518.4	Analyze security issues and synchronization protocols of cloud.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MC518.1	1	-	3	2	-	-	-	-	-	-	-	-
MC518.2	1	-	2	-	2	-	-	-	-	-	-	-
MC518.3	-	2	1	-	2	-	-	-	-	-	-	-
MC518.4	2	-	1	1	3	-	-	-	-	-	-	-

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PSO1	PSO2
MC518.1	2	-	-	-	2
MC518.2	2	-	-	-	2
MC518.3	2	-	-	-	2
MC518.4	2	-	-	-	2

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze✓	Evaluate	Create
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# Sardar Patel Institute of Technology

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Theory Component			
Module No.	Topics	Ref.	Hrs.
1	<b>Introduction to Cloud Computing</b> Trends in computing - Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Defining a Cloud, Vision of Cloud, Cloud Computing Reference Model, Characteristics and benefits, Challenges of Cloud	1,2, 3	7
2	<b>Virtualization in Cloud</b> Introduction & benefit of Virtualization, Implementation Levels of Virtualization, Types: Full and para virtualization Taxonomy of virtualization techniques - Execution Virtualization, Virtualization and cloud computing, Pros and cons of virtualization	1,2, 3	6
3	<b>Cloud Architecture</b> Cloud Types: Private Cloud, Public cloud, Hybrid cloud, community cloud. Cloud as a service : Infrastructure as a service, Platform as a service, Software as a service, XaaS	1,2	4
4	<b>Cloud Security</b> Identity and access management, security challenges, Storage basics, Storage as a service providers, aspects of data security AAA model, SSO model, Threat Agents - Anonymous Attacker, Malicious Service Agent, Trusted Attacker, Malicious Insider Cloud Security Threats - Traffic Eavesdropping, Malicious Intermediary, Denial of Service, Insufficient Authorization, Virtualization Attack, Overlapping Trust Boundaries, Common Attacks, Cloud-Specific Attacks, Flawed Implementations, Risk Management	2,4	8
5	<b>Cloud Infrastructure Mechanisms</b> Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud Usage Monitor, Resource Replication Ready-Made Environment, Specialized Cloud Mechanisms - Automated Scaling Listener, Load Balancer, SLA Monitor, Pay-Per-Use Monitor Monitor, Pay-Per-Use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, MultiDevice Broker, State Management Database. Types of Data Center – Enterprise Data Centers; managed ServicesData Centers; Colocation; Cloud Data CentersDesign consideration for Private Cloud (Enterprise Data Centers). On Premise vs. Cloud propositions	1,2	10
6	<b>Synchronization in cloud environment</b> Clock synchronization protocols in cloud data centers, Leader Election protocols in cloud, Gossip Protocols and its types	3	7
7	<b>Self-study Topics</b> Economics of Cloud, Challenges in Cloud, Fog Computing, Edge Computing, Mobile Cloud Computing, Business Transformation with Google Cloud Superpowers of Cloud	1,2	
		Total	42



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20

Shubham  
Signature



## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

### Laboratory Component

Sr. No	Title of the Experiment
1	Study and implementation of Infrastructure as a Service.
2	Implementation of identity management.
3	Study and installation of Storage as Service.
4	User Management in Cloud.
5	Study and implementation of Single-Sign-On
6	Study of containerization tool
7	Analyze various Clock synchronization
8	Analyze various mutual exclusion algorithm
9	Analyze various Election Algorithms.
10	Case study :Google/Ms Azure/Amazon

### Textbooks:

- [1] Rajkumar Buyya, Christian Vecchiola, "Mastering Cloud Computing Foundations and Applications Programming", Morgan Kaufmann, 2<sup>nd</sup> Edition, 2013.
- [2] Thomas Erl, Zaigham Mahmood, Ricardo Puttini, "Cloud Computing, Concept, Technology and Architecture", Prentice Hall, 1<sup>st</sup> Edition, 2013.

### Reference Books:

- [3] Rajiv Mishra, Yashwant Singh Patel, "Cloud and Distributed Algorithms and systems", Wiley publications, 1<sup>st</sup> edition 2020.
- [4] Zaigham Mahmood, "Cloud Computing - Challenges, Limitations and R&D Solutions", Springer International Publishing, 1<sup>st</sup> edition, 2014.

old lab syllabus list

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# New lab Experiment list - 50% of the overall syllabus changed

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
OE053 & MC518	Cloud Computing Lab	--	--	2	-	-	2	1
Examination Scheme								
ISE		MSE		ESE		Total		
50		--		50		100		

Expt. No.	Experiment Details	Ref.	Marks	CO Mapping
1	To understand the benefits of cloud infrastructure and setup AWS account.		30	OECS1.1
2	To build EC2 instance using AWS	1		OECS1.2
3	To build and deploy S3 / EBS	1,2		OECS1.2
4	To build RDS services	3,4		OECS1.3
5	To build Cloud Watch in AWS	1,2		OECS1.3
6	To build Cloud Trail in AWS	1,2		OECS1.3
7	To build Simple Notification System	1, 2		OECS1.3
8	To build Lambda Function	1,3		OECS1.3
9	To build static website using S3 Bucket	2		OECS1.3
10	To build dynamic website using Light Sail	2		OECS1.3
11	Build the pipeline of jobs using jenkins, create a pipeline script to deploy an application	2		OECS1.3
12	Deploying a website for High Availability and High Resilience Problem Statement: Design an architecture which can automatically scale up and down based on traffic and is de-coupled for components like Database, webapp etc.	1,2,3,4		OECS1.3
13	Deploying a high-availability WordPress website with the Amazon RDS database to elastic beanstalk	1,2,3,4		OECS1.1 OECS1.3
14	To deploy a website with features such as autoscaling and load balancing	1,2,3,4		OECS1.1 OECS1.3
15	Deploy a multi-tier website on AWS Problem Statement: Deploying a Custom PHP Website to AWS with functionalities for SQL, NoSQL and file storage	1,2,3,4		OECS1.1 OECS1.3
16	Microservices From Development to Production Using Docker & Docker Swarm: Problem statement: Design a Microservices Architecture for a full stack application; containerize various microservices using Docker Compose and Docker Swarm	1,2,3,4		OECS1.1 OECS1.3
17	Demonstrate Infrastructure as a code/Configuration as a code using configuration management tools like Ansible/Puppet/Chef/Salt	1,2,3,4		OECS1.1 OECS1.3 OECS1.3



18	AWS Security File	1,2,3,4		OECS1.1
19	Mini Project	1,2,3,4	20	OECS1.1 OECS1.3 OECS1.3 OECS1.4
Total Marks			40	

**Textbooks:**

- [1] Rajkumar Buyya, Christian Vecchiola, "Mastering Cloud Computing Foundations and Applications Programming", Morgan Kaufmann, 2nd Edition, 2013.
- [2] Thomas Erl, Zaigham Mahmood, Ricardo Puttini, "Cloud Computing, Concept, Technology and Architecture", Prentice Hall, 1st Edition, 2013.

**Reference Books:**

- [3] Rajiv Mishra, Yashwant Singh Patel, "Cloud and Distributed Algorithms and systems", Wiley publications, 1st edition 2020.
- [4] Zaigham Mahmood, "Cloud Computing - Challenges, Limitations and R&D Solutions", Springer International Publishing, 1st edition, 2014.





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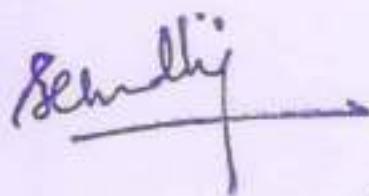
Munshi Nagar Andheri (West), Mumbai-400 058  
Autonomous Institute Affiliated to Mumbai university

### MCA Department Syllabus Revision Report

2021-22

Course Code	Name of the course	Year of Introduction (During Last five years)	Percentage
Cloud Computing	MC518	2021-22	100
Block Chain Technology	MC521	2021-22	100
Computer Graphics	MC523	2021-22	100

H.O.D.  
MCA Department





## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058  
Autonomous Institute Affiliated to Mumbai university

### MCA Department Theory Course Revision Report

2021-22

Name of the course	Course Code	Year of Introduction (During Last five years)	Percent age	Remark	Faculty sign
MC518	Cloud Computing	To introduce the students with basics of cloud computing.	100	Newly Added	
MC521	Block Chain Technology	Student will be learning basics and advanced concepts from block chain and IoT	100	Newly Added	
MC523	Computer Graphics	Students will be skilled for graphical concepts using 2D and 3D image processing techniques	100	Newly Added	

H.O.D  
MCA Department

Reviewer





**Sardar Patel Institute of Technology**  
 Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
PE		3	-	2	4	9	3	-	1	4
Examination Scheme										
MCS18	Cloud Computing	Component	ISE		MSE		ESE		Total	
		Theory	75		75		150		300	
		Laboratory	50		-		50		100	

**Pre-requisite Course Codes, if any.**

**Course Objective:** To have a comprehensive understanding of Cloud computing.

**Course Outcomes (CO):** At the End of the course students will be able to

MC518.1	Illustrate fundamentals of Cloud Computing.
MC518.2	Analyze different virtualization techniques and their role in enabling the cloud computing system model.
MC518.3	Categorize various Cloud architecture and Infrastructure.
MC518.4	Analyze security issues and synchronization protocols of cloud.

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MC518.1	1	-		3	2	-	-	-	-	-	-	-
MC518.2	1	-	2	-	2	-	-	-	-	-	-	-
MC518.3	-	2	1	-	2	-	-	-	-	-	-	-
MC518.4	2	-	1	1	3	-	-	-	-	-	-	-

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PSO1	PSO2
MC518.1	2	-	-	-	2
MC518.2	2	-	-	-	2
MC518.3	2	-	-	-	2
MC518.4	2	-	-	-	2

**BLOOM'S Levels Targeted (Pl. Tick appropriate)**

Remember	Understand	Apply	Analyze✓	Evaluate	Create
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# Sardar Patel Institute of Technology

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## Theory Component

Module No.	Topics	Ref.	Hrs.
1	<b>Introduction to Cloud Computing</b> Trends in computing - Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Defining a Cloud ,Vision of Cloud,Cloud Computing Reference Model, Characteristics and benefits ,Challenges of Cloud	1,2, 3	7
2	<b>Virtualization in Cloud</b> Introduction & benefit of Virtualization, Implementation Levels of Virtualization, Types: Full and para virtualization Taxonomy of virtualization techniques - Execution Virtualization, Virtualization and cloud computing, Pros and cons of virtualization	1,2, 3	6
3	<b>Cloud Architecture</b> Cloud Types: Private Cloud, Public cloud, Hybrid cloud, community cloud. Cloud as a service : Infrastructure as a service, Platform as a service, Software as a service,XaaS	1,2	4
4	<b>Cloud Security</b> Identity and access management, security challenges, Storage basics, Storage as a service providers, aspects of data security AAA model, SSO model, Threat Agents - Anonymous Attacker, Malicious Service Agent, Trusted Attacker, Malicious Insider Cloud Security Threats - Traffic Eavesdropping, Malicious Intermediary, Denial of Service, Insufficient Authorization, Virtualization Attack, Overlapping Trust Boundaries, Common Attacks, Cloud-Specific Attacks, Flawed Implementations, Risk Management	2,4	8
5	<b>Cloud Infrastructure Mechanisms</b> Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud Usage Monitor, Resource Replication Ready-Made Environment. Specialized Cloud Mechanisms - Automated Scaling Listener, Load Balancer, SLA Monitor, Pay-Per-Use Monitor Monitor, Pay-Per-Use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, MultiDevice Broker, State Management Database.Types of Data Center – Enterprise Data Centers; managed ServicesData Centers; Colocation; Cloud Data CentersDesign consideration for Private Cloud (Enterprise Data Centers),On Premise vs. Cloud propositions	1,2	10
6	<b>Synchronization in cloud environment</b> Clock synchronization protocols in cloud data centers, Leader Election protocols in cloud ,Gossip Protocols and its types	3	7
7	<b>Self-study Topics</b> Economics of Cloud ,Challenges in Cloud, Fog Computing, Edge Computing, Mobile Cloud Computing ,Business Transformation with Google Cloud Superpowers of Cloud	1,2	
	Total		42





# Sardar Patel Institute of Technology

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## Laboratory Component

Sr. No	Title of the Experiment
1	Study and implementation of Infrastructure as a Service.
2	Implementation of identity management.
3	Study and installation of Storage as Service.
4	User Management in Cloud.
5	Study and implementation of Single-Sign-On
6	Study of containerization tool
7	Analyze various Clock synchronization
8	Analyze various mutual exclusion algorithm
9	Analyze various Election Algorithms.
10	Case study :Google/Ms Azure/Amazon

## Textbooks:

- [1] RajkumarBuyya, Christian Vecchiola, "Mastering Cloud Computing Foundations and Applications Programming", Morgan Kaufmann, 2<sup>nd</sup> Edition, 2013.
- [2] Thomas Erl, Zaigham Mahmood, Ricardo Puttini, "Cloud Computing, Concept, Technology and Architecture", Prentice Hall, 1<sup>st</sup> Edition, 2013.

## Reference Books:

- [3] Rajiv Mishra, Yashwant Singh Patel, "Cloud and Distributed Algorithms and systems", Wiley publications, 1<sup>st</sup> edition 2020.
- [4] Zaigham Mahmood, "Cloud Computing - Challenges, Limitations and R&D Solutions", Springer International Publishing, 1<sup>st</sup> edition, 2014.





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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned				
		L	T	P	O	E	L	T	P	Total	
PE		3	-	2	4	9	3	-	1	4	
Block Chain Technology											
MC521		Examination Scheme			Component		ISE		MSE	ESE	
					Theory		75		75	150	
					Laboratory		50		-	50	
									100		

Pre-requisite Course Codes, if any.

Course Objective: To give insights to students about blockchain and its various technologies to gain knowledge

Course Outcomes (CO): At the End of the course students will be able to

MC521.1	Explain the basics of Block chain
MC521.2	Analyze various block chain Technology
MC521.3	Demonstrate the working of Bitcoin and Ethereum
MC521.4	Explain the basic of Multichain technology
MC521.5	Explain the use of IoT in block chain

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
MC521.1	3	-	-	-	-	-	-	-	-	-	-	-
MC521.2	-	2	-	1	-	-	-	-	-	-	-	-
MC521.3	-	-	2	-	3	-	1	-	-	-	-	-
MC521.4	2	1	-	-	-	-	-	-	-	-	-	-
MC521.5	3	-	-	-	-	-	-	1	-	-	-	-

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
MC521.1	-	-	-	-	-	-	-
MC521.2	-	-	-	-	-	-	-
MC521.3	-	-	-	-	-	-	-
MC521.4	-	-	-	-	-	-	3
MC521.5	-	-	-	-	-	-	-

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand ✓	Apply	Analyze ✓	Evaluate	Create ✓
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# Sardar Patel Institute of Technology

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Theory Component			
Module No.	Topics	Ref.	Hrs
1	<b>Introduction</b> Blockchain Basic , Four Core building blocks of blockchain, , Life cycle of Blockchain, Blockchain working, Difference between blockchain and databases, Centralized, De-Centralized and Distributed system, Distributed Ledger Technology, Blockchain ecosystem and structure, Features of Blockchain, Advantages of Blockchain.	1,2	7
2	<b>Blockchain Technology</b> Generation and evolution of Blockchain, Blockchain Solutions beyond Finance, Types of Blockchain Technology, Difference between public blockchain and private blockchain, Blockchain characteristics comparison, Blockchain requirement flowchart, Consensus Algorithm: introduction and objectives, Types of Consensus Algorithm: Proof of Work and Proof of Stake, Comparison between POW and POS, Blockchain Wallets introduction	1,2	9
3	<b>Bitcoin and Ethereum</b> History of Cryptocurrency, Cryptography in blockchain, Hash Functions, SHA hash Function, Merkle Tree, Digital Signatures, How does bitcoin transaction works, Bitcoin improvement Proposal (BIP) introduction, Types of BIP, BIP Lifecycle, Introduction to ethereum, Ethereum Technology Stack, Advantages and Drawbacks of ethereum, Smart Contract, ether, solidity.	1,2	10
4	<b>Introduction to Multichain</b> Multichain helping enterprise in blockchain, Multichain development timeline, Bitcoin to private blockchain, Aim of Multichain, The Handshaking Process, Use Cases of Multichain, Multichain permissions, Multichain assets, Multichain streams, Mining in multichain Technology and its flexibility, Security, speed and scalability in Multichain.	1,2	9
5	<b>IoT in Blockchain</b> Introduction to IoT, IoT Schematic Diagram, Challenges in IoT devices, Benefits of using Blockchain with IoT, Use Cases of blockchain IoT connected devices(Automotive industry ,Smart Vehicle monitoring system)	1,2	7
6	<b>Self-Study Topics</b> Use Cases Of Blockchain Technology. <ul style="list-style-type: none"><li>• Blockchain in Supply Chain</li><li>• Blockchain in Manufacturing</li><li>• Blockchain in Automobiles</li></ul>		



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## Sardar Patel Institute of Technology

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	<ul style="list-style-type: none"> <li>Blockchain in Healthcare</li> <li>Blockchain in Cyber security</li> <li>Blockchain in Financial Industry</li> </ul> <p><b>Use Cases of blockchain IoT connected devices:</b></p> <ul style="list-style-type: none"> <li>Agri-food supply chain management</li> <li>Smart Environmental Monitoring</li> <li>Smart Waste Management system</li> <li>Smart Street Lightening</li> </ul>		
		<b>Total</b>	<b>42</b>

### Laboratory Component

Sr. No	Title of the Experiment
1	Demonstrating secret key cryptography techniques
2	Demonstrating public key cryptography techniques
3	Demonstrating Hashing Techniques (SHA and MD5)
4	Demonstrate the working of the Merkle tree.
5	Implementing basic program using solidity
6	Implementing calculator using solidity
7	Implementing and demonstrating smart contract
8	Demonstrating Tokens in ethereum
9	Working with Web3.js in ethereum
10	Case study on bitcoin

### Text Books :

- [1] Tiana Laurence, "Blockchain For Dummies", First Edition, John Wiley & Sons, Inc, 2017.
- [2] Mark Gates, "Blockchain :Ultimate guide to understanding blockchain, bitcoin, cryptocurrencies smart contracts and the future of money", First Edition, Wise Fox Publishing and Mark Gates ,2017.

### Reference Books :

- [3] Joseph J. Bambara Paul R. Allen, "Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions", McGraw-Hill Education, 2018.
- [4] Ritesh Modi, "Solidity Programming", Packt Publishing, 2018.
- [5] Mayukh Mokhopadhyay, "Ethereum Smart Contract Development", Packt Publishing, 2018

### Web References

- [6] <https://ethereum.org/en/>
- [7] <https://web3js.readthedocs.io/en/v1.2.9/>
- [8] <https://studio.ethereum.org/>





## Sardar Patel Institute of Technology

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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
PE	Computer Graphics	3	-	2	4	9	3	-	1	4
Examination Scheme										
MC523		Component		ISE		MSE		ESE		Total
MC523.1		Theory		75		75		150		300
MC523.2		Laboratory		50		-		50		100

Pre-requisite Course Codes, if any. Linear Algebra

Course Objective: To give students knowledge about the basics of graphics, its operations and applications which they can apply in real world problems.

Course Outcomes (CO): At the End of the course students will be able to

- MC523.1 Apply output primitive algorithms on a given scenario
- MC523.2 Apply 2D geometric transformation functions and clipping algorithms.
- MC523.3 Apply basics of 3D concepts and Fractals.
- MC523.4 Apply image processing techniques in a given scenario

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MC523.1	2	1	-	-	2	-	-	-	-	-	-	-
MC523.2	2	2	-	-	3	-	-	-	-	-	-	-
MC523.3	-	3	-	2	-	-	-	-	-	-	-	-
MC523.4	-	-	2	-	3	-	-	-	-	-	-	-

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PSO1	PSO2
MC523.1	-	-	-	-	2
MC523.2	-	-	-	-	2
MC523.3	-	-	-	-	-
MC523.4	-	-	-	-	2

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply ✓	Analyze	Evaluate	Create
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>





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Theory Component		Ref.	Hrs.
Module No.	Topics		
1	<b>Introduction</b> Introduction to Computer Graphics, Elements of Computer Graphics, Graphics display systems.	1,2	2
2	<b>Output primitives &amp; its Algorithms</b> Points and Lines, Line Drawing algorithms: DDA line drawing algorithm, Bresenham's drawing algorithm, Circle and Ellipse generating algorithms :Mid-point Circle algorithm ,Mid-point Ellipse algorithm, Parametric Cubic Curves :Bezier curves Fill area algorithms: Scan line polygon fill algorithm ,Inside-Outside Tests, Boundary fill algorithms, Flood fill algorithms	1,2	10
3	<b>2D Geometric Transformations &amp; Clipping</b> Basic transformations, Matrix representation and Homogeneous Coordinates, Composite transformation, shear & reflection. Transformation between coordinate systems, Window to Viewport coordinate transformation, Clipping operations – Point clipping, Line clipping : Cohen – Sutherland line clipping, Midpoint subdivision, Polygon Clipping: Sutherland – Hodgeman polygon clipping,Weiler – Atherton polygon clipping	1,2	11
4	<b>Basic 3D Concepts &amp; Fractals</b> 3D object representation methods: B-REP Fractals, Sweep representations, CSG, Basic transformations, Reflection, shear, Projections – Parallel and Perspective Halftone and Dithering technique, Self-similarity: Koch Curves/snowflake, Sierpenski Triangle	1,2	8
5	<b>Introduction to Image Processing and image enhancement</b> Fundamental Steps in Digital Image Processing ,Components of an Image Processing System, Some Basic Intensity, Transformation Functions: Image Negatives, Log Transformations, and Power Law Transformations, Piecewise Linear Transformation Functions: Contrast stretching, Gray-level slicing, Bit plane slicing, Introduction to Histogram, Image Histogram and Histogram, Equalization, Image Subtraction, and Image Averaging	3	11
6	<b>Self-Study Topics</b> Color and shading models, Ray tracing		
Total			42





## Sardar Patel Institute of Technology

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### Laboratory Component

Sr. No	Title of the Experiment
1	Implement Line drawing algorithms
2	Implement Mid-point circle algorithm
3	Implement boundary fill algorithm
4	Implement flood fill algorithm
5	Implement transformation, shear and reflection in a given scenario.
6	Implement Sutherland line clipping algorithm
7	Implement Sutherland – Hodgeman polygon clipping algorithm
8	Implement Koch Curves in a given scenario
9	Implement basic intensity transformation function on an image
10	Implement Histogram on an image

#### Text Books:

- [1] Donald Hearn and M Pauline Baker,"*Computer Graphics C Version*", Second edition, Pearson Education,2012.
- [2] David F. Rogers, James Alan Adams,"*Mathematical elements for computer graphics*", Second edition, McGraw-Hill,2011.
- [3] Rafael C. Gonzalez and Richard E. Woods,"*Digital Image Processing*", Third Edition, Pearson Education,2009.

#### Reference Books:

- [4] S. Sridhar, "*Digital image Processing*", Second Edition, Oxford University Press,2011.
- [5] Zhigang Xiang, Roy.A. Plastock, "*Schaum's outline of theory and problems of computer graphics*", Second Edition, McGraw-Hill,2000.



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## Sardar Patel Institute of Technology

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### MCA Department Syllabus Revision Report

2020-21

Course Code	Name of the course	Year of the Introduction (during the last five years)	Percentage
Linear Algebra	MA501	2020 21	100
Process Automation	MC508	2020 21	100
Communication & Presentation Skills	AS502	2020 21	60
Software Testing and Quality Assurance	MCAL42	2020 21	50
Deep Learning	MCA54B	2020 21	100

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## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058  
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### MCA Department Theory Course Revision Report

2020-21

Name of the course	Course Code	Reason	Percentage	Remark	Faculty sign
MA501	Linear Algebra	Student will be enhanced with the skills of solving system of linear equations by Numerical methods. This will help students to learn data structures	100	Newly Added	<i>[Signature]</i>
MC508	Process Automation	To teach how to automate different tasks in the computer system	100	Newly Added	<i>[Signature]</i>
AS502	Communication & Presentation Skills	Students are skilled with persuasive skills in the process of interview. Students are skilled for data transformation as per requirement of the communication pattern	60		<i>[Signature]</i>
MCAL42	Software Testing and Quality Assurance	To learn new software automation and testing tools used in different IT sectors	50		<i>[Signature]</i>
MCA54B	Deep Learning	Students are will be skilled with deep learning approach is its ability to execute feature engineering by itself.	100	Newly Added	<i>[Signature]</i>

H.O.D  
MCA Department



*[Signature]*



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
SBC		1	-	2	2	5	1	-	1	2
<b>Examination Scheme</b>										
AS502	Communication & Presentation Skills	Component	ISE		MSE		ESE		Total	
		Theory	100		-		-		100	
		Laboratory	100		-		-		100	

Pre-requisite Course Codes, if any.

Course Objective:

Course Outcomes (CO): At the End of the course students will be able to

- AS502.1 Demonstrate persuasive skills in interviews
- AS502.2 Demonstrate creative and critical thinking in Group Discussions
- AS502.3 Explain research, analysis and presentation skills
- AS502.4 Apply data transformation skills

CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
AS502.1	-	-	-	-	-	3	2	-	3	-	1	-
AS502.2	-	-	-	-	-	3	2	-	3	-	1	-
AS502.3	-	-	-	-	-	3	2	-	3	-	1	-
AS502.4	-	-	-	-	-	3	2	-	3	-	1	-

CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PSO1	PSO2
AS502.1	-	3	-	-	-
AS502.2	-	3	-	-	-
AS502.3	-	3	-	-	-
AS502.4	-	3	-	-	-

BLOOM'S Levels Targeted (Pl. appropriate)

Remember	Understand	Apply ✓	Analyze	Evaluate	Create



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# Sardar Patel Institute of Technology

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## Theory Component

Module No.	Topics	Ref.	L Hrs.	P Hrs
1	<b>Persuasive Skills in Interviews</b>  Persuasion using facial expressions, gestures, body language Persuasion using voice, verbal style, verbal content, Interview skills	1,2	4	8
2	<b>Creative and Critical Thinking</b>  Different Perspectives to a situation, Group Discussion Skills, Picture based group discussions	1,2	3	6
3	<b>Research, Analysis and Presentation Skills</b>  What is research? Types of research, Citation styles – a glimpse, Basic Literature Review and Presentation	1,2	3	6
4	<b>Data Transformation</b>  Graphics to Paragraphs and vice versa, Oral interpretation of graphics, Research Paper, News Analysis	1,2	2	4

## List of ISEs

Sr. No	Title of the Experiment	Marks
1	Mock Interview	20
2	Group Discussion	20
3	Presentation	20
4	Quiz – Citation Styles	10
5	Data Transformation	20
6	Oral Interpretation of Graphics	10
	<b>Total</b>	<b>100</b>

### Text Books:

- [1] John Hayes, "Interpersonal Skills at Work", McGraw Hill Education, 2002.
- [2] Ankur Malhotra, "Campus Placement: A Comprehensive Guide", McGraw Hill Education, 2016.

### Reference Books:

- [3] Alan Alda, "If I Understood You, Would I Have This Look on My Face? My Adventures in the Art and Science of Relating and Communicating", Random House, 2017.
- [4] Harry Chambers, "Effective Communication Skills for Scientific and Technical Professionals", Paperback Basic Books, 2000.
- [5] William Issac, "The Art of Writing Together", Crown Business, 2008.
- [6] Meenakshi Raman, Sangeeta Sharma, "Communication Skills", Oxford, India, 2011.



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
		2	1	-	5	8	2	1	-	3
<b>Examination Scheme</b>										
BSC  MA501	Linear Algebra	Component			ISE		MSE		ESE	Total
		Theory			75		75		150	300
		Laboratory			-		-		-	-

**Pre-requisite Course Codes, if any.**

**Course Objective:** To develop mathematical skills for solving computer science problems.

**Course Outcomes (CO):** At the End of the course students will be able to:

- MA501.1 Solve a homogeneous and non-homogeneous system of linear equations using rank of a matrix.
- MA501.2 Solve system of linear equations by Numerical Methods.
- MA501.3 Solve equations in real life problems and to encode and decode messages using the
- MA501.4 Identify whether given structures are vector spaces and subspaces and construct a basis for them.
- MA501.5 Show if a given matrix is diagonalizable or not.
- MA501.6 Apply concepts of eigenvalues and eigenvectors to calculate functions of a square

**CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
MA501.1	2	2	-	-	-	-	-	-	-	-	-	-
MA501.2	2	2	-	-	-	-	-	-	-	-	-	-
MA501.3	2	2	-	-	-	-	-	-	-	-	-	-
MA501.4	2	2	-	-	-	-	-	-	-	-	-	-
MA501.5	2	2	-	-	-	-	-	-	-	-	-	-
MA501.6	2	2	2	-	-	-	-	-	-	-	-	-

**CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)**

	PEO1	PEO2	PEO3	PSO1	PSO2
MA501.1	-	-	1	1	-
MA501.2	-	-	1	1	-
MA501.3	-	-	1	1	-
MA501.4	-	-	1	1	-
MA501.5	-	-	1	1	-
MA501.6	-	-	1	1	-

**BLOOM'S Levels Targeted (PL Tick appropriate)**

Remember	Understand ✓	Apply	Analyze	Evaluate	Create
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*[Handwritten signatures/initials over the correlation matrix table]*



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## Theory Component

Module No.	Topics	Ref	Hrs.
1	<b>Basics of matrices</b> Revision of basic matrices and types of matrices, Row echelon form, Reduced Row Echelon form, Rank of a matrix.	3,5	03
2	<b>Linear equations &amp; Its solutions</b> Consistency and solution of simultaneous linear homogeneous and non-homogeneous equations, Application of solving systems of equations in traffic control. Solution of system of linear algebraic equations, by (1) Gauss Elimination Method (2) Gauss Jordan method (3) Gauss Jacobi Iteration method (4) Gauss Seidel Method. (5) LU Decomposition -Crout's method	1,2,3, 5	07
3	<b>Vector spaces (over field of real numbers)</b> Vector space, subspace, span, linear dependence and independence of vectors, basis, dimension, orthogonal projection & gram-schmidt process.  Null space, row space, column space, Rank-Nullity theorem (only statement). Least square method.	1,2,5	08
4	<b>Encoding &amp; decoding using Matrices.</b> Application of matrices to Coding and Decoding	4	02
5	<b>Eigenvalues and Eigenvectors</b> Eigenvalues, Eigenvectors and its properties. Cayley Hamilton theorem and its applications. Diagonalisation of matrices.  Derogatory and Non-derogatory matrices. Application to find google page rank. Functions of a square matrix. Solving system of differential equations using diagonalisation.	1,2,3, 5	08
	<b>Self-Study Topics</b>	1,2,3,	



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	Normal form, Forming equations using KVL for circuits and solving them using matrices, Singular Value Decomposition, Additional properties with proofs of eigenvalues and eigenvectors, Spectral theorem for Hermitian matrices, Quadratic forms, Classification of quadrics.		
		Total	28

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## Sardar Patel Institute of Technology

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### Tutorial Component

Sr. No	Title of the Tutorial
1	Problems on vectors and matrix operation
2	Problems on rank of a matrix.
3	Solution to any linear system
4	Solution of linear equations using row-echelon and inverse of a matrix.
5	Solutions of linear equations using Gauss Elimination method.
6	Solutions of linear equations using Gauss Jordan method.
7	Solutions of linear equations using Gauss-Jacobi method.
8	Solutions of linear equations using Gauss-Seidel method.
9	Solutions of linear equations using Crout's method.
10	To find Eigenvalues and Eigenvectors

### Text books :

- [1] Gilbert Strang , "Linear Algebra and its applications", Cengage publications, 4<sup>th</sup> Edition, 2014
- [2] Dr.B.S.Grewal, "Higher Engineering Mathematics", Khanna Publications, 44<sup>th</sup> Edition, 2020

### Reference Books:

- [3] David.C.Lay, "Linear Algebra and its applications", Pearson Education ,3<sup>rd</sup> Edition, 2006
- [4] H.Anton and Crottes, "Elementary Linear Algebra Application Version", John and Wiley Sons, 6<sup>th</sup> Edition, 2010
- [5] H.K.Das, "Advanced Engineering Mathematics", S.Chand, 28<sup>th</sup> Edition, 2014
- [6] Erwin Kreyszig, "Advanced Engineering Mathematics", 10<sup>th</sup> Edition, 2011



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Course (Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned				
		L	T	P	O	E	L	T	P	Total	
PC	Process Automation	2	-	2	4	8	2	-	1	3	
		Examination Scheme									
		Component	ISE		MSE		ESE		Total		
MC508		Theory	50		50		100		200		
		Laboratory	50				50		100		

Pre-requisite Course Codes, if any.

Course Objective: To give students exposure about process automation, its working, importance and security related to it.

Course Outcomes (CO): At the End of the course students will be able to

- MC508.1 Explain the basics of Process Automation
- MC508.2 Analyze the methodologies and techniques used in Process Automation
- MC508.3 Develop the BOTs using Process Automation
- MC508.4 Explain different intelligent Process Automation techniques
- MC508.5 Analyze the securities required for Process Automation

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MC508.1	3	-	-	-	-	-	-	-	-	-	-	-
MC508.2	-	2	-	2	-	-	-	-	-	-	-	-
MC508.3	-	-	3	-	3	-	2	-	-	1	-	-
MC508.4	2	2	-	-	-	-	-	-	-	-	-	-
MC508.5	-	3	-	1	-	-	-	-	-	-	-	-

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PSO1	PSO2
MC508.1	-	-	-	-	-
MC508.2	-	-	-	-	-
MC508.3	-	-	2	-	2
MC508.4	-	-	-	-	-
MC508.5	-	-	-	-	-

BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate	Create ✓
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## Theory Component

Module No.	Topics	Ref.	Hrs.
1	<b>Robotics Process Automation : Foundations and Skills</b> Introduction to RPA, Different types of RPA Approaches, History of RPA, Benefits and Limitations of RPA, Terms and concepts used in RPA, Levels of RPA.	1, 2	5
2	<b>RPA Methodologies, Planning and Vendor Evaluation</b> Introduction to Lean, Introduction to Six Sigma, Six Sigma roles and levels, Lean Six Sigma, Finding the right balance and apply lean and six sigma to RPA, ROI for RPA.	1	5
3	<b>Developing BOTs using RPA</b> Analysis of Business Process and development of BOT, Activities, Flowcharts and sequences, Log Message, loops and conditions, Best practices for BOT Development, Evaluating BOT Performance, Testing, Monitoring.	1	6
4	<b>Intelligent Automation</b> Cognitive Automation, Intelligent Process Automation or IPA, Examples of cognitive RPA, Web Scraping	3	6
5	<b>Security of Process Automation</b> Security Challenges for RPA, Secured BOT Development and Secured BOT Deployment, Secured BOT architecture design	6, 7	6
6	<b>Self-Study Topics</b> RPA compared to BPA, BPM and BPO, Key challenges in RPA, RPA use cases and the planning, RPA vendor evaluation, Type of Data for RPA, Data Process and Types of Algorithms, Managing RPA Implementation Cycle, Types of BOTs, Examples of BOTs	1, 2, 7	
<b>Total</b>			<b>28</b>






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## Laboratory Component

Sr. No	Title of the Experiment
1	Working with Linux commands: <ul style="list-style-type: none"><li>• Basic Linux/Unix commands</li><li>• Changing file permissions and ownership</li><li>• Types of links soft and hard link</li><li>• Filter commands</li><li>• Simple filter and advance filter commands</li><li>• Start and stop services</li><li>• Find and kill the process with id and name</li><li>• Package installation using RPM and YUM</li></ul>
2	Demonstrate the use of Docker : <ul style="list-style-type: none"><li>• Installation</li><li>• Downloading Dockers images.</li><li>• Uploading the images in Docker Registry and AWS ECS</li><li>• Understanding the containers</li><li>• Running commands in container.</li><li>• Running multiple containers.</li></ul>
3	Part 1: Use of recorder, editors and basic commands to build simple tasks. Part 2: Run Bot from Control Room and Schedule Bot from Control Room
4	Automate task of replacing few characters from a string and copying files from a source folder to destination folder.
5	Automate task of writing text into Notepad file
6	Extract data from JSON file and display output in message box
7	Part 1: Automate the task of extracting the data from an Excel File according to some condition and storing the extracted data in another File. Part 2: Automate the task of extracting the data from multiple PDF documents and storing the data into a CSV file.
8	Manipulate web-based components like textbox, drop down and Extract data and table from website and store it in excel or database.
9	Demonstrate Scheduler and trigger
10	Design IQ BOT and resilience BOT

- Practicals 3-10 to be done in "Automation Anywhere / UiPath" software.

### Text Books:

- [1] Tom Taulli, "The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems", 1st Edition, Apress Publisher, 2019.  
[2] Gerardus Blokdyk, "Robotic Process Automation RPA a Complete Guide - 2020 Edition", 1st Edition, 5STARCook, 2019.

### Reference Books:

- [3] Mathias Kirchmer, Peter Franz and Danny Bathmaker and Danny Bathmaker , "Value-Driven Robotic Process Automation Enabling Effective Digital Transformation Effective Digital Transformation" , White paper: BPM-D Paper - London, Philadelphia 2019 .  
[4] Alok Mani Tripathi,"Learning Robotic Process Automation", Packt Publishing, 2018.



Dr. S. B. Shinde



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### Web References:

- [5] <https://www.infobeans.com/robotic-process-automation-lifecycle>
- [6] <https://www.uipath.com/blog/the-evolution-of-rpa-past-present-and-future>
- [7] <https://www.chatbot.com/blog/6-types-of-bots-that-can-serve-your-clients/>
- [8] <https://www.onesourcevirtual.com/resources/blogs/technology-and-innovation/prepare-for-robotic-process-automation-with-lean-six-sigma.html>
- [9] <https://docs.automationanywhere.com/bundle/enterprise-v11.3/page/enterprise/topics/aae-client/bot-creator/commands/commands.html>
- [10] <https://university.automationanywhere.com/rpa-learning-trails/automation-anywhere-university-essential-cvcl-prep-courses-mba-students/>

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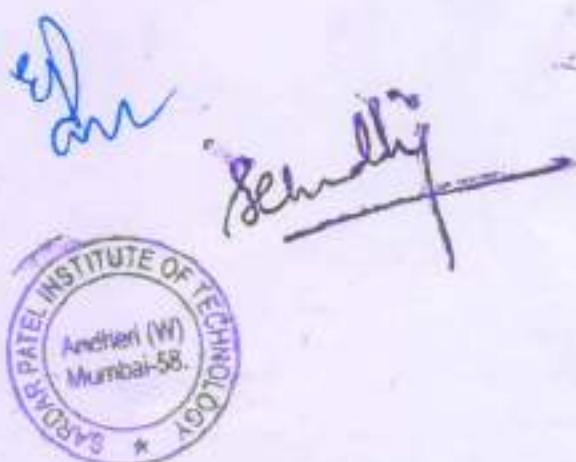
Course Name	Course Code	Prerequisites			Credits Allocated		
		L	T	P	Credit	Total	
		ES	LS	PS			
Software Testing and Quality Assurance Lab	MCAL42	-	-	2	-	1	1
		ES	LS	PS			
		40	-	-			40

Pre-requisite Course Codes	MCA42
Course Outcomes	Student will be able to
	CO1 Apply automation testing tool for web based application.
	CO2 Apply bug tracking tool.
	CO3 Apply mobile testing tool
	CO4 Apply behavior testing tool and test management tool.

Exp. No.	Experiment Details	Ref.	Marks
1	Study of automation tool, run test cases and use Base URL to run test cases in different domains.	1	5
2	Selenium commands-selenese, Matching Text Patterns, Performance Testing Concepts :Load Testing, Stress Testing	1	5
3	Web Driver Implicit & Explicit Wait, Cross Browser Testing, API Testing.	1	5
4	Apply of bug tracking tool.	2	5
✓ 5	Study of mobile apps testing tool.	3	5
✓ 6	Run test cases on mobile devices and emulators.	3	5
✓ 7	Apply behavior driven testing tool.	4	5
✓ 8	Study of test management tool.	1,3,4	5
Total Marks			40

**References :**

- [1] David Burns, "Selenium 1.0 Testing Tools", PACKT publication, third edition.
- [2] Sharad Khare, "Essentials of bugzilla".
- [3] Nishant Verma, "Mobile test automation with Appium", PackT publication, 2017.
- [4] Seb Rose, Matt Wynne & Aslak Hellesoy, "The Cucumber for Java Book, Behaviour-Driven Development for Testers and Developers"





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	E	T	P	Total	
		3	1	-	3	1	-	4	
MCA54B	Deep Learning	Examination Scheme				ISE MSE ESE			
		ISE		MSE		ESE		60	

## Pre-requisite Course Codes AI,ML

		Student will be able to
Course Outcomes	CO1	Explain the basics of machine learning.
	CO2	Analyze Deep Feedforward networks for deep learning.
	CO3	Implement Convolutional Networks and Recurrent and Recursive Nets for a given scenario.
	CO4	Analyze Autoencoders and its applications
	CO5	Implement Deep Learning applications using Tensorflow.

Module No.	Topics	Ref	Hrs
1	Machine Learning Basics: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets ,Estimators, Bias and Variance ,Supervised Learning Algorithms ,Unsupervised Learning Algorithms ,Stochastic Gradient Descent ,Building a Machine Learning Algorithm Challenges Motivating Deep Learning	1,2, 3	5
2	Deep Feedforward Networks and Regularization for Deep Learning: Gradient-Based Learning , Hidden Units ,Architecture Design ,Back-Propagation and Other Differentiation Algorithms ,Parameter Norm Penalties ,Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems ,Dataset Augmentation ,Noise,Robustness ,Semi-Supervised Learning ,Multi-Task Learning ,Early Stopping ,Parameter Tying and Parameter Sharing ,Sparse Representations.	1,2, 3	6
3	Convolutional Networks: The Convolution Operation ,Motivation ,Pooling ,Convolution and Pooling as an Infinitely Strong Prior Variants of the Basic Convolution Function ,Structured Outputs ,Data Types ,Efficient Convolution Algorithms ,Random or Unsupervised Features ,The Neuroscientific Basis for Convolutional Networks ,Convolutional Networks and the History of Deep Learning	1,2, 3	6
4	Recurrent and Recursive Nets:		



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	Unfolding Computational Graphs ,Recurrent Neural Networks ,Bidirectional RNNs , Encoder-Decoder Sequence-to-Sequence Architectures ,Deep Recurrent Networks ,Recursive Neural Networks ,The Challenge of Long-Term Dependencies,Echo State Networks Leaky Units and Other Strategies for Multiple Time Scales ,The Long Short-Term Memory and Other Gated RNNs	3	
5	Autoencoders; Undercomplete Autoencoders ,Regularized Autoencoders ,Representational Power, Layer Size and Depth ,Stochastic Encoders and Decoders ,Denoising Autoencoders ,Learning Manifolds with Autoencoders ,Contractive Autoencoders ,Predictive Sparse Decomposition ,Applications of Autoencoders	1,2, 3	6
6	Tuning Specific Deep Network Architectures: Convolutional Neural Networks (CNNs),Recurrent Neural Networks,Restricted Boltzmann Machines,DBNs.	1,2, 3	5
7	Applications of Deep Learning Large-Scale Deep Learning ,Computer Vision ,Speech Recognition Natural Language Processing ,Other Applications	1,2, 3	4
8	Implementing neural networks in TensorFlow: Installing TensorFlow,TensorFlow operations,Placeholders in tensor, session in tensor flow, building multilayer model in tensor flow.	1,2, 3	4
Total			42

**References:**

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016.
2. Deep learning a practitioner's Approach By Adam Gibson, Josh Patterson.
3. Fundamentals of Deep Learning Nikhil Buduma.

**Tutorial on Deep Learning**

Sr.no	Tutorial Topics	No of Hours
1	Tutorial on basic machine learning basics.	2
2	Tutorial on feedforward networks.	2
3	Tutorial on Convolutional Neural Networks (CNNs).	2
4	Tutorial on Recurrent and Recursive Nets.	2
5	Tutorial on Tuning deep networks.	2
6	Implementing neural networks using Tensor flow	4
Total		14



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## Sardar Patel Institute of Technology

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### MCA Department Syllabus Revision Report

2019-20

Course Code	Name of the course	Year of the Introduction (during the last five years)	Percentage
Database Management System lab	MCAL32	2019-20	50
Computational Intelligence -I	MCA41	2019-20	100
Information Security	MCA45A	2019-20	100
Natural Language Processing (NLP)	MCA45B	2019-20	100
Computational Intelligence -I Lab	MCAL41	2019-20	100
Mobile programming Lab	MCAL46	2019-20	100

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MCA Department

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MCA Department

## Theory Course Revision Report 2019-20

Name of the course	Course Code	Year of introduction (During Last five years)	Percent age	Remark	Faculty sign
MCAL32	Database Management System lab	To introduce different database like MonGO DB and Cassandra	50		
MCA41	Computational Intelligence -I	Computational Intelligence offers numerous benefits such as improved decision-making, better predictions, automation of repetitive tasks, increased efficiency, and reduced human error.	100	Newly Added	
MCA45A	Information Security	Information security subject will help students to ensure the safety and privacy of critical data such as customer account details, financial data or intellectual property.	100	Newly Added	
MCA45B	Natural Language Processing (NLP)	NLP makes it possible for computers to read text, hear speech, interpret it, measure sentiment and determine which parts are important. Student can develop certain project based on the concept	100	Newly Added	
MCAL41	Computational Intelligence -I Lab	Students will be provided with hands on session using innovative tools and techniques to understand the concepts	100	Newly Added	
MCAL46	Mobile programming Lab	Students will be enhanced with the new technology to develop mobile application using Android software	100	Newly Added	

H.O.D  
MCA Department





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAL32	Database Management System Lab	--	--	4	--	--	2	2
<b>Examination Scheme</b>								
		ISE		MSE		ESE		Total
		40		-		-		40

Pre-requisite Course Codes	-		
	Student will be able to		
Course Outcomes	CO1	Apply SQL statements on database.	
	CO2	Apply PL/SQL concepts for processing database.	
	CO3	Demonstrate MongoDB database.	
	CO4	Demonstrate Cassandra Database.	

Exp. No.	Experiment details	Ref	Marks
1	<b>SQL</b> <b>Data Definition Language:</b> Create, Alter, Drop, Rename, Truncate <b>Data Manipulation Language:</b> Insert, Update, Delete, Select <b>Data Control Language:</b> Grant, Revoke, Roles <b>Transaction Control Language:</b> Commit, Rollback, Save point <b>Constraints:</b> Not Null, Unique Key, Primary Key, Foreign Key, Check, Dropping a Constraint, Enabling & Disabling <b>Functions:</b> Single Row Functions, Character Functions, Number Functions, Date, Functions, Conversion Functions, General Functions, Multiple Row Functions, Group Function	1,2,3	5
2	<b>SQL SELECT Statements:</b> Selecting All Columns, Selecting Specific Columns, Column Alias, Concatenation Operator, Arithmetic Operators, Comparison Conditions, Logical Conditions, ORDER BY Clause <b>Subquery:</b> Subquery, Types of Subquery, Group Function, Having Clause <b>Joins:</b> Equijoins, Non-Equijoins, Joining Three Tables, Self Joins, Left Outer Joins, Right Outer Joins, Full Outer Joins, Cross Joins, Natural Joins <b>Other Concepts:</b> Sequence, View, Index	1,2,3	5





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3	<b>PL/SQL</b> <b>Programming:</b> Variables, Identifiers, Comment, PL/SQL Block Structure <b>IF Statements:</b> Simple IF Statements, Compound IF Statements <b>IF-THEN-ELSE Statements</b> <b>Loop:</b> Basic Loop, WHILE Loop, FOR Loop <b>Cursor:</b> Types of Cursor, Explicit Cursor Life Cycle, Explicit Cursor Attributes <b>Trigger:</b> Trigger, Statement Trigger, Row Trigger, Using Conditional Operations <b>Exceptions:</b> Block Structure, Exception Handlers, Types of Exceptions <b>Records:</b> Table-Based, Cursor-Based, Programmer-Defined	1,2,3	5
4	<b>PL/SQL</b> <b>Functions:</b> Create Function, Function with Arguments, Executing Function, Dropping Function <b>Procedures:</b> Block Structure of Subprogram, Types of Subprograms, Procedure with Parameters, Executing Procedures, Dropping Procedures. <b>Packages:</b> Package Specification, Package Body, Creating Package, Execution, Dropping Package	1,2,3	5
5	<b>MongoDB Installation</b> Creating, updating and deleting documents	4,5	5
6	<b>MongoDB querying, indexing and aggregation</b>	4,5	5
7	<b>Cassandra Installation</b>	6,7	5
8	<b>Cassandra key space operations, table operations and CURD operations</b>	6,7	5
Total Marks			40

**References:**

- [1] Dr. P.S. Deshpande, "SQL & PL/SQL for Oracle 11g", Dreamtech Press.
- [2] Kevin Loney, "Oracle Database 11g The complete Reference", Oracle Press.
- [3] Ivan Bayross, "SQL, PL/SQL: The programming language of Oracle", BPB Publication, Second revised edition.
- [4] Kristina Chodorow, "MongoDB : The Definitive Guide", O'Reilly, Second edition.
- [5] Kyle Banker and Tim Hawkins, "MongoDB in Action", Manning, Second edition.
- [6] Eben Hewitt, "Cassandra : The Definitive Guide", O'Reilly, First edition.
- [7] Nishant Neeraj, "Mastering Apache Cassandra", Packt Publishing, Second Edition.

$$4/8 = 50\%$$



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# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		3	-	-	3	-	-	3
MCA 41	Computational Intelligence - I	Examination Scheme						
		JSE		MSE		ESE		Total
		20		20		60		100

Pre-requisite Course Codes	Mathematics, Probability ,Programming languages - Java/C++					
After successful completion of the course, student will be able to						
Course Outcomes	CO 1	To search and plan suitability of different computational scenarios				
	CO 2	To design Neural Networks and Convolutional Neural Networks				
	CO 3	To design fuzzy controllers for various applications.				
	CO 4	To apply Genetic Programming concept on real time case studies				
	CO 5	To create hybrid model using soft computing techniques				
	CO 6	To apply computational intelligence technique to solve real world problems				

Module No.	Topics	Ref.	Hrs.
1	<b>Introduction to Computational Intelligence:</b> Concepts <ul style="list-style-type: none"><li>• Introduction to computational intelligence</li><li>• Adaptation</li><li>• Self-organization</li><li>• Computational intelligence systems</li></ul>	4	3
2	<b>Search and Planning (Artificial Intelligence Perspective)</b> <ul style="list-style-type: none"><li>• Problem spaces and search</li><li>• Knowledge and rationality</li><li>• Heuristic search strategies</li><li>• Search and optimization (gradient descent)</li><li>• Case studies: Playing chess, Manufacturing scheduling</li></ul>	7	6
3	<b>Basics of Artificial Neural Networks and Convolutional Neural Networks</b> <ul style="list-style-type: none"><li>• Short History of Neural Networks, Rosenblatt's Neuron</li><li>• Types of Learning (Supervised, Unsupervised, Reinforcement), Activation Functions</li><li>• Basic Models of Artificial Neural Network, Basic terminologies and architecture of ANN</li><li>• Supervised Learning, Linear Separability,</li><li>• Back-Propagation Network</li><li>• Basic architecture of CNN</li></ul>	2, 3	10
4	<b>Fuzzy Controllers</b> <ul style="list-style-type: none"><li>• Crisp Logic, Fuzzy logic</li><li>• Classical Sets (Crisp Sets), Fuzzy Sets</li><li>• Classical Relations and Fuzzy Relations, Introduction Cartesian Product of Relation, Classical Relation, Fuzzy Relations</li><li>• Fuzzification, De-fuzzification</li></ul>	2, 3	10



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	<ul style="list-style-type: none"> <li>• Fuzzy Inference Systems (FIS)- Construction and Working Principle of FIS, Methods of FIS</li> </ul>		
<b>5</b>	<b>Genetic Algorithm</b> <ul style="list-style-type: none"> <li>• Simple genetic algorithm and operations</li> <li>• Encoding methods, Fitness function,</li> <li>• Working principle</li> </ul>	2,3,4	<b>5</b>
<b>6</b>	<b>Hybrid Soft Computing Techniques</b> <ul style="list-style-type: none"> <li>• Neuro fuzzy hybrid system</li> <li>• Genetic neuro hybrid system</li> <li>• Fuzzy-GA systems</li> </ul>	<b>5, 6</b>	<b>5</b>
<b>7</b>	<b>Application of Soft computing</b>	2,3	3
			42

**Recommended Books:**

1. S.N.Sivanandam, S.N.Deepa "*Principles of Soft Computing*" 2<sup>nd</sup> Edition, Wiley Publication.
2. Samir Roy and Chakraborty, "*Introduction to soft computing*", Pearson Edition.
3. Computational Intelligence: Concepts to Implementations by Eberhart and Shi
4. Russell Eberhart and Yuhui Shi – "*Computational Intelligence: Concepts to Implementations*" (2007).
5. Fakhreddine Karray and Clarence de Silva – "*Soft Computing and Intelligent Systems Design*" (2004)
6. Neural network, fuzzy logic and genetic algorithm by Rajshekaran





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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
		3	1	-	3	1	-	4
MCAE45A	Information Security	Examination Scheme						
		ISE		MSE		ESE		Total
		20		20		60		100

Pre-requisite Course Codes	MCAE35 A
	Student will be able to
	CO1 Understand the basics of security principles and practices.
	CO2 Explain data and program security
Course Outcomes	CO3 Analyze database and operating system security
	CO4 Analyze security of wireless network and web services
	CO5 Understand laws for information security.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1	<b>Security Principles and Practices</b>	3	5
		1.1 Information System Security Principles		
		1.2 Threats and Attacks		
		1.3 Classification of threats and assessing damages		
		1.4 Protecting Information Systems Security		
		1.5 Information System Security Engineering Process		
		1.6 Security Policies		
2	2	<b>Data and Program Security</b>	2	7
		2.1 Data Protection		
		2.2 End Point security		
		2.3 Physical Security		
		2.4 Insider threats and data Protection Secure programs		
		2.5 Non-malicious program errors		
		2.6 malicious code		
		2.7 Targeted malicious code		
		2.8 Controls against program threats		
		2.9 Viruses, Virus Countermeasures		
3	3	<b>Operating System Security</b>	1,2	7
		3.1 Role of Operating systems in Information systems applications		
		3.2 Operating systems Security		
		3.3 Patched Operating systems		
		3.4 Protected Objects and Methods of Protection		
		3.5 Memory Address Protection		
		3.6 Control of Access to General Objects		
4	4	<b>Database Security</b>	3?	6
		4.1 Database Security Requirements and Challenges		
		4.2 Database Integrity, Data Security Policies		
		4.3 Sensitive data		
		4.4 Interface		



4.1	Database Security Requirements and Challenges	<i>Sanjay</i>
4.2	Database Integrity, Data Security Policies	
4.3	Sensitive data	
4.4	Interface	



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	4.5	Multilevel database Application Software Controls Concurrency Control		
	4.6	Cryptograph control		
	4.7	Audit train control		
5		<b>Software Web Services Security</b>	4	6
	5.1	Technologies for web services (XML, SOAP, WSDL & UDDI)		
	5.2	Web Services Security – Token types		
	5.3	XML encryption		
	5.4	XML segment		
6		<b>Security of Wireless Networks</b>	4	
	6.1	An overview of wireless technology		
	6.2	Wired world versus wireless world: putting Wireless Networks in Information Security Context		
	6.3	Attacks on Wireless Networks		
7		<b>Laws &amp; Legal Framework for Information Security</b>	1	7
	7.1	Introduction, Information Security and Law		
	7.2	Understanding the Laws of Information Security		
	7.3	Indian IT Act, Laws of IPR		
	7.4	Patent laws		
	7.5	Copyright Law		
	7.7	Ethical Issues in Information Security: Introduction		
	7.8	Issues in Network enterprises		
	7.9	Computer Ethics and Security and Privacy Policies		
			Total	42

#### References:

- [1] Nina Godbole, "Information Systems Security", Wiley India
- [2] Eric Cole, "Network Security Bible", Wiley India Edition
- [3] C. P. Pfleeger, and S. L. Pfleeger, "Security in Computing", Pearson Education.
- [4] Matt Bishop, "Computer Security: Art and Science", Pearson Education

#### Tutorials on Information Security

Tut. No	Topics	Hours
1	Tutorial on Security Principles and Practices	2
2	Tutorial on Data and Program Security	3
3	Tutorial on Operating systems Security	2
4	Tutorial on Database Security	2
5	Tutorial on Software Web Services Security	3
6	Tutorial on Laws & Legal Framework for Information Security	2
	Total	14



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAE45B	Natural Language Processing	3	1	-	3	1	-	4
		Examination Scheme						
		ISE	MSE		ESE			
		20	20		60			

Pre-requisite Course Codes		MCA11 & MCA23, MCAE35B
		Student will be able to
Course Outcomes	CO1	Apply linguistic phenomena with formal grammars.
	CO2	Analyze word level, syntax and semantic analysis.
	CO3	Apply techniques and pragmatics for NLP applications.
	CO4	Analyze the various NLP algorithms.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Introduction	1,4	3
	1.1	History of NLP, Generic NLP system, levels of NLP , Knowledge in language processing ,		
	1.2	Ambiguity in Natural language , stages in NLP, challenges of NLP , Applications of NLP- Machine translation,		
	1.3	Question answering system, Information retrieval, Text categorization , text summarization & Sentiment Analysis		
2		Word Level Analysis	1,3,4	11
	2.1	Finite Automata , Nondeterministic Finite Automata , Nondeterministic Finite Automata with $\epsilon$ -transitions		
	2.2	Morphology analysis -survey of English Morphology, Inflectional morphology & Derivational morphology;		
	2.3	Regular expression, finite automata, finite state transducers (FST) ,Morphological parsing with FST ,		
	2.4	Lexicon free FST - Porter stemmer, N -Grams- N-gram language model, Ngram for spelling correction.		
3		Syntax analysis	1,3	8
	3.1	Part-Of-Speech tagging( POS)- Tag set for English ( Penn Treebank ) , Rule based POS tagging,		
	3.2	Stochastic POS tagging, Issues –Multiple tags & words, Unknown words, class based n -grams.		
	3.3	Context Free Grammar – Constituency , Context free rules & trees, Sentence level construction , Noun Phrase, coordination, agreement, the verb phrase & sub categorization.		
4		Semantic Analysis	1,2,3	8
	4.1	Attachment for fragment of English- sentences, noun phrases,Verb phrases, prepositional phrases,		
	4.2	Relations among lexemes & their senses -Homonymy, Polysemy, Synonymy, Hyponymy, Wordnet,		
	4.3	Selectional restriction based disambiguation & limitations , Robust WSD – machine learning approach and dictionary based approach		
5		Pragmatics	1,2,3	8
	5.1	Discourse –reference resolution, reference phenomenon , syntactic & semantic constraints on co reference,		
	5.2	preferences in pronoun interpretation , algorithm for pronoun resolution .Text coherence, discourse structure		



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6	Applications ( preferably for Indian regional languages)	1,2,3,4,5	4
6.1	Machine translation, Information retrieval.		
6.2	Question answers system, categorization, summarization, sentiment analysis.		
Total			42

## References:

- [1] Daniel Jurafsky, James H. Martin "Speech and Language Processing" Second Edition, Prentice Hall, 2008.
- [2] Christopher D.Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999
- [3] Siddiqui and Tiwary U.S., Natural Language Processing and Information Retrieval, Oxford University Press (2008).
- [4] Daniel M Bikel and Imed Zitouni " Multilingual natural language processing applications" Pearson, 2013
- [5] Alexander Clark (Editor), Chris Fox (Editor), Shalom Lappin (Editor) " The Handbook of Computational Linguistics and Natural Language Processing "

## Tutorial on Natural Language Processing

Sr.no	Tutorial Topics	No of Hours
1	Tutorial on basics in NLP.	1
2	Tutorial on Applications of NLP	1
3	Tutorial on Morphology analysis	1
4	Tutorial on Lexicon free FST	1
5	Tutorial on Sentiment Analysis	1
6	Tutorial on word level analysis	2
7	Tutorial on Syntax analysis	1
8	Tutorial on Context free grammar.	2
9	Tutorial on Semantic Analysis	1
10	Tutorial on Relations among lexemes & their senses	1
11	Tutorial on Pragmatics	1
12	Tutorial on Applications.	1
Total		14



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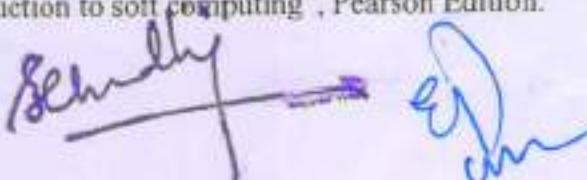
Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAL41	Computational Intelligence - I Lab	--	--	4	--	--	2	2
<b>Examination Scheme</b>								
ISE			MSE		ESE		Total	
40			--		--		40	

Pre-requisite Course Codes		Mathematics, Probability ,Programming languages - Java/C++						
After successful completion of the course, student will be able to								
Course Outcomes	CO 1	Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).						
	CO 2	To design Neural Networks						
	CO 3	To analyze the applications which can use fuzzy logic						
	CO 4	Understand the basics of genetic algorithm, use of GA operators and its applications.						
	CO 5	Appreciate the importance of hybrid approach						

Exp. No.	Suggested List of Experiments	Ref.	Marks
1	To design MP neuron for various problems	1,2,5	5
2	To design Perceptron Neural network	1,2,5	5
3	To design supervised NN model using BPN	1,2	5
4	Implement Union, Intersection, Complement and Difference operations on fuzzy sets.	1, 2,3,4, 5	5
5	To perform Union, Intersection and Complement operations To implement De-Morgan's Law.	4,5	5
6	To design fuzzy controller	4,5	5
7	Implementation of Simple Genetic Application	4,5	5
8	Color recipe prediction using ANFIS	2,3, 4, 5	5
Assessment Marks			40

**References:**

1. Russell Eberhart and Yuhui Shi "Computational Intelligence: Concepts to implementations" (2007).
2. Fakhreddine Karray and Clarence de Silva, "Soft Computing and Intelligent Systems Design" (2004)
3. Andries Engelbrecht – "Computational Intelligence: an Introduction" (2007)
4. S.N.Sivanandam and S.N.Deepa "Principles of Soft Computing" 2<sup>nd</sup> Edition, Wiley Publication.
5. Samir Roy and Chakraborty, "Introduction to soft computing", Pearson Edition.
6. NN in practice by Hagan



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAL46	Mobile Programming Lab	--	--	4	--	--	2	2
<b>Examination Scheme</b>								
		ISE	MSE	ESE	-	-	Total	40
		<b>40</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>40</b>	<b>40</b>

Pre-requisite Course Codes	-		
	Student will be able to		
Course Outcomes	CO1	Understand basics of Ionic Native	
	CO2	Design and Develop User Interface components using Ionic Native.	
	CO3	Develop Application using file handling techniques and API	
	CO4	Develop Mobile Applications with database connectivity.	

Exp. No.	Experiment Details	Ref.	Marks
1	Introduction: understanding ionic native and installing the development environment.	1.2	5
2	Building app with ionic: understanding SASS[Syntactically awesome style sheet] and angular components, ionic serve and ionic view, ionic CLI.	1.2	5
3	To Implement UI(User Interface) components (Toggle, checkbox, Alert, Action Sheet, Floating action bar button )	1.2	5
4	To implement navigational components (Menus, Navigation, Tabs, etc.)	1.3	5
5	To implement files concept for read/write access to files	1.3	5
6	To implement ionic Native Plugins API	1.3	5
7	To implement HTTP (REST API request)	1.3	5
8	To implement Firebase/SQLite	1.3	5
Total Marks			40



**References:**

- [1] <https://ionicframework.com/docs>
- [2] Learning Ionic - Second Edition, by Arvind Ravulavaru, Packt Publishing, ISBN: 9781786466051
- [3] Hybrid Mobile Development with ionic ,Build high performance hybrid applications with HTML,CSS and Javascript, by Gaurav Saini, Packt Publication, ISBN: 9781785286056.



## Sardar Patel Institute of Technology

Munshi Nagar Andheri (West), Mumbai-400 058  
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MCA Department

2022-23 – 2018 19 Revision

Year	Percentage Change
2022-23 (2 Yrs)	0.980392157
2021-22 (2 Yrs)	21.666666667
2020-21 (2 Yrs)	16.733333333
2019-20 (3 Yrs)	9.492063492
2018-19 (3 Yrs)	20.16428571





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MCA Department

2018 19 to 2022-23 Revision

Year	Percentage Change
2018-19 (3 Yrs)	20.16428571
2019-20 (3 Yrs)	9.492063492
2020-21 (2 Yrs)	18.73333333
2021-22 (2 Yrs)	21.66666667
2022-23 (2 Yrs)	0.980382157

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## Sardar Patel Institute of Technology

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MCA Department

### Syllabus Revision Report

2018-19

Course Code	Name of the course	Year of the Introduction (during the last five years)	Percentage
User Experience Design	MCA44	2018-19	100
Data Analytics	MCA52	2018-19	100
Internet of Things	MCA53	2018-19	100
Machine Learning	MCA54B	2018-19	100
Customer Relationship Management	MCA54C	2018-19	100
Digital Marketing	MCA54D	2018-19	100
Web Services	MCA54E	2018-19	100
Distributed Computing and Cloud Computing Lab	MCAL51	2018-19	100
Data Analytic Lab	MCAL52	2018-19	100
Animation and Graphic Design Lab	MCAL53	2018-19	100

H.O.D  
MCA Department





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## MCA Department Theory Course Revision Report

2018-19

Name of the course	Course Code	Reason	Percentage	Remark	Faculty Signature
MCA44	User Experience Design	At the end of course student will be learned to design the software front screen	100	Newly Added	<i>Patel</i>
MCA52	Data Analytics	With appropriate analysis and interpretation of data, students can make informed decisions that positively affect student outcomes.	100	Newly Added	<i>Patel</i>
MCA53	Internet of Things	Student can learn the embedded system with the help of their communication protocol	100	Newly Added	
MCA54B	Machine Learning	Machine learning subject will upskill the concepts of students for their calculus to formulate the functions that are used to train algorithms.	100	Newly Added	<i>Patel</i>
MCA54C	Customer Relationship Management	At the end of the course student will understand different phases of CRM Cycle. This will enhance managerial skills in the domain of CRM	100	Newly Added	<i>Patel</i>
MCA54D	Digital Marketing	A digital marketing course can help student skills and expand your knowledge, which can lead to career advancement opportunities.	100	Newly Added	<i>Patel</i>
MCA54E	Web Services	Student can learn XML-based information exchange systems that use the Internet for direct application-to-application interaction.	100	Newly Added	<i>Patel</i>
MCAL51	Distributed Computing and Cloud Computing Lab	There was no previous lab introduced for this subject. Under university subject was conceptual oriented. Students will have hands on distributed algorithms	100	Newly Added	<i>Patel</i>
MCAL52	Data Analytic Lab	By learning harness the power of the data using hands-on session student can understand business decisions and success.	100	Newly Added	<i>Patel</i>
MCAL53	Animation and Graphic Design Lab	This subject focuses on providing a detailed knowledge about multimedia, animation, computer graphics, languages, features films, product designing, graphic designing etc.	100	Newly Added	<i>Patel</i>

H.O.D  
MCA Department

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8	Case study on Max Flow Algorithm.	2
9	Case study on Single source shortest path and All pair shortest path algorithm.	2
10	Case study on String Matching Algorithm.	2
Total		14

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCA44	User Experience Design	3	1	--	3	1	--	4
		Examination Scheme						
		ISE		MSE	ESE		Total	
		20		20	60		100	

Pre-requisite Course Codes	MCA 12, MCA 22
	Student will be able to
	CO1 Understand HMI as basic for UX Design
	CO2 Explain UX design life cycle
	CO3 Analyze UX design process for users
	CO4 Analyze various parameters for design process.
	CO5 Evaluate UX design process
	CO6 Understand UX design for Agile development

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Introduction to Human Machine Interaction	6,8	3
	1.1	Introduction		
	1.2	History of User interface designing		
	1.3	Usability		
	1.4	GUI & Web		
	1.5	User interface Design Goals		
2		UX Design and Life Cycle	1,2	6
	2.1	What is UX (User Experience), Ubiquitous interaction		





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	2.2	A UX process lifecycle template		
	2.3	The system complexity space		
	2.4	Meet the user interface team		
3		<b>The UX Design Process – Understand Users</b>	1	7
	3.1	Introduction		
	3.2	The system concept statement		
	3.3	Contextual analysis-Introduction, User work activity gathering		
	3.4	Creating and managing work activity notes		
	3.5	Constructing your WAAD(Work Activity Affinity Diagram)		
	3.6	Formal Requirements Extraction		
	3.7	Abridged method for requirement extraction		
	3.8	User Model (Social Model), Usage Model (Flow Model, Task Interaction Model), Work Environment Model.		
4		<b>The UX Design Process-thinking, ideation and sketching</b>	1,3	9
	4.1	Design thinking		
	4.2	Design perspective		
	4.3	User personas, Ideation, Sketching		
	4.4	Mental models		
	4.5	Conceptual model		
	4.6	Storyboards		
	4.7	Wireframes		
5		<b>The UX Design Process- Prototyping and Evaluation</b>	1,3	9
	5.1	Fidelity of prototype		
	5.2	To make effective paper prototype		



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### Tutorial on User Experience Design

Sr. no	Tutorial name	No of hours
1	Demonstration of Requirement Gathering	1
2	Making Life Cycle Design of Requirement	2
3	Study of Different types of Open Source Software	2
4	Basic Overview of JustInMind Prototype	1
5	Designing the user requirement	2
6	Verifying the Design and ReDesign if required	2
7	Presentation based on Design made	2
8	Case Study based on User Experience Design	2
Total Hours		14



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	5.3	UX Evaluation and Improve UX Goals, Metrics and Targets		
	5.4	UX Evaluation Techniques.- Formative vs Summative		
	5.5	Types of formative and informal summative evaluation methods		
	5.6	Types of evaluation data		
	5.7	Practical Approach to UX Inspection		
6		<b>UX methods for Agile Development</b>	1,2	8
	6.1	Introduction		
	6.2	Basics of agile SE method		
	6.3	drawbacks of agile SE method from the UX perspective		
	6.4	A synthesized approach to integrate UX		
	6.5	Four Kinds of Affordance in UX Design		
			Total	42

### Recommended Books:

- [1] Rex Hartson and PardhaPyla , "The UX Book", MK Publication.
- [2] Jesmond Allen and James Chudley , "Smashing UX Design", John Wiley & Sons.
- [3] Russ Unger and Carolyn Chandler , " A Project Guide to UX Design". O'reilly, Series Editor
- [4] Lindsay Ratcliffe and Marc McNeill , "Agile Experience Design", Pearson.
- [5] William Lidwell, Kritina Holden and Jill Butler , "Universal Principles of Design", Rosenfeild Media
- [6] Wilbert Galitz , "The Essential Guide to User Interface Design", Second Edition, Wilcy.
- [7] Alan Dix , "Human Computer Interaction", New riders
- [8] Dr.Dhananjay Kalbande , Prashant Kanade, Sridari Iyer, " Human Machine Interaction", wiley.



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Course Code	Course Name	Teaching Scheme (Hrs/ week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCA52	Data Analytics	3	1	-	3	1	-	4
		Examination Scheme						
		ISE		MSE	ESE		Total	
		20		20	60		100	

Pre-requisite Course Codes	MCA13, MCA 25				
	Student will be able to				
Course Outcomes	CO1	Apply data analysis and visualization techniques to communicate findings and present results effectively.			
	CO2	Apply the basic theory underlying machine learning algorithms.			
	CO3	Evaluating learning algorithms for model selection.			
	CO4	Apply knowledge of network analysis to real world problems.			
	CO5	Analyze ethical issues in business related to data science.			

Module No.	Module name	Topics	Ref no	No. of Hrs.
1	Introduction	The data science process, The roles in a data science project, Stages of a data science project, Setting expectations, Determining lower and upper bounds on model performance	3	2
2	Statistical Inference	-Populations and samples, Statistical modeling, probability distributions, fitting a model, - Intro to R	1	3
3	Exploratory Data Analysis and the Data Science Process	Types of Data - Continuous/ Discrete/Categorical Scale - Nominal, Ordinal, Interval and Ratio, Data Sources & Cleaning, Data Wrangling, Data Quality - Missing/ Outliers/ Standardization, Web Scraping  The Data Science Process - Case Study: Real Direct (online real estate rm)	1	4
4	Introduction - Machine Learning	The Learning Problem - Introduction, supervised, unsupervised, and reinforcement learning, Components of the learning problem, Is Learning Feasible? - Can we generalize from a limited sample to the entire space? Relationship between in-sample and out-of-sample.  The Linear Model I - Linear classification and linear regression. Extending linear models through nonlinear transforms.  Error and Noise - The principled choice of error measures. What happens when the target we want to learn is noisy.	2	8





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		Training versus Testing - The difference between training and testing in mathematical terms. What makes a learning model able to generalize?		
5	Machine Learning Algorithms	Linear Regression with Multiple variables, Cost Function - (OLSR)/ Gradient Descent, Over fitting & Regularization, Polynomial Regression, Feature scaling, Logistic Regression, K-fold cross validation K- Means/ Affinity propagation & mean shift/ Spectral clustering, - PCA. & Dimension reduction	1	7
6.	Feature Generation and Feature Selection	Motivating application: user (customer) retention Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms, - Filters; Wrappers; Decision Trees; Random Forests	1	5
7	Recommendation Systems: Building a User-Facing Data Product	Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, Principal Component Analysis - Exercise: build your own recommendation system	1	4
8	Mining Social-Network Graphs	Social networks as graphs, Clustering of graphs Direct discovery of communities in graphs, Partitioning of graphs, - Neighborhood properties in graphs	1	3
9	Data Visualization	Basic principles, ideas and tools for data visualization Examples of inspiring (industry) projects	1	3
10	Data Science and Ethical Issues	Discussions on privacy, security, ethics, A look back at Data Science, - Next-generation data scientists	1	3
Total				42

## Reference Book

- 1]Cathy O'Neil and Rachel Schutt Doing Data Science, Straight Talk From The Frontline O'Reilly-2013, 1<sup>st</sup> Edition.
- 2]Yaser S. Abu-Mostafa , Malik Magdon-Ismail, Hsuan-Tien Lin Learning From Data -- 2012, 1<sup>st</sup> Edition.
- 3] Nina Zumel John MountPractical Data Science With R -2014,1<sup>st</sup> Edition.





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## Tutorial on Data Analytics

Tutorial No.	Tutorial Details	Hours
1	Problem solving based on probability distributions and fitting a model	2
2	Problem solving based on data preprocessing and data cleaning	2
3	Problem solving based on types of Learning	2
4	Problem solving based on types of Machine Learning Algorithm	2
5	Problem solving based on Decision Trees; Random Forests	2
6	Case study based on Designing recommendation system.	2
7	Tutorial based on clustering of graphs.	2
8	Tutorial based on study of inspiring (industry) projects	2
		Total 14

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Course Code	Course Name	Teaching Scheme (Hrs/ week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCA53	Internet of Things	3	1	-	3	1	-	4
		Examination Scheme						
		ISE		MSE		ESE		Total
		20		20		60		100

Pre-requisite Course Codes	MCA22
	Student will be able to
Course Outcomes	CO1 Relate the concept of IoT as Market perspective
	CO2 Design the IoT Reference Architecture and Real World Constraints
	CO3 Compare various IoT Protocols ( Datalink, Network, Transport, Session, Service)
	CO4 Build State of the Art – IoT Architecture with Security features

Module No.	Module Name	Topics	Ref.	Hrs.
1	M2M to IoT A Market Perspective	The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT	1	6
2	IoT Technology Fundamental s	Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management	2	8
3	IOT system Architecture	IoT system components: IoT Devices, IoT Gateways, Cloud Access, Cloud Components Cross connectivity across IoT system components: Device to Gateway -Short Range Wireless(Cell Phone as Gateway, Dedicated Wireless Access Point), Gateway to Cloud- Long Range connectivity(Wired, Cellular, Satellite, WAN), Direct Device to Cloud connectivity, IoT Device Power Constraints, Powered and Unpowered Sensors, Power Harvesting, Energy Storage Technologies	3	10
4	IOT networking	Networking Architectures: Star, Mesh, Tree Networking Protocols: TCP/IP, 6LowPan, RPL, Thread IoT Devices Application Level Protocols: MQTT, CoAP, REST, Proprietary, More (to be added)		6
5	IOT Security	Security Requirements in IoT Architecture - Security in Enabling Technologies - Security Concerns in IoT Applications. Security Architecture in the Internet of Things - Security Requirements in IoT- Attacks Specific to IoT	3	6

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		Symmetric Encryption Standards: Symmetric Encryption (DES, AES 128...), Hashing, Authentication, CCMP Authentication and Encryption protocol, Non Symmetric Encryption Standards, Diffie Hellman (principle, Man in the Middle attack), RSA		
6	Use case examples	AMR (Automatic Meter Reading), Smart City, Smart Home Industrial Control, Smart Social Networks, Big Data Analytics	1,2, 3,4, 5	6
Total				42

## References :

1. Vijay Madisetti and Arshdeep Bahga, -Internet of Things (A Hands-on-Approach)I, 1<sup>st</sup> Edition, VPT, 2014. 2.
2. Francis daCosta, -Rethinking the Internet of Things: A Scalable Approach to Connecting Everything!, 1<sup>st</sup> Edition, Apress Publications, 2013
3. Practical Internet of Things Security (Kindle Edition) by Brian Russell, Drew Van Duren
4. Jan Holler, Vlasisos Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, —From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence!, 1<sup>st</sup> Edition, Academic Press, 2014.
5. Peter Waher, —Learning Internet of ThingsI, PACKT publishing, BIRMINGHAM – MUMBAI
6. Bernd Scholz-Reiter, Florian Michahelles, —Architecting the Internet of ThingsI, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

## Tutorial on Internet of Things

Tutorial No.	Tutorial Topics	No of Hours
1	To study Market perspective of IOT	2
2	To study about companies using XaaS as a service	1
3	To compare Amazon, google and Azure services	1
4	To differentiate TCP/IP and 6LowPan	1
5	To study the application of CoAP in real world	1
6	To study the application of REST in real world	1
7	To study attacks on IOT system and its prevention	1
8	To solve Symmetric encryption standards	2
9	To solve Non Symmetric encryption standards	2
10	To solve a case study on smart home appliances	2
Total		14



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Course Code	Course Name	Teaching Scheme (Hrs/ week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAE53 B	Machine Learning	3	1	-	3	1	-	4
Examination Scheme								
ISE			MSE			ESE		Total
20			20			60		100

Pre-requisite Course Codes	MCAE45 B		
	Student will be able to		
Course Outcomes	CO1	Apply Regression and classification techniques to solve real world problems	
	CO2	Categorize different unsupervised learning techniques	
	CO3	Describe various reinforcement learning techniques	
	CO4	Implement various machine learning algorithms in a range of real-world applications	

Module No.	Module Name	Topics	Ref.	Hrs.
1	Introduction To Machine Learning	Need of machine learning, Learning types : Supervised Learning, Unsupervised learning, Reinforcement learning, Applications of machine learning	1,2, 4	3
2	Supervised Learning	Regression: Regression fundamentals, Linear Regression and Logistic Regression Classification: Classification fundamentals Decision trees(Constructing a decision tree, Decision Tree algorithm, testing and storing a classifier, Classification tree, Regression tree) Naïve Bayes (Classifying with Bayesian decision theory, conditional probability, classifying with conditional probabilities, Document classification with Naïve Bayes) Support Vector Machine(Separating data with maximum margin, Finding maximum margin, Efficient optimization with the SMO algorithm)	1,2, 4	10
3	Unsupervised Learning	Clustering: K-means clustering, Expectation-Maximization algorithm, Supervised learning after clustering, K-nearest neighbour Estimator Deep machine learning: Deep feed forward network, Applications of Deep learning	4,5	10
4	Reinforcement Learning	The learning task, Q learning, Temporal difference learning, Generalizing from Examples, Relationship to Dynamic programming	3	6





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5	Implementation Of Algorithm Using R / Python /MATLAB Programming	Linear Regression, Logistic Regression Decision Tree, SVM, Naive Bayes K Nearest Neighbour , K-Means algorithm implementation	6	10
				Total 42

## References:

1. Peter Harrington, —Machine Learning In Action!, DreamTech Press First Edition Year 2012
2. ShaiShalev-Shwartz, —UNDERSTANDING MACHINE LEARNING From Theory toAlgorithms!, Cambridge University Press
3. Tom M.Mitchell,—Machine Learning!, McGraw Hill First Edition Year 1997
4. EthemAlpaydin, —Introduction to Machine Learning!, MIT Press Third Edition Year 2014
5. Deep Learning by Ian GoodfellowYoshuaBengio Aaron Courville

## Tutorials on Machine Learning

Sr. No	Suggested List of Topics	No. of hours
1	Solve real time problem on Regression	02
2	Solve real time problem on Classification	02
3	Solve real time problem on Clustering	02
4	Solve Q-Learning Example	02
5	Solve Dynamic programming problems	02
6	Implementation Of Algorithm Using R / Python /Matlab Programming	04
		Total 14

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Course Code	Course Name	Teaching Scheme (Hrs/ week)			Credits Assigned				
		L	T	P	L	T	P	Total	
MCAE53C	Customer Relationship Management	3	1	-	3	1	-	4	
		Examination Scheme							
		ISE	MSE	ESE	Total				
		20	20	60	100				

Pre-requisite Course Codes	MCA14			
	Student will be able to			
Course Outcomes	CO1	To compare the strategic nature of CRM and e-CRM		
	CO2	To analyze decision making and cognitive experimental process		
	CO3	To develop a plan to build CRM		
	CO4	To evaluate the integrating phase and quality analysis phase of CRM.		

Module No.	Module Name	Topics	Ref.	Hrs.
1	CRM Basics	What is customer, CRM, Customer Life Cycle, B2B CRM, Customer Asset, Goal of CRM, CRM functions	1	8
		CRM architecture	4	
		Scale to measure the depth of relationship, types of relationship, stages of relationship, customer life cycle, CRM process framework	2	
		Knowledge management with focus on CRM, Knowledge management conceptual framework, CRM value chain, proposed customer knowledge management for effective CRM,	2	
		CRM methodology	1	
2	E-Customer Relationship Management	Merging CRM and the internet, customer expectations and importance of E-CRM, Delivering CRM on the internet,	1	5
		Changing pattern of E-CRM, customer value service matrix, existing CRM solutions and future CRM solutions	2	
		Recognizing barriers to internet adoption.	1	
3	Customer Cognitive and Experimental Process	Cognitive learning Perceptual process Customer information Acquisition, Customer Information Processing Model Marketing Communication Process	3	6
4	Planning CRM	CRM Culture, Realistic expectations, CRM strategy – Strategic planning tools, collecting data, assessing findings, creating strategic proposal,	1	4
5	Building CRM	Steps for building infrastructure, gathering business requirements, analyzing and designing components.	1	8





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		Understanding data and information, process engineering steps, choose process automation software. Technology engineering steps, Managing the project – developing the project, controlling the project, finishing the project.		
6	Integrating and Using CRM	Combine process, technology and people Create customer profile, segmenting customers, targeting customer, tools to find right customers. Prepare offers for customer, present the offer Evaluating performance metrics, understand value metrics	1	7
7	Managing Quality and Customer Privacy	Identify data quality issues, planning information quality, Customer information management Elements of customer privacy	1	4
Total				42

#### References:

- [1] Judith W. Kincaid, —Customer Relationship Management – Getting it Right!!], first edition, 2015, Pearson.
- [2] Jagdish N Sheth, AtulParvatiyar, G. Shainesh, —Customer Relationship management!, Emerging concepts, tools and applications, first edition, 2001, Tata McGrawHill publication.
- [3] Henry Assael, —Consumer Behavior and marketing action!, sixth edition, Cengage Learning.
- [4] H Peeru Mohamed, A Sagadevan, —Customer Relationship Management!, A step by step approach, first edition, 2003, Vikas publication.

#### List of Tutorials on Customer Relationship Management

Tutorial No.	Title	No. of Hrs
1	Case study on need for customer relationship and customer support	2
2	Case study on various goals and basics of CRM and E-CRM	1
3	Case study on Cognitive learning and experimental process	1
4	Case study on strategy for CRM	1
5	Case study on building phase of CRM	2
	Case study on integrating tools and components in CRM	1
6	Case study on Quality checking & security for customer data	1
7	Case study on services marketing: CRM in Services Marketing CRM in Banking CRM in Insurance CRM in Hospital Industry	4
8	Case study on future of E-CRM	1
Total		14

Note: Assign a single project and do tutorial 1-8 based on that.



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Course Code	Course Name	Teaching Scheme (Hrs/ week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCA E53D	Digital Marketing	3	1	-	3	1	-	4
		Examination Scheme						
		ISE		MSE		ESE		Total
		20		20		60		100

Pre-requisite Course Codes	MCA14, MCA 15	
	Student will be able to	
Course Outcomes	CO1	Explain the foundation for Global Digital Marketing.
	CO2	Apply online branding activities for the assigned product
	CO3	Develop strategies which would help to achieve marketing objectives and achieve Online Reputation Management.
	CO4	Determine emerging trends in Digital marketing.

Module No.	Module Name	Topics	Ref.	Hrs.
1	Introduction to digital marketing	Marketing in the digital age – the present and the future, The technology behind digital marketing. Digital marketing framework, Need a digital marketing strategy, Your business and digital marketing. Digital Consumer, 10 Ps of digital marketing, Website a hub of digital marketing world, E-commerce basics, advantages, disadvantages, People power, market research versus market reality, 3i principles, Digital marketing models	1,2,3	6
2	Search Engine Optimization	SEO : Four stage SEO process, Goals, On-page, off-page optimization, Keyword research, Google webmaster tool, Google Adwords, Google Analytics	1,3	6
3	Online Marketing : Social media, e-mail marketing, mobile marketing	Different forms of social media E-mail marketing process, leads and sales with email marketing, design and content, delivery, discovery, campaign planning, success measurement.  Mobile advertising, Mobile gaming, Mobile applications, mobile privacy, mobile data Video Marketing, Statistics on video marketing, Augmented and virtual reality	1,3	15
4	Digital Marketing Strategy	Digital marketing strategy groundwork Defining digital marketing mix Digital marketing strategy roadmap	2	6
5	ORM, Performance Marketing &	Online Reputation Management Performance marketing Web analytics	1	4



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	Web Analytics			
6	The future of Digital Marketing	Digital marketing – Global landscape, The Indian view Emerging trends and concepts, Emerging opportunities for digital marketing professionals.	2	5
			Total	42

**References:**

- [1] Damian Ryan, -Understanding Digital Marketing: Marketing strategies for engaging the digital generation!, 4<sup>th</sup> edition, 2017, Kogan Page Limited.
- [2] Puneet Singh Bhatia, -Fundamentals of Digital MarketingI, 1<sup>st</sup> edition, 2017, Pearson Edition.
- [3] Ian Dodson, -The Art of Digital Marketing : The definitive guide to creating strategic targeted and measurable online campaigns!, 2016, Wiley.

**List of Tutorials on Digital Marketing**

Tutorial No.	Title	No. of Hrs
1	Case study :Dulux, Entertainer Social media marketing and optimization YouTube Marketing Facebook marketing Linkedin Google Plus Twitter	2
2	Case study: Mobile conversions increased year on year. The rise and rise of mobile advertising	2
3	Case study on content marketing and native advertising Info graphics Content Marketing Optimize customer and user experience	2
4	Case study on video marketing . Webinar Marketing Live Streaming	2
5	Case study on Online Reputation Management. Online Marketing Plan	2
6	Case study: Creating & publishing Blogs	1
7	Adobe analytics – SiteCatalyst, Life without Google	1
8	Develop Strategy for Digital Marketing Discussion on Future development in video marketing	2
	Total	14



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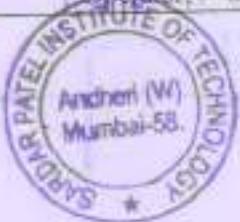
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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	
MCAE35 E	Web Services	3	1	-	3	1	-	4
Examination Scheme								
		ISE		MSE		ESE		Total
		20		20		60		100

Pre-requisite Course Codes	MCAL16
	Student will be able to
	CO1 Conceptualize working of web service architecture
	CO2 Relate messaging framework with SOAP
Course Outcomes	CO3 Analyze business policy implemented in web services
	CO4 Integrating concept of security for web services

Module No.	Module Name	Topics	Ref.	Hrs.
1	Web Services: A Realization of SOA	Scope of the Architecture, Transport Services Messaging Services: SOAP, WS-Addressing Service Description: WSDL, Policy Discovery Services: UDDI, MetaData Exchange Quality of Service: WS-Security, Reliable Messaging, Transactions Service Components: Composition of Web Services Composeability	1	4
2	Messaging Framework	SOAP: A Brief History of SOA Architectural Concepts: Defining Some Terms, The SOAP Processing Model, SOAP Roles (Enforcing SOAP Roles—The –must Understand Attribute, Passing Headers—The –relay Attribute), SOAP Faults, Documents and RPC, Message Exchange Patterns, Request/Response MEP, Long-Running Conversational MEP, SOAP Bindings, SOAP and HTTP, SOAP, SOAP Attachments	1	4
3	Web Services Addressing	Addressing Web Services Architectural Concepts: Endpoint References, Comparing Endpoints, Message Information Headers, Binding Endpoint References to SOAP Messages, Request-Reply Pattern in WS-Addressing, Request Message, Reply Message	1	2
4	Describing Metadata : Web Services Description Language (WSDL)	Role of WSDL in WS-* /SOA Architectural Concepts: Extensibility, Support for Multiple Type Systems, Unifying Messaging and RPC, Separation of –What from –How and –Where, Support for Multiple Protocols and Transports, No Ordering, No Semantics	1	6
5	Web Services Policy	Architectural Concepts : Policy Framework( The Policy Container, Policy Operators, ExactlyOne Operator, All Operator, –Optional Operator, Policy Vocabulary, Policy	1	4



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		Identification and Inclusion, Policy Intersection, Attaching Policies to Web Service		
6	Discovering Metadata: Universal Description, Discovery, and Integration (UDDI)	Role of UDDI in SOA and the WS Stack: Use of UDDI During Design and Development, Use of UDDI at Runtime, Motivation for UDDI Architectural Concepts UDDI and WSDL: Mapping of WSDL portType Element, Mapping of WSDL Binding Element, Mapping of WSDL Service Element, Mapping of WSDL Port Element, UDDI and WSDL at Development Time, UDDI and WSDL at Runtime UDDI and WS-Policy: Referencing Remote Policy Expressions Directly, Referencing Remote Policy Expressions Indirectly, Querying UDDI Using Policy Expressions	1	4
7	Reliable Interaction	Reliable Messaging, Motivation for Reliable Messaging Reliable Messaging Scenarios: Store and Forward, Batch Window, Failure Recovery, Long-Running Transactions Processing Model: Sequence Lifecycle, Basic Syntax, Sequence Element, Sequence Acknowledgement Element, AckRequested Element, Sequence Fault Element, Delivery Semantics Supported, Policy Assertions, Inactivity Timeout	1	4
8	Motivation for Transactions: Classic Transactions, Business Transactions	Definition of Transaction Architectural Terms: Coordination, Protocols for Atomic Transactions (WS-Atomic Transaction), Protocols for Business Transactions (WS-BusinessActivity) Services and Protocols: WS-Coordination Service, Context, Activation Service, Registration Service, Transaction Protocols, WS-Atomic Transaction, Completion Protocol, Durable Two-Phase Commit Protocol, Volatile Two-Phase Commit Protocol, WS-Business Activity, Business Agreement with Participant Completion, Business Agreement with Coordinator Completion, General Considerations Example: Travel Agent Scenario Using Atomic Transaction(Activation, Application Calls Web Service, Registration, Completion/Coordination), Travel Agent Scenario Using Business Activity(Activation, Application Calls Web Service, Registration, Web Service Completion), Coordination Security A Motivating Example: Travel Agent Web Services Roles of Security in Web Services Motivation for Using WS-Security	1	4
9	End-to-End Security When Intermediaries Are Present	Federating Multiple Security Domains, A Brief History, Architectural Concepts, Processing Model: XML Signature, XML Encryption, Putting the Pieces Together: The Basic Model, Model with Intermediary, Trust Relationships, Interoperability: Basic Security Profile Future Directions, Summary, Advanced Security	1	4
				Total 42



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAL51	Distributed Computing and cloud computing Lab	-	-	2	-	--	1	1
<b>Examination Scheme</b>								
ISE			MSE		ESE		<b>Total</b>	
40			-		-		40	

Pre-requisite Course Codes	MCA22 , MCA31			
	Student will be able to			
Course Outcomes	CO1	Implement RPC and RMI on the given scenario.		
	CO2	Implement Clock Synchronization algorithms		
	CO3	Implement Shared memory and load balancing on the given situation		
	CO4	Analyze various case studies on cloud computing		

Sr.n o		Experiment details	Ref	Marks
1	Implementation of Remote Procedure Call Concept	This application will demonstrate the remote procedure communication. a) Implement a Server calculator containing ADD(),MUL(),SUB()etc. b) Implement a Date Time Server containing date() and time()	1,2,3	5
2	Remote Method Invocation supporting the distributed computing in java.	Concept: Create a client and server application where the client invokes methods via an interface. These methods are implemented on the server side. Create the necessary STUBS and SKELETONS. a)Design a Graphical User Interface (GUI) based calculator (scientific or standard). Operations should be performed using both mouse and keyboard. b) Retrieve time and date function from server to client. This program should display server date and time. c) Equation solver. The client should provide an equation to the server through an interface. The server will solve the expression given by the client. $(a-b)^2 = a^2 - 2ab + b^2;$ If a = 5 and b = 2 then return value = $5^2 - 2 \cdot 5 \cdot 2 + 2^2 = 9$ .	1,2,3	5
3	Show the implementation of Physical and logical clock synchronization algorithm.		1,2,3	5
4	Implementation of mutual exclusion using	Concept: This technique solves the mutual exclusion existing in the process communication. a) Centralized	1,2,3	5





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	any of the technique.	b) Distributed c) Token Ring Note: Use any one technique		
5	Implement Suzuki Kasami Token Based Algorithm.		1,2,3	5
6	Implementation of Shared Memory	Write a program to increment counter in Shared memory	1,2,3	5
7	Study of cloud technologies	Virtualization Technologies, Virtual Machine Technology, Cloud data center.	1,2,3	5
8	Case Study	on Google, Microsoft, AWS	1,2,4	5
Total				40

**Reference Books:**

1. Core Java2 Volume I & II – Horstmann, Cornell and gary, 9<sup>th</sup> edition,2013.
2. Java Complete Reference – Herbert Schildt, 5<sup>th</sup> edition,2002.
3. Distributed computing system and concepts – Andrew Tanenbaum, 2<sup>nd</sup> edition, PHI.
4. Distributed OS - Pradeep K. Sinha , PHI
5. Cloud Computing unleashing next gen infrastructure to application – Dr. Kumar Saurabh, willey
6. Cloud Computing insights into new-era infrastructure –Dr.Kumarsaurabh, willey

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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAL52	Data Analytics Lab	—	—	2	—	—	1	1
Examination Scheme								
			ISE	MSE		ESE	Total	
			40	—		--	40	

Pre-requisite Course Codes	MCA25
	Student will be able to
Course Outcomes	CO1 Analyze statistical data for data forecasting and visualization.
	CO2 Analyze large data set for selection of model.
	CO3 Implement efficient solution for data manipulation and data analysis.
	CO4 Build responsive Layout of R applications.

Experiment No.	Experiment Details	Ref no	Marks
1	Introduction R and R Studio, R data types and objects, reading and writing data	1	5
2	Control structures, functions, scoping rules, dates and times	1	5
3	Loop functions, debugging tools	1	5
4	Mathematical Functions in R	2	5
5	Fitting Linear Models in R	2	5
6	Bayesian Analysis in R	2	5
7	Spatial Analysis in R	2	5
8	Shiny R Applications and R server deployment	2	5
Total			40

#### Reference Book

- 1]R Programming for Data Science by Roger D. Peng-2016,1<sup>st</sup> Edition.
- 2] Practical Data Science With R by Nina Zumel John Mount-2014,1<sup>st</sup> Edition.



Dr. Anil Sankari



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAL53	Animation and Graphic Design Lab	-	-	2	-	-	1	1
<b>Examination Scheme</b>								
ISE			MSE			ESE		Total
40			-			-		40

Pre-requisite Course Codes	MCAE35 D			
	Student will be able to			
Course Outcomes	CO1	Install blender software		
	CO2	Demonstrate 3D space and camera setting		
	CO3	Implement window types and edit objects		
	CO4	Implement Mesh objects using modifiers		
	CO5	Develop animation on the given scenario		

Module No.	Topics	Ref no	Marks
1	Study and Installation of Blender software	2, 3	5
2	3D cursor and moving in 3D space	2,4	5
3	Camera View setting	2, 1	5
4	To change the window types (File Browser info panel, User preference, Outliner)	3	5
5	Navigate and import objects.	3,2	5
6	Create and edit objects (Moving, Scaling And Rotating Objects)	3	5
7	Mesh objects and Modifiers	3	5
8	To develop animation on given scenario	2,3	5
Total Marks			40

#### Reference books:

1. Blender Basics ,Classroom tutorial books, 4<sup>th</sup> Edition, James Chronister,2011.
2. <https://docs.blender.org/manual/en/dev/>
3. The Beginner's guide to Blender, Jonathan Lampel,2015.
4. An introduction to 3D blender, A Book for Beginners, John M Blain.
5. A Blender Tutorial, Building a Loco © Paul Hobbs 2014-15, Version 1.02





## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
 (Autonomous Institute Affiliated to University of Mumbai)

### Sem III (For Computer/IT Graduates)

No	Type	Code	Course	L	T	P	O	E	C
1	OE*	OEXXX	Open Elective-I	3	0	0	5	8	3
2	PE	MC5XX-II	Thread Elective-II /Program Elective-II	3	0	2	4	9	4
3	PE	MC5XX-III	Thread Elective-III /Program Elective-III	3	0	2	4	9	4
4	SBC	MC601	Project-II	0	0	8	8	16	4
5	HSSE	HSEX3	HSS-III	2	0	0	3	5	2
6	SBC	AS603	Selling and Negotiation Skills	2	0	0	3	5	2
7	ABL	SVXX/STXX	SEVA/SATVA-III	0	0	0	2	2	1
			<b>TOTAL</b>	<b>13</b>	<b>0</b>	<b>12</b>	<b>29</b>	<b>54</b>	<b>20</b>

### Sem III (For Non Computer/IT Graduates)

No	Type	Code	Course	L	T	P	O	E	C
1	PC	MC602	Computer Networks	2	0	0	3	5	2
2	OE*	OEXXX	Open Elective-I	3	0	0	5	8	3
3	PE	MC5XX-II	Thread Elective-II /Program Elective-II	3	0	2	4	9	4
4	PE	MC5XX-III	Thread Elective-III /Program Elective-III	3	0	2	4	9	4
5	SBC	MC601	Project-II	0	0	8	8	16	4
6	SBC	AS603	Selling and Negotiation Skills	2	0	0	3	5	2
7	ABL	SVXX/STXX	SEVA/SATVA-II	0	0	0	2	2	1
			<b>TOTAL</b>	<b>13</b>	<b>0</b>	<b>12</b>	<b>29</b>	<b>54</b>	<b>20</b>



*Shrikant*

*J. P. Dabholkar*



## Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
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Sem IV							
No	Type	Code	Course	L	T	P	O
1	OE*	OEXXX	Open Elective-II	3	0	0	5
2	ABL	SVXX / STXX	SEVA/SATVA	0	0	0	2
3	SBC	MC610	6-Month Industry Internship/Research internship at SPIT or Other Institute / Internship with Startup at TBI	0	0	0	45
			<b>TOTAL</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>55</b>
							<b>16</b>

### THREAD ELECTIVES

Sr. No.	Thread	Thread Elective I	Thread Elective II	Thread Elective III
1	Data Science	Machine Learning (MC511)	Deep Learning (MC512)	Data Visualization and Analytics (MC513)
2	Testing	Software Testing (MC514)	Quality Assurance (MC515)	Risk Analysis (MC516)
3	Any new thread approved by BoS			

### PROGRAM ELECTIVES / MOOC

MC517	IoT and IIoT
MC518	Cloud Computing
MC519	Artificial Intelligence
MC520	Cyber Security
MC521	Block Chain Technology
MC522	Data Warehousing and Mining
MC523	Computer Graphics
MC524	Ethical Hacking
MCS11	Machine Learning
MC514	Software Testing
	Any other Course approved by the Dean Academics and Principal



Shrivastav

**SYMCA SEM:III & IV Open Elective Choice 2021 22 (Jan 2022)**

Name (starting with surname)	UID No.	Open elective allotted
Bhat Geeta Vishwanath	2020510007	(MOOC) Business Planning & Project Management
Tiwari Anupam	2020510065	(MOOC) Business Planning & Project Management
Bhumesh Bodalia	2020510009	(MOOC) Business Planning & Project Management
Gani Tahir	2020510021	(MOOC) Business Planning & Project Management
Salian Samidha	2020510056	(MOOC) Business Planning & Project Management
Gupta Aphishek	2020510026	(MOOC) Business Planning & Project Management
Kolhe Sachin	2020510034	(MOOC) Business Planning & Project Management
GUJAR PRASHANT SAKHARAM	2020510025	(MOOC) Business Planning & Project Management
Vakurdekar Pratik Dilip	2020510037	(MOOC) Business Planning & Project Management
MORE OMKAR VISHWANATH	2020510045	(MOOC) Business Planning & Project Management
Dound Prathamesh Popat	2020510017	(MOOC) Business Planning & Project Management
Ghag Pranali Ashok	2020510024	(MOOC) Business Planning & Project Management
Salvi Anushka	2020510057	(MOOC) Principles of Management
D Sundaram	2020510062	(MOOC) Principles of Management
Suvarna Rashika	2020510063	(MOOC) Principles of Management
Srivastava Tanay	2020510061	(MOOC) Principles of Management
Dubey Vivishwan Vinod	2020510019	(MOOC) Principles of Management
Sadhwani Mahek	2020510055	(MOOC) Principles of Management
Kukade Piyush	2020510037	(MOOC) Principles of Management
Gupta Shubham	2020510027	(MOOC) Principles of Management
Dubey Akash Anil	2020510018	(MOOC) Principles of Management
Pati Siddhi	2020510050	(MOOC) Principles of Management
Kolapate Sourabh Laxman	2020510033	(MOOC) Principles of Management
Misal Mayur Pandurang	2020510044	(MOOC) Principles of Management
Kumawat Rahul	2020510039	(MOOC) Principles of Management
KULKARNI UDIT	2020510038	(MOOC) Principles of Management
Haryan Sneha	2020510028	(MOOC) Principles of Management
Jadhav Tejal Ajay	2020510030	(MOOC) Principles of Management
Chavan Anushka	2020510012	(MOOC) Principles of Management
D'Cruz Lovin	2020510014	(MOOC) Principles of Management
Lunkar Swapnil Pramod	2020510022	(MOOC) Principles of Management
Tatkare Onkar Sudhakar	2020510064	(MOOC) Principles of Management
Pujari Vinod Ramchandra	2020510053	(MOOC) Principles of Management
Bellwani Mohit Ravinder	2020510006	(MOOC) Principles of Management
Biswas Debaroti	2020510008	(MOOC) Principles of Management
Nair Siddharth	2020510047	(MOOC) Principles of Management
Kshirsagar Sanket	2020510036	(MOOC) Principles of Management
Phadke Nikhil	2020510052	(MOOC) Principles of Management
Honmene Mayur	2020510029	(MOOC) Principles of Management
Mhapankar Swapnil Sakharam	2020510043	(MOOC) Principles of Management
Sohawane Rutika Sandipan	2020510060	(MOOC) Principles of Management
DESHMUKH ANIRUDDHA SHANK	2020510015	(MOOC) Principles of Management
BOLAR PALLAVI PRAVINCHAND	2020510010	(MOOC) Principles of Management
Shaikh Samee	2020510058	* IPR and Patents
Kevalkumar Limbani	2020510041	* IPR and Patents
Rajput Tanuj	2020510054	* IPR and Patents
BORKAR RUTWIK RAJESH	2020510011	* IPR and Patents
WARKHADE PRAJWAL BHAGWA	2020510069	* IPR and Patents
Baraskar Sahil	2020510005	* IPR and Patents
Patta Jagannath	2020510051	* IPR and Patents



*Pls*

*Sehdev Singh*

Bagul Jaikishan Babulal	2020510002	* IPR and Patents
GANGWAL TANISH	2020510020	* IPR and Patents
Khandelwal Kalpesh Anil	2020510032	* IPR and Patents
Agarwal Surbhi	2020510001	* IPR and Patents
Singh Adarshkumar	2020510059	* IPR and Patents
Chhabria Krishna	2020510013	* IPR and Patents
Gavande Siddhi Anil	2020510023	* IPR and Patents
Bamble Akash Ashok	2020510004	* IPR and Patents
Koli Ashwin Prakash	2020510035	* IPR and Patents
Patil Dhawal Jitendra	2020510016	* IPR and Patents
Panchbhai Srushti Nandu	2020510049	* IPR and Patents
Tyagi Sanjeev Vaibhav	2020510066	* IPR and Patents
Naik Bhavesh Nitin	2020510046	* IPR and Patents
Jaiswal Shubham	2020510031	* IPR and Patents
Wankhede Meghna Bhojneesh	2020510068	* IPR and Patents
Mangalarapu Rahul Rajaram	2020510042	* IPR and Patents
Kutty Mahesh	2020510040	* IPR and Patents




Aarti Karande &lt;aartimkarande@spit.ac.in&gt;

**Fwd: OPEN ELECTIVE \_SEM III\_IV (July\_December'23) Batch [21\_23]**

Nikhita Mangaonkar <nikhita.mangaonkar@spit.ac.in>  
 To: Aarti Karande <aartimkarande@spit.ac.in>

Tue, Jan 9, 2024 at 4:33 PM

----- Forwarded message -----

From: Nikhita Mangaonkar <nikhita.mangaonkar@spit.ac.in>  
 Date: Tue, May 30, 2023 at 2:38PM  
 Subject: OPEN ELECTIVE \_SEM III\_IV (July\_December'23) Batch [21\_23]  
 To: <Spit\_mca2023@spit.ac.in>  
 Cc: Dr. Puja Raundekar <drpujaraundekar@spit.ac.in>, Dhananjay Kambande <dhananjay.kambande@spit.ac.in>, Academic B.P.I.T. <academics@spit.ac.in>, Rajendra Sutar <rajendra.sutar@spit.ac.in>

Dear Students,

Kindly enrol for Open Elective for Sem III & IV as mentioned in the shared sheet. NOTE :- Do not opt for the subject which you have already taken in either SEM III or IV, such cases will not be considered.

Name	Link
Understanding Incubation and Entrepreneurship	<a href="https://drive.google.com/file/d/1mIwQzJLmOg23_oG9p9nn">https://drive.google.com/file/d/1mIwQzJLmOg23_oG9p9nn</a>
Organizational Behavior	<a href="https://drive.google.com/file/d/1mIwQzJLmOg23_oG9p9nn">https://drive.google.com/file/d/1mIwQzJLmOg23_oG9p9nn</a>
Entrepreneurship	<a href="https://drive.google.com/file/d/1mIwQzJLmOg23_oG9p9nn">https://drive.google.com/file/d/1mIwQzJLmOg23_oG9p9nn</a>

Regards,  
 Nikhita Mangaonkar,  
 Assistant Professor,  
 CSE (MCA) Department,  
 SPIT



SPIT Vision : To build a renowned institute which will produce graduate engineers with global competency and social sensitivity.

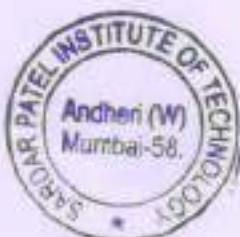
SPIT MCA Vision : To create a center of excellence which will produce cutting edge technologists to cater the needs of Business and Society.

Regards,  
 Nikhita Mangaonkar,  
 Assistant Professor,  
 CSE (MCA) Department,  
 SPIT



SPIT Vision : To build a renowned institute which will produce graduate engineers with global competency and social sensitivity.

SPIT MCA Vision : To create a center of excellence which will produce cutting edge technologists to cater the needs of Business and Society.



**Choose the course which is starting from upcoming semester only i.e. Jan to April 2023**

**Sem III students will opt for OE-I and Sem IV Students(Internship students) will opt for OE-II**

**Sr. III** Students can choose from Choice 1 to 4.

Sem IV (Internship) Students will have to choose from Choice 2 to 4

Sr. No.	UCID	Full Name	Choice
1	2021510001	Mahima Agrahari	Leadership and Team Effectiveness (NPTEL)
2	2021510002	Shashank Basant Agrawal	Principles Of Management
3	2021510003	Shubham Narendra Atrame	Leadership and Team Effectiveness
4	2021510004	Abhishek Bharat Bawachkar	Leadership and Team Effectiveness
5	2021510005	Chinmay Shrikrushna Bhagwat	Leadership and Team Effectiveness
6	2021510006	Pankaj Ramu Bhoir	Leadership and Team Effectiveness
7	2021510007	Ganesh Jagannath Chaudhari	Leadership and Team Effectiveness
8	2021510008	Tirsha Asim Das	Leadership and Team Effectiveness
9	2021510009	Titas De	Leadership and Team Effectiveness
10	2021510010	Chetan Prabhakar Dhandge	Leadership and Team Effectiveness
11	2021510011	Rutik Bhupal Dhure	Leadership and Team Effectiveness
12	2021510012	Mayur Gajanan Dhevale	Leadership and Team Effectiveness
13	2021510013	Utkarsh Dipak Doras	Leadership and Team Effectiveness
14	2021510014	Shivani Dharamrajan Eranjikal	Leadership and Team Effectiveness
15	2021510015	Haresh Ananta Gayakhe	Leadership and Team Effectiveness
16	2021510016	Dipesh Dattaram Ghag	Leadership and Team Effectiveness
17	2021510017	Jasmit Pravin Gharat	Leadership and Team Effectiveness
18	2021510018	Sudhir Narayan Gomase	Leadership and Team Effectiveness (NPTEL)
19	2021510019	Prashant Pradeep Gowda	Leadership and Team Effectiveness
20	2021510020	Raashi Gupta	Understanding Incubation and Entrepreneurship
21	2021510021	Hema Manoj	Leadership and Team Effectiveness
22	2021510022	Omkar Vikas Ingle	Leadership and Team Effectiveness
23	2021510023	Valbhav Balasaheb Kamble	Leadership and Team Effectiveness (NPTEL)
24	2021510024	Tejas Shailendra Kamble	Leadership and Team Effectiveness (NPTEL)
25	2021510025	Ompreakash Devprasad Kambli	Principles of Management
26	2021510026	Shantanu Ananta Kamte	Leadership and Team Effectiveness
27	2021510027	Sagar Vinod Kesharwani	Leadership and Team Effectiveness (NPTEL)
28	2021510028	Rashi Khandelwal	Understanding Incubation and Entrepreneurship (NPTEL)
29	2021510029	Kshitij Anil Koyande	Leadership and Team Effectiveness
30	2021510030	Rohit Rajaram Mahadik	Leadership and Team Effectiveness
31	2021510031	Ritik Rajendra Maheshwari	Leadership and Team Effectiveness
32	2021510032	Kanchan Ramdas Mali	
33	2021510033	Mayank Janardhan Mali	Leadership and Team Effectiveness
34	2021510034	Nikhil Ashok Maurya	Leadership and Team Effectiveness
35	2021510035	Suman Ashok Mudliyar	Leadership and Team Effectiveness
36	2021510036	Sakshi Sadanand Naik	Leadership and Team Effectiveness
37	2021510037	Sura Prakkash Nair	Leadership and Team Effectiveness
38	2021510038	Ashutosh Balasaheb Nistane	Leadership and Team Effectiveness
39	2021510039	Sanket Rajesh Nitnaware	Leadership and Team Effectiveness
40	2021510040	Jay Umesh Oswal	Principles Of Management
41	2021510041	Vishal Devidas Padme	Leadership and Team Effectiveness
42	2021510042	Pratish Mangalsing Padvi	Leadership and Team Effectiveness
43	2021510043	Siddhant Jayant Panda	Leadership and Team Effectiveness
44	2021510044	Vivek Shashibhushan Pandey	Leadership and Team Effectiveness
45	2021510045	Pratik Ramesh Parale	Leadership and Team Effectiveness
46	2021510046	Sakshi Ashok Parkar	Leadership and Team Effectiveness
47	2021510047	Devika Uday Patil	Leadership and Team Effectiveness
48	2021510048	Atharva Suhas Patil	Leadership and Team Effectiveness
49	2021510049	Shubham Sangratna Patil	Leadership and Team Effectiveness (NPTEL)
50	2021510050	Akshay Avdhut Pawar	Leadership and Team Effectiveness



51	2021510051	Mukesh Ananth Pilai	Leadership and Team Effectiveness
52	2021510052	Jalaj Porwal	Understanding Incubation and Entrepreneurship
53	2021510053	Amit Manchar Rathod	Leadership and Team Effectiveness
54	2021510054	Sanket Subhash Raut	Leadership and Team Effectiveness
55	2021510055	Anish Atul Redkar	Leadership and Team Effectiveness
56	2021510056	Kevin Joseph Keith Rego	Leadership and Team Effectiveness
57	2021510057	Anjali Sandeep Saharkar	Leadership and Team Effectiveness (NPTEL)
58	2021510058	Neha Sabrin Saleem T K	Understanding Incubation and Entrepreneurship
59	2021510059	Prithviraj Sathyajit	Leadership and Team Effectiveness
60	2021510060	Payal Milind Save	Leadership and Team Effectiveness (NPTEL)
61	2021510061	Saleal Mahendra Sawant	Leadership and Team Effectiveness
62	2021510062	Ankita Ramaji Selokar	Leadership and Team Effectiveness (NPTEL)
63	2021510063	Sandesh Shivaji Shivane	Leadership and Team Effectiveness (NPTEL)
64	2021510064	Prashant Bhupendra Pratap Singh	Leadership and Team Effectiveness (NPTEL)
65	2021510065	Devvrat Sukte	Leadership and Team Effectiveness (NPTEL)
66	2021510066	Parnika Tewari	Leadership and Team Effectiveness (NPTEL)
67	2021510067	Vyankatesh Badriprasad Wable	Leadership and Team Effectiveness (NPTEL)



*Bhavna* →

*Rishi*

**OPEN ELECTIVES**

Choice 1 : IPR and Patent (Institute Level)

Choice 2 : Principles of Management (NPTEL)

Choice 3 : Understanding Incubation and Entrepreneurship (NPTEL)

Choice 4 : Leadership and Team Effectiveness (NPTEL)

**IPR and Patents will be conducted through institute****Example Courses on NPTEL**

<b>Principles Of Management</b>	<a href="https://onlinecourses.nptel.ac.in/noc23_ma33/preview">https://onlinecourses.nptel.ac.in/noc23_ma33/preview</a>
By Prof. Usha Lenka	IIT Roorkee
Course Status	Upcoming
Course Type	Core
Duration :	12 weeks
Start Date	23 Jan 2023
End Date	14 Apr 2023
Exam Date	30 Apr 2023 IST
Enrollment Ends	30 Jan 2023
Category	Management Studies
Credit Points	3
Level	Undergraduate/Postgraduate

This is an AICTE approved FDP course

<b>Understanding Incubation and Entrepreneurship</b>	<a href="https://onlinecourses.nptel.ac.in/noc23_de04/preview">https://onlinecourses.nptel.ac.in/noc23_de04/preview</a>
Prof. B.K. Chakravarthy	IIT Bombay
Course Status	Upcoming
Course Type	Elective
Duration :	12 weeks
Start Date	23 Jan 2023
End Date	14 Apr 2023
Exam Date	29 Apr 2023 IST
Enrollment Ends	30 Jan 2023
Category	Design Engineering
Credit Points	3
Level	Undergraduate/Postgraduate

This is an AICTE approved FDP course

<b>Leadership and Team Effectiveness</b>	<a href="https://onlinecourses.nptel.ac.in/noc23_ma28/preview">https://onlinecourses.nptel.ac.in/noc23_ma28/preview</a>
Prof. Santosh Rangnekar	IIT Roorkee
Course Status	Upcoming
Course Type	Elective
Duration :	12 weeks
Start Date	23 Jan 2023
End Date	14 Apr 2023
Exam Date	30 Apr 2023 IST
Enrollment Ends	30 Jan 2023
Category	Management Studies
Credit Points	3
Level	Undergraduate/Postgraduate

This is an AICTE approved FDP course



A handwritten signature in blue ink is placed over a blue arrow pointing towards the right.

A handwritten signature in black ink is located at the bottom left.

Aarti Karande <aartimkarande@spit.ac.in>

## Fwd: NPTEL Course in lieu of "Selling and Negotiation Skills"

Pallavi Thakur <pallavi.thakur@spit.ac.in>  
To: Aarti Karande <aartimkarande@spit.ac.in>

Tue, Jan 9, 2024 at 4:04 PM

----- Forwarded message -----

From: Rajendra Sutar <rajendra.sutar@spit.ac.in>  
Date: Tue, Jul 5, 2022 at 1:39 PM  
Subject: Re: NPTEL Course in lieu of "Selling and Negotiation Skills"  
To: Pallavi Thakur <pallavi.thakur@spit.ac.in>  
Cc: Dr. Poornima Raundale <poorna@spit.ac.in>

On/  
Approved.

Please inform the concerned students to enrol for the course.

Dr. Rajendra Sutar  
Dean Academics  
S. P. I. T. Mumbai, 400058

On Tue, Jul 5, 2022 at 11:00 AM Pallavi Thakur <pallavi.thakur@spit.ac.in> wrote:

Hello Sir,

As per MCA scheme, students have selling and negotiation skills course in their 3rd semester which is 2 credit course. As per our discussion, the following course from Swayam can be given to students

Details of the course:

Strategic Sales Management

By Prof. Kalpana Kukarni, Prof. Sourabhi Antra | IIT Roorkee, IIT Roorkee  
[https://onlinecourses.nptel.ac.in/RoG22\\_mg107/preview](https://onlinecourses.nptel.ac.in/RoG22_mg107/preview)

Kindly check and approve, if found proper.

Regards

Pallavi Thakur  
Assistant Professor  
MCA Department  
Saider Patel Institute of Technology (S.P.I.T.)  
Mumbai

MCA DEPT VISION:

To create a center of excellence which will produce cutting edge technologists to cater the needs of Business and Society

MCA DEPT MISSION:

- To provide high quality education .
- To train the students to excel in cutting edge technologies that makes them industry ready.
- To inculcate ethical and professional values in students for betterment of society.
- To inculcate an Entrepreneurial mindset in students to make them job creators.

Regards,  
Pallavi Thakur  
Assistant Professor  
Department of Computer Science & Engineering(MCA)  
Saider Patel Institute of Technology (S.P.I.T.)  
Mumbai-400058  
Tel: 02226788529 Ext. no. 398

MCA DEPT VISION:

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- To inculcate an Entrepreneurial mindset in students to make them job creators.

Rhitte



Rhitte