SCHEME OF EXAMINATION

and

SYLLABI

for

Bachelor of Technology
Electronics and Communication Engineering

Offered by

University School of Engineering and Technology

1st SEMESTER TO 8th SEMESTER

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

Guru Gobind Singh Indraprastha University
Dwarka, Delhi – 110078 [INDIA]
www.ipu.ac.in

BACHELOR OF TECHNOLOGY
(COMMON TO ALL BRANCHES)
FIRST SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETMA-101		Applied Mathematics-I	3	1	4	M
ETPH-103		Applied Physics-I	2	1	3	M
ETME-105		Manufacturing Processes	3	0	3	M
ETEE-107		Electrical Technology	3	0	3	M
ETHS-109		Human Values and Professional Ethics-I#	1	1	1	--
ETCS-111		Fundamentals of Computing	2	0	2	--
ETCH-113		Applied Chemistry	2	1	3	M
PRACTICAL/VIVA VOCE						
ETPH-151		Applied Physics Lab-I	------	2	1	
ETEE-153		Electrical Technology Lab	------	2	1	M
ETME-155		Workshop Practice	------	3	2	M
ETME-157		Engineering Graphics Lab	------	3	2	
ETCS-157		Fundamentals of Computing Lab	------	2	1	--
ETCH-161		Applied Chemistry Lab	------	2	1	--
		NCC/NSS*#	------	------	------	--
TOTAL			**16**	**18**	**27**	

M: Mandatory for award of degree
#NUES (Non University Examination System)
**#NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards. The camps/classes will be held either during Weekends/Holidays or Winter/Summer Vacations.*

BACHELOR OF TECHNOLOGY
(COMMON TO ALL BRANCHES)
SECOND SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETMA-102		Applied Mathematics-II	3	1	4	M
ETPH-104		Applied Physics-II	2	1	3	
ETEC-106		Electronic Devices	3	0	3	M
ETCS-108		Introduction to Programming	3	0	3	M
ETME-110		Engineering Mechanics	2	1	3	--
ETHS-112		Communication Skills	2	1	3	--
ETEN-114		Environmental Studies	2	1	3	--
PRACTICAL/VIVA VOCE						
ETPH-152		Applied Physics Lab-II	-------	2	1	
ETCS-154		Programming Lab	-------	2	1	M
ETEC-156		Electronic Devices Lab	------	2	1	M
ETME-158		Engineering Mechanics Lab	-------	2	1	--
ETEN-160		Environmental Studies Lab	-------	2	1	--
		NCC/NSS*#	-------	------	------	--
TOTAL			**17**	**15**	**27**	

M: Mandatory for award of degree
#NUES (Non University Examination System)
**#NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards. The camps/classes will be held either during Weekends/Holidays or Winter/Summer Vacations.*

BACHELOR OF TECHNOLOGY
(ELECTRONICS AND COMMUNICATION ENGINEERING)
THIRD SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETMA-201		Applied Mathematics – III	3	1	4	
ETEC-203		Analog Electronics - I	3	1	4	M
ETEC-205		Switching Theory and Logic Design	3	1	4	M
ETEC-207		Electronic Instruments and Measurements	3	1	4	M
ETCS-209		Data Structures	3	1	4	
ETEC-211		Signals and Systems	3	1	4	
PRACTICAL/VIVA VOCE						
ETEC-251		*Analog Electronics-I Lab	0	2	1	
ETEC-253		Switching Theory and Logic Design Lab	0	2	1	
ETEC-257		Electronic Instruments and Measurements Lab	0	2	1	
ETCS-255		Data Structures Lab	0	2	1	
ETEC-259		Signals and Systems Lab *	0	2	1	
		NCC/NSS**	0	0	0	
TOTAL			**18**	**16**	**29**	

M: Mandatory for award of degree

*** Some lab experiments must be performed using any circuit simulation software e.g. PSPICE/Scilab/MATLAB/LabVIEW etc.**

*** NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards.*

BACHELOR OF TECHNOLOGY
(ELECTRONICS AND COMMUNICATION ENGINEERING)
FOURTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETMA 202		Applied Mathematics – IV	3	1	4	
ETEC 204		Analog Electronics – II	3	1	4	
ETEC 206		Network Analysis and Synthesis	3	1	4	M
ETEC 212		Communication Systems	3	1	4	M
ETEE 210		Electromagnetic Field Theory	3	0	3	
ETCS 204		Computer Organization and Architecture	3	0	3	
PRACTICAL/VIVA VOCE						
ETMA 252		Applied Mathematics Lab	0	2	1	
ETEC 258		Network Analysis and Synthesis Lab	0	2	1	
ETEC 256		Communication System Lab	0	2	1	
ETEC 254		Analog Electronics – II Lab*	0	2	1	
ETCS 260		Computer Organization and Architecture Lab	0	2	1	
ETSS 250		NCC/NSS**	0	0	1	
TOTAL			**18**	**14**	**28**	

M: Mandatory for award of degree

*** Some lab experiments must be performed using any circuit simulation software e.g. PSPICE/Scilab/MATLAB/LabVIEW etc.**

*** NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards.*

NOTE: 4 weeks Industrial / In-house Electronic Workshop/PCB making and assembling/Use of CAD software (Lab needs to be developed) will be held after fourth semester. However, Viva-Voce will be conducted in the fifth semester.

BACHELOR OF TECHNOLOGY
(ELECTRONICS AND COMMUNICATION ENGINEERING)
FIFTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETHS-301		Communication Skills for Professionals	2	0	1	
ETEC-303		Digital Communication	3	1	4	M
ETEC-305		Microprocessors and Microcontrollers	3	1	4	M
ETEL-307		Control Systems	3	1	4	M
ETEC-309		Digital System Design	3	1	4	M
ETMS-311		Industrial Management	3	0	3	
PRACTICAL/VIVA VOCE						
ETHS-351		Communication Skills for Professionals Lab	0	2	1	
ETEC-351		Digital System Design Lab	0	2	1	
ETEL-355		Control Systems Lab	0	2	1	
ETEC-355		Microprocessors and Microcontrollers Lab	0	2	1	
ETEC-357		Digital Communication Lab	0	2	1	
ETEC-359		Industrial training / In-house electronics Workshop#	0	0	1	
TOTAL			**17**	**14**	**26**	

M: Mandatory for award of degree
#Viva-Voce for evaluation of Industrial Training / In-house electronics workshop will be conducted in this semester.
Note: Minimum of 2 weeks of In-house training related to ECE will be held after 5th semester; however, viva-voce will be conducted in 6th Semester (ETEC 360).

BACHELOR OF TECHNOLOGY
(ELECTRONICS AND COMMUNICATION ENGINEERING)
SIXTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETEC 302		Microwave Engineering	3	1	4	M
ETEC 304		Information Theory and Coding	3	1	4	
ETEC 306		Digital Signal Processing	3	1	4	M
ETEC 308		VLSI Design	3	1	4	M
ETEC 310		Data Communication and Networks	3	1	4	M
ETEC 314		Antenna and Wave Propagation	3	1	4	
PRACTICAL/VIVA VOCE						
ETEC 352		Microwave Engineering Lab	0	2	1	
ETEC 354		VLSI Design Lab	0	2	1	
ETEC 356		Digital Signal Processing Lab	0	2	1	
ETEC 358		Data Communication Network Lab	0	2	1	
ETEC 360		Industrial/In-house Training#	0	0	1	
TOTAL			**18**	**14**	**29**	

M: Mandatory for award of degree

Note: Minimum of 4-6 weeks of industrial training related to ECE will be held after 6th semester; however, viva-voce will be conducted in 7th Semester (ETEC 461).

Important:- Elective Paper will be offered in 7th Semester, if at-least one-third of the total students opt for the same. It is advised that the decision about the elective subject for 7h Semester is done before the 15th April every year before end of 6th semester.

BACHELOR OF TECHNOLOGY
(ELECTRONICS AND COMMUNICATION ENGINEERING)
SEVENTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETEC-401		Embedded Systems	3	1	4
ETEC-403		Optoelectronics and Optical Communication	3	1	4
ETEC-405		Wireless Communication	3	1	4
ELECTIVE- SELECT ANY TWO (ONE FROM EACH GROUP)					
#GROUP-A					
ETEC-407		Advanced DSP	3	0	3
ETEC-409		Introduction to MEMS	3	0	3
ETEC-411		Advanced VLSI Design	3	0	3
ETIC-403		Biomedical Instrumentation	3	0	3
ETEE-413		PLC and SCADA Systems	3	0	3
ETEE-415		Power Electronics	3	0	3
ETEC-417		RF Devices and Circuits	3	0	3
ETCS-425		Database Management System	3	0	3
ETEE-419		Renewable Energy Resources	3	0	3
#GROUP-B					
ETEC-419		Radar and Navigation	3	0	3
ETMS-421		Project Management	3	0	3
ETMS-423		Economics for Engineers	3	0	3
ETIT-425		Grid Computing	3	0	3
ETCS-427		Parallel Computing	3	0	3
ETHS-419		Sociology and Elements of Indian History for Engineers	3	0	3
ETEC 429		Selected topics in ECE**	3	0	3
PRACTICAL/VIVA VOCE					
ETEC-451		Optical and Wireless Communication Lab	0	2	1
ETEC-453		Embedded System Lab	0	2	1
ETEC-455		Lab Based on Elective I and/or II	0	2	1
ETEC-457		Seminar	0	2	1
ETEC-459		Minor Project+	0	6	3
ETEC-461		Industrial Training@	0	0	1
TOTAL			**15**	**17**	**26**

**Syllabus may be revised after 2 years.

+ The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports.

@ Industrial training was conducted after sixth semester. However, Viva-Voce for evaluation of Industrial Training will be conducted in this semester.

Important :- #Elective Paper will be floated if atleast one-third of the total students opt for the same. It is advised that the decision about the elective subject is done before 15th November every year before end of seventh semester. New Electives may be added as per requirement after getting it duly approved by BOS and AC respectively.

BACHELOR OF TECHNOLOGY
(ELECTRONICS AND COMMUNICATION ENGINEERING)
EIGHTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETHS-402		Human Values and Professional Ethics-II	1	0	1
ETEC-404		Satellite Communication	3	1	4
ETEC-406		Ad Hoc and Sensor Networks	3	0	3
ELECTIVE- SELECT ANY TWO (ONE FROM EACH GROUP)					
#GROUP – A					
ETEC-408		Consumer Electronics	3	0	3
ETIT418		Digital Image Processing	3	0	3
ETEC-412		ASIC Design	3	0	3
ETIT-402		Mobile Computing	3	0	3
ETEC 416		Introduction to Nanotechnology	3	0	3
#GROUP-B					
ETIT-422		GPS and GIS	3	0	3
ETEC-424		Adaptive Signal Processing	3	0	3
ETMT-402		Robotics	3	0	3
ETIC-428		Computer Graphics and Multimedia	3	0	3
ETEC-428		Next Generation Networks	3	0	3
PRACTICAL/VIVA VOCE					
ETEC-452		Satellite and Antenna Lab	0	2	1
ETEC-454		Practical Based on Elective or Compulsory Subject	0	2	1
ETEC-456		Major Project*	0	12	8
TOTAL			**13**	**17**	**24**

#Elective Paper will be floated if atleast one-third of the total students opt for the same. It is advised that the decision about the elective subject is done before 15th November every year before end of seventh semester. New Electives may be added as per requirement after getting it duly approved by BOS and AC respectively.

*The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports. Seminar related to major project should be delivered before one month, after the start of the Semester. The progress will be monitored through seminars and progress reports.

NOTE:

1. Total number of the credits of the B.Tech. (ECE) Programme = 216.
2. Each student shall be required to appear for examinations in all the papers. However, for the award of the degree a student shall be required to earn minimum of 200 credits including Mandatory papers (M).

FOR LATERAL ENTRY STUDENTS:

1. Total number of the credits of the B.Tech. (ECE) Programme = 162.
2. Each student shall be required to appear for examinations in all the papers Third Semester onwards. However, for the award of the degree a student shall be required to earn minimum of 150 credits, including mandatory papers (M).

NOMENCLATURE OF CODES GIVEN IN THE SCHEME OF B.TECH AND M.TECH

1. **ET** stands for Engineering and Technology.
2. **PE** stands for Power Engineering.
3. **ME** stands for Mechanical Engineering.
4. **MT** stands for Mechatronics.
5. **AT** stands for Mechanical and Automation Engineering.
6. **EE** stands for Electrical and Electronics Engineering.
7. **EL** stands for Electrical Engineering.
8. **IT** stands for Information Technology
9. **CS** stands for Computer Science and Engineering
10. **CE** stands for Civil Engineering
11. **EC** stands for Electronics and Communications Engineering**.**
12. **EN** stands for Environmental Engineering
13. **TE** stands for Tool Engineering
14. **MA** stands for Mathematics
15. **HS** stands for Humanities and Social Sciences
16. **SS** stands for Social Services

APPLIED MATHEMATICS-I

Paper Code : ETMA-101	**L**	**T**	**C**
Paper : Applied Mathematics-I	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the basics of Applied Mathematics that are required for an engineering student.

UNIT- I

Successive differentiation: Leibnitz theorem for n^{th} derivative (without proof). Infinite series: Convergence and divergence of infinite series, positive terms infinite series, necessary condition, comparison test (Limit test), D'Alembert ratio test, Integral Test, Cauchy's root test, Raabe's test and Logarithmic test(without proof). Alternating series, Leibnitz test, conditional and absolutely convergence. Taylor's and Maclaurin's expansion(without proof) of function (e^x, log(1+x), cos x , sin x) with remainder terms ,Taylor's and Maclaurin's series, Error and approximation.

[T1], [T2][No. of hrs. 12]

UNIT- II

Asymptotes to Cartesian curves. Radius of curvature and curve tracing for Cartesian, parametric and polar curves. Integration: integration using reduction formula for $\int_0^{\frac{\pi}{2}} \sin^n\theta \, d\theta$, $\int_0^{\frac{\pi}{2}} \cos^n\theta d\theta$, $\int_0^{\frac{\pi}{2}} \sin^n\theta \cos^m\theta d\theta$. Application of integration : Area under the curve, length of the curve, volumes and surface area of solids of revolution about axis only .Gamma and Beta functions.

[T1],[T2][No. of hrs. 12]

UNIT- III

Matrices: Orthogonal matrix, Hermitian matrix, Skew-Hermitian matrix and Unitary matrix. Inverse of matrix by Gauss-Jordan Method (without proof). Rank of matrix by echelon and Normal (canonical) form. Linear dependence and linear independence of vectors. Consistency and inconsistency of linear system of homogeneous and non homogeneous equations . Eigen values and Eigen vectors. Properties of Eigen values (without proof). Cayley-Hamilton theorem (without proof). Diagonlization of matrix. Quadratic form, reduction of quadratic form to canonical form.

[T1], [T2][No. of hrs. 12]

UNIT-IV

Ordinary differential equations: First order linear differential equations, Leibnitz and Bernaulli's equation. Exact differential equations , Equations reducible to exact differential equations. Linear differential equation of higher order with constant coefficients, Homogeneous and non homogeneous differential equations reducible to linear differential equations with constant coefficients. Method of variation of parameters. Bessel's and Legendre's equations (without series solutions), Bessel's and Legendre's functions and their properties.

[T1],[T2][No. of hrs. 12]

Text:

[T1] B. S. Grewal,"Higher Engineering Mathematics" Khanna Publications.
[T2]. R. K. Jain and S.R.K. Iyengar,"Advanced Engineering Mathematics "Narosa Publications.

References:

[R1] E. kresyzig," Advance Engineering Mathematics", Wiley publications
[R2] G.Hadley, " Linear Algebra" Narosa Publication
[R3] N.M. Kapoor, " A Text Book of Differential Equations", Pitambar publication.
[R4] Wylie R, " Advance Engineering mathematics" , McGraw-Hill
[R5] Schaum's Outline on Linear Algebra, Tata McGraw-Hill
[R6] Polking and Arnold, " Ordinary Differential Equation using MatLab" Pearson.

APPLIED PHYSICS – I

Paper Code: ETPH – 103 **L** **T** **C**
Paper: Applied Physics – I **2** **1** **3**

INSTRUCTIONS TO PAPER SETTERS:	MAXIMUM MARKS: 75
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.	

Objective: The objective of the paper is to facilitate the student with the basics of Applied Physics aspects that are required for his understanding of basic physics.

UNIT I

Interference: Introduction, Interference due to division of wave front: Fresnel's Biprism, Interference due to division of amplitude: wedge shaped film, Newton's rings.

Diffraction: Introduction, Difference between Fresnel and Fraunhofer diffraction, Single slit diffraction, Transmission diffraction grating, Absent spectra.

[T1], [T2](No. of Hrs. 8)

UNIT II

Polarization: Introduction, Uniaxial crystals, Double refraction, Nicol prism, Quarter and half wave plates, Theory of production of plane, circularly and elliptically polarized lights, Specific rotation, Laurents half shade polarimeter.

Laser: Spontaneous and stimulated emissions, Einstein's coefficients, Laser and its principle, He-Ne laser.

Fibre optics: Introduction, Single mode fibre, Step index and graded index multimode fibres, Acceptance angle and numerical aperture.

[T1], [T2](No. of Hrs. 8)

UNIT III

Theory of Relativity: Introduction, Frame of reference, Galilean transformation, Michelson-Morley experiment, Postulates of special theory of relativity, Lorentz transformations, Length contraction, Time dilation, Mass energy relation

Ultrasonics: Introduction, Production of ultrasonics by magnetostriction and Piezoelectric methods, Applications.

[T1], [T2](No. of Hrs. 8)

UNIT IV

Nuclear Physics: Introduction, Radioactivity, Alpha decay, Beta decay, Gamma decay, Q value, Threshold energy, Nuclear reactions, Nuclear fission: Liquid drop model, Nuclear fusion, Particle accelerators: Linear accelerator, Cyclotron, Radiation detectors: Ionization chamber, Geiger Mueller Counter.

[T1](No. of Hrs. 8)

Text Books:

[T1]. Arthur Beiser, 'Concepts of Modern Physics', [McGraw-Hill], 6th Edition 2009
[T2]. A. S.Vasudeva, 'Modern Engineering Physics', S. Chand, 6th Edition, 2013.

Reference Books

[R1]. A. Ghatak 'Optics' , TMH, 5th Edition, 2013
[R2]. G. Aruldhas 'Engineering Physics' PHI 1st Edition, 2010.
[R3]. Fundamentals of Optics : Jenkins and White , Latest Edition
[R4]. C. Kittle, "Mechanics", Berkeley Physics Course, Vol.- I.
[R5]. Feynman " The Feynman lectures on Physics Pearson Volume 3 Millennium Edition, 2013
[R6]. Uma Mukhrji 'Engineering Physics' Narosa, 3rd Edition, 2010.
[R7]. H.K. Malik & A. K. Singh 'Engineering Physics' [McGraw-Hill], 1st Edition, 2009.

MANUFACTURING PROCESSES

Paper Code: ETME-105	**L**	**T**	**C**
Paper: Manufacturing Processes	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The Objective of the paper is to facilitate the student with the basic Manufacturing processes.

Unit-I

Introduction: Introduction of Manufacturing processes and their classification, Basic Metals & Alloys : Properties and Applications. Properties of Materials: Strength, elasticity, stiffness, malleability, ductility, brittleness, toughness and hardness. Ferrous Materials: Carbon steels, its classification based on % carbon as low, mild, medium & high carbon steel, its properties & applications. Wrought iron. Cast iron. Alloy steels: stainless steel, tool steel. Elementary introduction to Heat- treatment of carbon steels: annealing, normalizing, quenching & tempering and case- hardening.

Non-Ferrous metals & alloys: Properties and uses of various non-ferrous metals & alloys and its composition such as Cu-alloys: Brass, Bronze, Al-alloys such as Duralumin.

Casting Processes:

Principles of metal casting, Pattern materials, types and allowance, composition and properties of moulding sand, foundry tools, concept of cores and core print, elements of gating system, description and operation of cupola, special casting processes e.g. die-casting; permanent mould casting; centrifugal casting; investment casting; casting defects.

(T_1, T_2, R_1, R_2, R_3, R_4, R_5) [No. of Hrs.12]

UNIT-II

Smithy and Forging:

Hot working and cold working, Forging tools and equipments, Forging operations, Forging types: Smith forging, Drop forging, Press forging, Machine forging; Forging defects; Extrusion, wire drawing, swaging.

BENCH WORK AND FITTING:

Fitting shop tools, operation: Fitting; sawing; chipping; thread cutting (with taps and dies);
Marking and marking tools.

(T_1, T_2, R_1, R_2, R_3, R_4, R_5) [No. of Hrs. 12]

Unit-III

Metal joining: Welding principles, classification of welding techniques, Oxyacetylene Gas welding, equipment and field of application, Arc-welding, metal arc, Carbon arc welding, submerged arc welding and atomic hydrogen welding, TIG and MIG welding, Electric resistance welding: spot; seam; flash; butt and percussion welding, Flux: composition; properties and function, Electrodes, Types of joints and edge preparation, Brazing and soldering, welding defects.

(T_1, T_2, R_1, R_2, R_3, R_4, R_5)[No. of Hrs. 12]

Unit-IV

Sheet Metal Work:

Tools and equipments used in sheet metal work, metals used for sheets, standard specification for sheets, Types of sheet metal operations: shearing, drawing, bending. Other operations like spinning, stretch forming, embossing and coining.

Powder Metallurgy: Introduction of powder metallurgy process: powder production, blending, compaction, sintering.

(T_1, T_2, R_1, R_2, R_3, R_4, R_5)[No. of Hrs. 12]

Text Books:

[T1]. Manufacturing Process by Raghuvanshi.(Dhanpat Rai and Co.)
[T2]. Manufacturing Technology by P.N.Rao (TMH publications)

Reference Books:

[R1]. Workshop Technology by Hazra-Chowdhary (Media Promoters and Publishers Pvt. Ltd.)
[R2]. Production Engineering by R.K.Jain (Khanna Publishers)
[R3]. Workshop Technology by Chapman (Elsevier Butterworth-Heinemann)
[R4]. Fundamentals of Modern Manufacturing by Mikell P. Groover (Wiley India Edition)
[R5]. Manufacturing Processes for Engineering Materials by Kalpakjian and Schmid (Pearson)

ELECTRICAL TECHNOLOGY

Paper Code: ETEE-107 | **L** 3 | **T** 0 | **C** 3
Paper : Electrical Technology

Paper Code: ETEE-107	**L**	**T**	**C**
Paper : Electrical Technology	3	0	3

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. This is first introductory course in electrical technology to the students of all the branches of engineering in first year.
2. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
3. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To provide exposure to the students in respects of the basics of different aspects of electrical engineering with emphasis on constructional, measurement and applications of various types of instruments and equipments.

UNIT – I: DC Circuits
Introduction of Circuit parameters and energy sources (Dependent and Independent), Mesh and Nodal Analysis, Superposition, Thevenin's, Norton's, Reciprocity, Maximum Power Transfer and Millman's Theorems, Star-Delta Transformation and their Applications to the Analysis of DC circuits.

[T1],[T2][No. of Hrs. 11]

UNIT – II: A.C.Circuits
A.C. Fundamentals, Phasor representation, Steady State Response of Series and Parallel R-L, R-C and R-L-C circuits using j-notation, Series and Parallel resonance of RLC Circuits, Quality factor, Bandwidth, Complex Power, Introduction to balanced 3-phase circuits with Star- Delta Connections.

[T1],[T2][No. of Hrs. 14]

UNIT – III: Measuring Instruments
Basics of measuring instruments and their types ,Working principles and applications of moving coil, moving iron (ammeter & voltmeter) and Extension of their ranges, dynamometer- type Wattmeter , induction-type Energy Meter , Two-wattmeter method for the measurement of power in three phase circuits, Introduction to digital voltmeter, digital Multimeter and Electronic Energy Meter.

[T1],[T2],[R2][No. of Hrs. 11]

UNIT – IV: Transformer and Rotating Machines
Fundamentals of Magnetic Circuits, Hysteresis and Eddy current losses, working principle, equivalent circuit, efficiency and voltage regulation of single phase transformer and its applications. Introduction to DC and Induction motors (both three phase and single phase), Stepper Motor and Permanent Magnet Brushless DC Motor.

[T1],[T2],[R2][No. of Hrs. 12]

Text Books:
[T1] S.N Singh, "Basic Electrical Engineering" PHI India Ed 2012
[T2] Chakrabarti, Chanda,Nath "Basic Electrical Engineering" TMH India", Ed 2012.

Reference Books:
[R1] William Hayt "Engineering Circuit Analysis" TMH India Ed 2012
[R2] Giorgio Rizzoni "Principles and Application of Electrical Engineering" Fifth Edition TMH India.

HUMAN VALUES & PROFESSIONAL ETHICS

	L	T	C
Paper Code: ETHS-109	**L**	**T**	**C**
Paper : Human Values & Professional Ethics	**1**	**1**	**1**

Non-University Examination Scheme (NUES)
Note: There will be no End-Term External University Examination. Marks are to be given on the basis of two internal sessional test of 30 marks each and one final Viva-voce project report Examination of 40 marks.

Objectives:
This introductory course input is intended

a. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
b. To facilitate the development of a holistic perspective among students towards life, profession and happiness, based on the correct understanding of the Human reality and the rest of the Existence. Such a Holistic perspective forms the basis of value-based living in a natural way.
c. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

UNIT-1: Introduction to Value Education **No. of lectures: 03+1**

1. Understanding the need, basic guidelines, content and process for value education.
2. Basic Human Aspirations: Prosperity and happiness
3. Methods to fulfil the human aspirations – understanding and living in harmony at various levels.
4. Practice Session – 1. **[T1], [R1], [R4]**

UNIT-2: Harmony in the Human Being **No. of lectures: 05+1**

1. Co-existence of the sentient "I" and the material body – understanding their needs – Happiness & Conveniences.
2. Understanding the Harmony of "I" with the body – Correct appraisal of physical needs and the meaning of prosperity.
3. Programme to ensure harmony of "I" and Body-Mental and Physical health and happiness.
4. Harmony in family and society: Understanding Human-human relationship in terms of mutual trust and respect.
5. Understanding society and nation as extensions of family and society respectively.
6. Practice Session – 02 **[T2], [R1], [R2]**

UNIT-3: Basics of Professional Ethics **No. of lectures: 04+1**

1. **Ethical Human Conduct** – based on acceptance of basic human values.
2. **Humanistic Constitution and universal human order** – skills, sincerity and fidelity.
3. **To identify the scope and characteristics of people** – friendly and eco-friendly production system, Technologies and management systems.
4. Practice Session – 03.

[T1],[R4]

UNIT-4: Professional Ethics in practice **No. of lectures: 04+1**

1. **Profession and Professionalism** – Professional Accountability, Roles of a professional, Ethics and image of profession.
2. **Engineering Profession and Ethics -** Technology and society, Ethical obligations of Engineering professionals, Roles of Engineers in industry, society, nation and the world.
3. **Professional Responsibilities –** Collegiality, Loyalty, Confidentiality, Conflict of Interest, Whistle Blowing
4. Practice Session – 04

[T1], [T2], [T3], [R3]

Text Books:

[T1] Professional Ethics, R. Subramanian, Oxford University Press.
[T2] Professional Ethics & Human Values: S.B. Srivasthva, SciTech Publications (India) Pvt. Ltd. New Delhi.
[T3] Professional Ethics & Human Values: Prof. D.R. Kiran, TATA Mc Graw Hill Education.

References:

[R1] Success Secrets for Engineering Students: Prof. K.V. SubbaRaju, Ph.D., Published by SMARTstudent.

[R2] Ethics in Engineering Mike W. Martin, Department of Philosophy, Chapman University and Roland Schinzinger, School of Engineering, University of California, Irvine.
[R3] Human Values: A. N. Tripathy (2003, New Age International Publishers)
[R4] Value Education website, http.//www.universalhumanvalues.info[16]
[R5] Fundamentals of Ethics, Edmond G. Seebauer & Robert L. Barry, Oxford University Press.
[R6] Human Values and Professional Ethics: R. R. Gaur, R. Sangal and G. P. Bagaria, Eecel Books (2010, New Delhi). Also, the Teachers" Manual by the same author.

***PRACTICAL SESSIONS OF 14 HOME ASSIGNMENTS** will be followed by the students pursuing this paper. (Ref: Professional Ethics & Human Values: S.B. Srivastava, SciTech Publications (India) Pvt. Ltd. New Delhi.)

CONTENT OF PRACTICE SESSION

Module 1: Course Introduction – Needs, Basic Guidelines, Content and Process of Value Education

PS-1: Imagine yourself in detail. What are the goals of your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcoming in your life? Observe and analyze them.

Expected Outcome:
The students start exploring themselves; get comfortable to each other and to the teacher and start finding the need and relevance for the course.

PS-2: Now a days there is lot of voice about techno-genie maladies such as energy and natural resource depletion, environmental Pollution, Global Warming, Ozone depletion, Deforestation, etc. – all these scenes are man-made problems threatening the survival of life on the earth – what is root cause of these maladies and what is the way out in your opinion?
On the other hand there is rapidly growing danger because of nuclear proliferation, arm race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression and suicidal attempts, etc - what do you think the root cause of these threats to human happiness and peace – what could be the way out in your opinion?

Expected Outcome:
The students start finding out that technical education with study of human values can generate more problems than solutions. They also start feeling that lack of understanding of human values is the root cause of all the problems and the sustained solution could emerge only through understanding of human values and value based living. Any solutions brought out through fear, temptation or dogma will not be sustainable.

PS-3:1.Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of following:
a)What is naturally acceptable to you in relationship – feeling of respect or disrespect?
b)What is naturally acceptable to you - to nurture or to exploit others? Is your living the same as your natural acceptance or different?
2.Out of three basic requirements for fulfillment of your aspirations, right understanding, relationship and physical facilities, observe how the problems in your family are related to each. Also observe how much time and efforts you devote for each in your daily routine.

Expected Outcome:

1. The students are able to see that verification on the basis of natural acceptance and experiential validation through living is the only way to verify the right or wrong, and referring to any external source life text or instrument or any other person cannot enable them to verify with authenticity, it will only develop assumptions.
2. The students are able to see that their practice in living is not in harmony with their natural acceptance at most of the time, and all they need to do is to refer to their natural acceptance to remove this disharmony.

3. The students are able to see that lack of right understanding leading to lack of relationship is the

major cause of the problems in their family and the lack of physical facilities in most of the cases; while they have given higher priority to earning of physical facilities in their life ignoring relationship and not being aware that right understanding is the most important requirement for any human being.

Module 2: Understanding harmony in human being – Harmony in myself!

PS-4: Prepare the list of your desires. Observe whether the desires. Observe whether the desires are related with self "I" or body. If it appears to be related with the both, see which part of it is related to self "I" and which part is related to body.

Expected Outcome:
The students are able to see that they can enlist their desires and the desires are not vague, also they are able to relate their desires to "I" and "body" distinctly. If, any desire appears to be related with both, they are able to see that feeling is related to "I" while the physical facility is related to the body. They are also able to see that "I" and "body" are two realities, and most of their desires are related to "I" and not with the "Body"; while their efforts are mostly connected on the fulfillment of the need of the body assuming that it will meet the needs of "I" too.

PS-5:
1. {A}. Observe that any physical facilities you use, follows the given sequence with time; Necessary and tasteful – unnecessary & tasteful – unnecessary & tasteless.
   {B}. In contrast, observe that any feelings in you are either naturally acceptable or not acceptable at all. If, naturally acceptable, you want it continuously and if not acceptable, you do not want it at any moment.
2. List Down all your activities. Observe whether the activity is of "I" or of "body" or with the participation both "I" and "body".
3. Observe the activities with "I". Identify the object of your attention for different moments (over a period say 5 to 10 minute) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

Expected Outcome:
1. The students are able to see that all physical facilities they use are required for limited time in a limited quantity. Also they are able to see that cause of feeling, they want continuity of the naturally acceptable feelings and they do not want feelings which are not naturally acceptable eve for a single moment.
2. The students are able to see that activities like understanding, desires, thoughts and selection are the activities of "I" only; the activities like breathing, palpitation of different parts of the body are fully the activities of the body. With the acceptance of "I", while activities they do with their sense organs like hearing through ears, seeing through eyes, sensing through touch, tasting through tongue and smelling through nose or the activities they do with their work organs like hands, legs, etc. are such activities that require the participation of both "I" and "body"
3. The students become aware of their activities of "I" and start finding their focus of attention at different moments. Also they are able see that most of their desires are coming from outsides (through preconditioning or sensation) and are not based on their natural acceptance.

PS-6: 1.Chalk out the program to ensure that you are responsible to your body – for the nurturing, protection and right utilization of the body.
2.Find out the plants and shrubs growing in and your campus. Find out their use for curing different diseases.

Expected Outcome:
The students are able to list down activities related to a proper upkeep of the body and practice them in their daily routine. They are also able to appreciate the plants wildly growing in and around the campus which can be beneficial in curing the different diseases.

Module 3: Understanding harmony in the family and society - Harmony in Human – Human relationship

PS-7: Form small groups in the class and in that group initiate the dialogue and ask the eight questions related to trust. The eight questions are-

S.No.	Intention (Natural Acceptance)	S.No.	Competence
1.a.	Do I want to make myself happy?	**1.b.**	Am I liable to make myself always Happy?
2.a.	Do I want to make the other happy?	**2.b.**	Am I liable to make the other always happy?
3.a.	Does the other want to make him happy?	**3.b.**	Is the other able to make him always happy?
4.a.	Does the other want to make me happy? What is answer?	**4.b.**	Is the other able to make me always happy? What is answer?

Let each student answer the question for himself and everyone else. Discuss the difference between intention and competence.

Expected Outcome:
The students are able to see that the first four questions are related to our natural acceptance i.e. intention and the next four to our competence. They are able to note that the intention is always correct, only competence is lacking. We generally evaluate ourselves on the basis of our intention and other on the basis of their competence. We seldom look at our competence and other's intention as a result we conclude that I am a good person and other is a bad person.

PS-8:
1. Observe that on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasion you are disrespecting by way of under evaluation, over evaluation or otherwise evaluation.
2. Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.

Expected Outcome:
The students are able to see that respect is right evaluation and only right evaluation leads to fulfilment of relationship. Many present problems in the society are an outcome of differentiation (lack of understanding of respect) like gender biasness, generation gap, caste conflicts, class struggle, and domination through poor play, communal violence, and clash of isms and so on so forth.
All these problems can be solved by realizing that the other is like me as he has the same natural acceptance, potential and program to ensure a happy and prosperous life for him and for others though he may have different body, physical facilities or beliefs.

PS-9:
1. Write a note in the form of a story, poem, skit, essay, narration, dialogue, to educate a child.
   Evaluate it in a group.
2. Develop three chapters to introduce "social science", its needs, scope and content in the primary education of children.

Expected Outcome:
The students are able to use their creativity for educating children. The students are able to see that they can play a role in providing value education for children. They are able to put in simple words the issues that are essential to understand for children and comprehensible to them. The students are able to develop an outline of holistic model for social science and compare it with the existing model.

Module 4: Understanding harmony in the nature and existence – Whole existence as Co – existence -

PS-10: Prepare the list of units (things) around you. Classify them into four orders. Observe and explain the mutual fulfilment of each unit with other orders.

Expected Outcome:
The students are able to differentiate between the characteristics and activities of different orders and study the mutual fulfilment among them. They are also able to see that human beings are not fulfilling to their orders today and need to take appropriate steps to ensure right participation (in term of nurturing, protection and right utilization) in the nature.

PS-11:

1. Make a chart for the whole existence. List down different courses of studies and relate them to different or levels in the existence.
2. Choose any one subject being taught today. Evaluate and suggest suitable modifications to make it appropriate and holistic.

Expected Outcome:
The students are confident that they can understand the whole existence; nothing is a mystery in this existence. They are also able to see the interconnectedness in the nature, and point out how different courses of study relate to the different units and levels. Also they are liable to make out how these courses can be made appropriate and holistic.

Module 5: Implication of the above Holistic Understanding of Harmony at all Levels of Existence.

PS-12: Choose any two current problem of different kind in the society and suggest how they can be solved on the basis of the natural acceptance of human values. Suggest the steps you will take in present conditions.

Expected Outcome:
The students are liable to present sustainable solutions to the problem in society and nature. They are also able to see that these solutions are practicable and draw road maps to achieve them.

PS-13:
1. Suggest ways in which you can use your knowledge of engineering / technology / management for universal human order from your family to world family.
2. Suggest one format of humanistic constitution at the level of nation from your side.

Expected Outcome:
The students are able to grasp the right utilization of their knowledge in their streams of technology / engineering / management to ensure mutually enriching and recyclable production systems.

PS-14: The course is going to be over now. Evaluate your state before and after the course in terms of-

- Thoughts
- Behavior
- Work and
- Realization

Do you have any plan to participate in the transition of the society after graduating from the institute? Write a brief note on it.

Expected Outcome:
The students are able to sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. They are also able to make use of their understanding in the course for happy and prosperous society.

FUNDAMENTALS OF COMPUTING

	L	T	C
Paper Code: ETCS-111	**L**	**T**	**C**
Paper: Fundamentals of Computing	**2**	**0**	**2**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Objective: The objective of the paper is to facilitate the student with applied working knowledge of computers. This is the first course of computing and does not assume any pre-requisite.

UNIT-I

Five Component Model of a Computer, System and Application software (introduction) storage devices , primary (RAM, ROM, PROM, EPROM, cache) Memory and secondary (magnetic tape, hard disk, Compact disks) memory , peripheral devices , printers.

[T1], [T2][8 Hours]

UNIT-II

Operating Systems: DOS Internal, External commands, Windows (2000 and NT) , Overview of architecture of Windows, tools and system utilities including registry , partitioning of hard disk , Overview of Linux architecture , File system , file and permissions , concept of user and group , installation of rpm and deb based packages.

[T1], [T2][8 Hours]

UNIT-III

Basics of programming through flow chart , Networking Basics - Uses of a network and Common types of networks , Network topologies and protocols , Network media and hardware , Overview of Database Management System.

[T1],[T2],[R1][8 Hours]

UNIT-IV

Libre / Open Office Writer : Editing and Reviewing, Drawing, Tables, Graphs, Templates
Libre / Open Office Calc : Worksheet Management , Formulas, Functions, Charts
Libre / Open Office Impress: designing powerful power-point presentation

[R2][R3] [8 Hours]

Text:

[T1] Peter Norton, Introduction to computers, Sixth Edition Tata McGraw Hill (2007).
[T2] Andrews Jean, A+Guide to Managing & Maintaining Your PC, Cengage Publication 6/e

References:

[R1] Anita Goel, Computer Fundamentals, Pearson Education.
[R2] Joiner Associates Staff, Flowcharts: Plain & Simple: Learning & Application Guide , Oriel Inc
[R3] http://www.openoffice.org/why/
[R4] http://www.libreoffice.org/get-help/documentation/

APPLIED CHEMISTRY

Paper Code: ETCH – 113	**L**	**T**	**C**
Paper : Applied Chemistry	**2**	**1**	**3**

INSTRUCTIONS TO PAPER SETTER: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Each unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the basics of Applied Chemistry aspects that are required for his understanding of basic chemistry

UNIT I: FUELS

Definition, Classification & Calorific value of fuels (gross and net), Dulong's formula **(Numericals)**, Determination of calorific value of fuels using bomb's calorimeter **(Numericals)**, Determination of calorific value of fuels using Boy's Gas Calorimeter **(Numericals),** Cracking – Thermal & catalytic cracking, Octane & Cetane numbers with their significance. High & Low temperature carbonization, Manufacture of coke (Otto – Hoffmann oven) Proximate and ultimate analysis of Coal **(Numericals)** Combustion of fuels **(Numericals)**.

[T1,T2][No. of hrs. 08]

UNIT II: THE PHASE RULE & CATALYSIS

Definition of various terms, Gibb's Phase rule & its derivation, Application of phase rule to One component system- The water system, Application of phase rule to Two component system- The Lead-Silver system (Pattinson's process).

Catalyst and its characteristics, Types of catalysts, Concept of promoters, inhibitors and poisons. Theories of catalysis: Intermediate compound formation theory, adsorption or contact theory. Application of catalysts for industrially important processes Enzyme catalysis: Characteristics, Kinetics & Mechanism of enzyme catalysed reaction (Michaelis-Menten equation), Acid-Base catalysis: Types, Kinetics & Mechanism, Catalysis by metals salts (Wilkinson's Catalyst), Auto-catalysis, Heterogeneous catalysis (Langmuir-Hinshelwood mechanism.

[T1,T2][No. of hrs. 08]

UNIT III: WATER

Introduction and specifications of water , Hardness and its determination by EDTA method **(Numericals)**, Alkalinity and its determination **(Numericals)**, Reverse Osmosis, Electrodialysis, Disinfection by break-point chlorination. Boiler feed water, boiler problems– scale, sludge, priming & foaming: causes & prevention, Boiler problems– caustic embrittlement & corrosion: causes & prevention, Water Softening by Internal Treatment: carbonate & phosphate conditioning, colloidal conditioning & calgon treatment Water Softening by External Treatment: Lime-Soda Process **(Numericals)** Zeolite & Ion-Exchange Process.

[T1,T2][No. of hrs. 08]

UNIT IV: CORROSION & ITS CONTROL

Causes, effects & consequences; Chemical or Dry corrosion & its mechanism (Pilling-Bedworth Rule) Electrochemial or Wet Corrosion & Its mechanism, Rusting of Iron Passivity, Galvanic series, Galvanic Corrosion, Soil Corrosion Pitting Corrosion, Concentration Cell or Differential Aeration Corrosion, Stress Corrosion. Factors Influencing Corrosion: Nature of metal and nature of corroding environment; Protective measures: Galvanization, Tinning Cathodic Protection, Sacrificial Anodic protection, Electroplating, Electroless plating, Prevention of Corrosion by Material selection & Design.

[T1,T2][No. of hrs. 08]

Text Books:

[T1] P. C. Jain & Monika Jain, *Engineering Chemistry*, Latest edition, Dhanpat Rai Publishing Co., 2002.
[T2] P. Mathew, *Advance Chemistry*, 1 & 2 Combined Editions, Cambridge University Press, 2003.

Reference Books:

[R1] P. W. Atkins and J. De Paula, *Atkins' Physical Chemistry*, Oxford, 2010.
[R2] T. Engel and P. Reid, *Physical Chemistry*, Pearson Education, 2013.
[R3] K. Qanungo, *Engineering Chemistry*, PHI Learning Private Limited, New Delhi, 2009.
[R4] O. G. Palanna, *Engineering Chemistry*, Tata McGraw Hill Education Private Limited, 2012.
[R5] D. A. Jones, *Principles and Prevention of Corrosion*, Prentice Hall, 2nd Edition, 1996.
[R6] H. K. Chopra and A. Parmar, *Engineering Chemistry- A Text Book*, Narosa Publishing House, 2012.
[R7] S. Chawla, *Engineering Chemistry*-All India Edition, Dhanpat Rai & Co., 2003.
[R8] R. Gadi, S. Rattan and S. Mohapatra, *Environmental Studies*, S.K. Kataria & Sons, 2nd Edition 2009.

APPLIED PHYSICS LAB – I

Paper Code: ETPH-151 | **P** 2 | **C** 1

Paper : Applied Physics Lab – I

	P	C
Paper Code: ETPH-151	**P**	**C**
Paper : Applied Physics Lab – I	**2**	**1**

LIST OF EXPERIMENTS

1. To determine the wavelength of sodium light by Newton's Rings.
2. To determine the wavelength of sodium light by Fresnel's biprism.
3. To determine the wavelength of sodium light using diffraction grating.
4. To determine the refractive index of a prism using spectrometer.
5. To determine the dispersive power of prism using spectrometer and mercury source.
6. To determine the specific rotation of cane sugar solution with the help of half shade polarimeter.
7. To find the wavelength of He-Ne laser using transmission diffraction grating.
8. To determine the numeral aperture (NA) of an optical fibre.
9. To plot a graph between the distance of the knife-edge from the center of the gravity and the time period of bar pendulum. From the graph, find
   (a) The acceleration due to gravity
   (b) The radius of gyration and the moment of inertia of the bar about an axis.
10. To determine the velocity of ultrasound waves using an ultrasonic spectrometer in a given liquid (Kerosene Oil).
11. To verify inverse square law.
12. To determine Planck's constant.

Text Books:

[T1] C. L. Arora 'B. Sc. Practical Physics' S. Chand

Note: Any 8-10 experiments out of the list may be chosen. Proper error – analysis must be carried out with all the experiments.

ELECTRICAL TECHNOLOGY LAB

Paper Code: ETEE 153 | **L P C**
Paper: Electrical Technology Lab | **0 2 1**

	L	P	C
Paper Code: ETEE 153			
Paper: Electrical Technology Lab	**0**	**2**	**1**

LIST OF EXPERIMENTS

1. To Design the circuit for a given load and selection of its various Components and instruments from the safety point of view
2. Study and applications of CRO for measurement of voltage, frequency and phase of signals.
3. Connection of lamp by
   (1)Single Switch Method.(2) Two-way Switch Method.
   OR
   Performance comparison of of fluorescent Tube & CFL Lamp.
4. To Verify Thevenin's & Norton's Theorem
   OR
   To Verify Superposition &Reciprocity Theorem.
   OR
   To Verify Maximum Power Transfer Theorem.
5. To Measure Power & Power Factor in a Single-Phase A.C Circuit using Three Ammeters or three Voltmeters.
6. To Measure Power & Power Factor in a Balanced Three Phase Circuit using Two Single Phase Wattcmeters.
7. To study of Resonance in a series R-L-C or Parallel R-L-C Circuits.
8. To perform open circuit and short circuit test on 1-phase transformer.
9. Starting, Reversing and speed control of DC shunt Motor
10. Starting, Reversing and speed control of 3-phase Induction Motor
11. To Study different types of Storage Batteries & its charging system.
12. .To Study different types of earthing methods including earth leakage circuit breaker (GFCI)

Note:- Any 8-10 Experiments out of the list may be chosen.

WORKSHOP PRACTICE

Paper Code: ETME-155 **L** **P** **C**
Paper: Workshop Practice **0** **3** **2**

LIST OF EXPERIMENTS

Sheet Metal Shop
1. To study the tools and machineries used in sheet metal shop.
2. To make a tray using sheet metal tools.
3. To make a Funnel using sheet metal tools.
4. To make a cylindrical mug in sheet metal shop.

Foundry Shop
5. To make a mould in Foundry Shop.

Carpentry Shop
6. To make a half lap T-joint in Carpentry Shop.
7. To make a half cross lap joint in Carpentry Shop.
8. To make a pattern using Carpentry Tools.

Welding Shop
9. To study arc and gas welding equipments and tools.
10. To make Lap Joint, T-Joint and Butt Joint in Welding shop.

Fitting Shop
11. To make V-Section and T-Slot in fitting shop.

Machine Shop
12. To study basic operations on lathe, shaper, milling, drilling and grinding machines..
13. To perform step turning, knurling and threading operations on lathe.
14. To prepare a simple job on shaper.

Note:- Any 8-10 Experiments out of the list may be chosen.

ENGINEERING GRAPHICS

Paper Code: ETME-157 **L** **P** **C**
Paper: Engineering Graphics Lab **0** **3** **2**

LIST OF EXPERIMENTS

UNIT - I

General: Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications,

Projections of Point and Lines: Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

(T_1, T_2, R_1, R_2, R_3)

Unit - II

Planes other than the Reference Planes: Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Projections of Plane Figures: Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

(T_1, T_2, R_1, R_2, R_3)

Unit - III

Projection of Solids: Simple cases when solid are placed in different positions, Axis faces and lines lying in the faces of the solid making given angles. (T_1, T_2, R_1, R_2, R_3)

Unit-IV

Isometric Projection of plain surface and bodies. (T_1, T_2, R_1, R_2, R_3)

Text Books:

[T1] Engineering drawing by N.D.Bhatt (Charotar Publications).
[T2] Engineering Drawing by S.C.Sharma & Navin Kumar (Galgotia Publications)

Reference Books:

[R1] Engineering Drawing by Venugopalan, (New Age International).
[R2] Engineering Drawing by P.S.Gill (S.K. Kataria & Sons)
[R3] Engineering Graphics by K.C.John (PHI)

Note:- Any 8-10 Experiments out of the list may be chosen.

FUNDAMENTAL OF COMPUTING LAB

Paper Code: ETCS 157 **L** **P** **C**
Paper: Fundamental of Computing Lab **0** **2** **1**

LIST OF EXPERIMENTS

For program development an IDE e.g. CodeBlock[a], Eclipse CDT [b], Netbeans[c] is recommended

1. Dismantling a PC Part -1
2. Dismantling a PC Part -2
3. Internal and External commands of DOS
4. System utilities of windows including regedit
5. Installation of any rpm or debianlinux distribution with emphasis on drive partitioning
6. Installation of rpm and deb based packages
7. Understanding of File system of Linux
8. Creating user and group (through CLI)
9. Understanding and working knowledge of .Libre / Open Office Writer : Editing and Reviewing, Drawing, Tables, Graphs, Templates
10. Understanding and working knowledge of Libre / Open Office Calc
11. Understanding and working knowledge Libre / Open Office Impress
12. Understanding of flow chart development through Dia *
13. Two Mini Projects based on the skills learned in experiments 1-12
    - [Dia] http://projects.gnome.org/dia/

Note:- Any 8-10 Experiments out of the list may be chosen.

APPLIED CHEMISTRY LAB

Paper Code –ETCH-161	**P**	**C**
Paper : Applied Chemistry Lab	**2**	**1**

LIST OF EXPERIMENTS

1. Determination of alkalinity of water sample.
2. Determination of hardness of water sample by EDTA method.
3. Determine the percentage composition of sodium hydroxide in the given mixture of sodium hydroxide and sodium chloride.
4. Determine the amount of oxalic acid and Sulphuric acid in one litre of solution, given standard sodium hydroxide and Potassium Permanganate.
5. Determine the amount of copper in the copper ore solution, provided hypo-solution (Iodometric Titration).
6. Determine the amount of chloride ions present in water using silver nitrate (Mohr's Precipitation Method).
7. Determine the strength of $MgSO_4$ solution by Complexometric titration.
8. Determine the surface tension of a liquid using drop number method.
9. Determine the viscosity of a given liquid (density to be determined).
10. Determine the cell constant of conductivity cell and titration of strong acid/strong base conductometrically.
11. To determine (a) λ max of the solution of $KMnO_4$. (b) Verify Beer's law and find out the concentration of unknown solution by spectrophotometer.
12. Determination of the concentration of iron in water sample by using spectrophotometer.
13. Determination of the concentration of Iron (III) by complexometric titration.
14. Proximate analysis of coal.
15. Determination of eutectic point and congruent melting point for a two component system by method of cooling curve.

(At least 8 to 10 experiments are to be performed)

Suggested Books:

1. A. I. Vogel, G. H. Jeffery, *Vogel's Text Book of Quantitative Chemical Analysis*, Published by Longman Scientific & Technical, 5th Edition, 1989.
2. S. Chawla, *Essentials of Experimental Engineering Chemistry*, Dhanpat Rai & Co., 3rd Edition, 2008.
3. S. Rattan, *Experiments in Applied Chemistry*, Published by S.K.Kataria & Sons, 2nd Edition, 2003.
4. O. P. Pandey, D. N. Bajpai and S. Giri, *Practical Chemistry*, Published by S. Chand, 2005.
5. M. S. Kaurav, *Engineering Chemistry with Laboratory Experiments*, Published by PHI Learning Private Limited, 2011.
6. S. K. Bhasin and Sudha Rani, *Laboratory Manual on Engineering Chemistry*, Published by Dhanpat Rai Publishing Company, 2006.

Note:- Any 8-10 Experiments out of the list may be chosen.

APPLIED MATHEMATICS-II

Paper Code : ETMA-102 | **L** | **T** | **C**
Paper: APPLIED MATHEMATICS-II | **3** | **1** | **4**

Paper Code : ETMA-102	**L**	**T**	**C**
Paper: APPLIED MATHEMATICS-II	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the basics of Applied Mathematics that are required for an engineering student.

Unit –I

Partial differentiation and its Applications: Partial derivatives of first and second order. Euler's theorem for homogeneous functions (without proof). Derivatives of Implicit Functions, total derivatives. Change of variables. Jacobian. Taylor's theorem for function of two variables(without proof). Error and approximation. Extreme values of function of several variables(maxima ,minima, saddle points). Lagrange method of undetermined multipliers. Partial differential equations: Formulation, solution of first order equations, Lagranges equations, Charpit's method.

[T2][No. of 12hrs.]

Unit-II

Laplace Transformation: Definition, Laplace transformation of basic functions , existence condition for Laplace transformation, Properties of Laplace transformation(Linearity, scaling and shifting). Unit step function, Impulse Function, Periodic Functions. Laplace transformation of derivatives, Laplace transformation of integrals, differentiation of transforms, Integration of transforms, Convolution theorem ,inverse Laplace transformation. Solution of ordinary Differential equations.

[T1, T2][No. of 12hrs.]

Unit-III

Complex Function: Definition, Derivatives, Analytic function, Cauchy's Riemann equation (without proof). Conformal and bilinear mappings, Complex Integration: Complex Line integration, Cauchy's integral theorem and integral formula(without proof). Zeros and Singularities, Taylor's and Laurent's series (without proof). Residues, Residue theorem (without proof). Evaluation of real definite integrals: Integration around the unit circle, Integration around a small semi circle and integration around rectangular contours.

[T1,T2][No. of 12hrs.]

Unit-IV

Multiple integrals: Double integrals, Change of order of integration, Triple integrals. Vector Calculus: Scalar and vector functions, Gradient, Divergence and curl. Directional derivatives, Line Integrals. Surface integrals, volume integrals. Green's theorem, Stoke's theorem and Gauss divergence theorem (without proof).

[T1, T2][No. of 12hrs.]

Text:

[T1]. E. kresyzig," Advance Engineering Mathematics", Wiley publications
[T2] Michael Greenberg, "Advance Engineering mathematics", Pearson.

References:

[R1] R.K. Jain and S.R.K. Iyengar,"Advanced Engineering Mathematics "Narosa Publications
[R2] B. S. Grewal,"Higher Engineering Mathematics" Khanna Publications.
[R3] S. Ponnusamy, "Foundation of Complex Analysis" Narosa Publication
[R4] G.B. Thomas and R. N. Finny " Calculus and Analytic Geometry" Addison Wesley/ Narosa
[R5] Wylie R, " Advance Engineering mathematics" , McGraw-Hill
[R6] M. Spiegel, "Schaum's Outline on Laplace Transform, Tata McGraw-Hill

APPLIED PHYSICS – II

Paper Code: ETPH-104 **L T C**
Paper : APPLIED PHYSICS – II **2 1 3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the basics of Applied Physics aspects that are required for his understanding of basic physics.

UNIT I
Electromagnetic Theory : Gradient, Divergence, Curl, Gauss' law, Ampere's Law, Continuity equation, Maxwell's equations (differential and integral forms), Significance of Maxwell's equations, Poynting Theorem, Electromagnetic wave propagation in dielectrics and conductors.

[T1], [T2][No. of Hrs. 8]

UNIT II
Statistical Physics: Black body radiation, Planck's radiation formula, Wien's and Rayleigh-Jeans Laws, Distribution laws: Qualitative features of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics & their comparison (without derivation).
Quantum Mechanics: Postulates of Quantum mechanics, de-Broglie hypothesis, Davisson Germer experiment, Wave function and its physical significance, Wave Packet, Phase and group velocities, Uncertainty principle, Schrodinger equation for free particle, Time dependent Schrodinger equation, Particle in a box (1-D).

[T1][T2][No. of Hrs. 8]

UNIT III
Crystal Structure: Types of solids, Unit cell, Types of crystals, Translation vectors, Lattice planes, Miller indices, Simple crystal structures, Interplaner spacing, Crystal structure analysis: Bragg's law, Laue method, Point defects: Schottcky and Frankel defects.

[T1], [T2][No. of Hrs. 8]

UNIT IV
Band Theory of Solids: Introduction, Kronig-Penney model: E-k diagram, Effective mass of an electron, Intrinsic semiconductors: Electron concentration in conduction band, Hole concentration in valence band, Extrinsic semiconductor: p-type and n-type semiconductors, Fermi level, Hall Effect: Hall voltage and Hall coefficient.

[T1][T2][No. of Hrs. 8]

Text Books:
[T1]. Arthur Beiser 'Concepts of Modern Physics', [McGraw-Hill], 6th Edition 2009.
[T2]. A. S.Vasudeva, 'Modern Engineering Physics', S. Chand, 6th Edition, 2013.

Reference Books
[R1]. Richard Wolfson 'Essential University Physics' Pearson, Ist edition, 2009.
[R2]. H.K. Malik & A. K. Singh 'Engineering Physics' [McGraw-Hill], Ist Edition, 2009.
[R3]. C. Kittle, 'Mechanics', Berkeley Physics Course, Vol.- I. Latest Edition.
[R4]. Irving Kaplan 'Nuclear Physics' Latest Edition.
[R5]. John R. Taylor, Chris D. Zafirator and Michael A. Dubson, 'Modern Physics For Scientists and Engineers', PHI, 2nd Edition.
[R6]. D.J. Griffith, 'Introduction to Electrodynamics', Prentice Hall, Latest Edition.

ELECTRONIC DEVICES

Paper Code: ETEC-106 **L T C**
Paper : Electronic Devices **3 0 3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. This is the first introductory course in Electronics Engineering to the students of all the branches of engineering during the first year.
2. Question No.1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions from each unit. It should be of 25 marks.
3. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: Objective of the paper is to facilitate the student with the basics of electronic aspects that are required for his understanding and applications in their respective field of study. The pre-requisites are, to have a basic understanding of Applied Physics and Mathematics.

Unit-I

Evaluation Of Electronics: Introduction & Application Of Electronics, Energy Band Theory Of Crystals, Energy Band Structures In Metals, Semiconductors And Insulators, Theory Of Semiconductors: Classification Of Semiconductors, Conductivity Of Semiconductors, Carrier Concentration In Intrinsic & Extrinsic Semiconductors, Properties Of Intrinsic And Extrinsic Semiconductors, Variation In Semiconductors Parameters With Temperature, Fermi-Dirac Function, Fermi Level In A Semiconductor Having Impurities, Band Structure Of Open-Circuited P-N Junction, Drift And Diffusion Currents, Carrier Life Time, Continuity Equation (Elementary Treatment Only)

[T1][T2][T3][No. Of Hours: 12]

Unit – II

Theory of p-n junction Diode: Diode Current Equation, Diode Resistance, Transition Capacitance, Diffusion Capacitance, (Elementary treatment only), Effect of Temperature on p-n Junction Diode, Switching Characteristics, Piecewise Linear Model, **Special Diodes:** Zener Diode, Varactor Diode, Tunnel Diode, Photodiode, Light Emitting Diodes, Schottky Barrier Diode, **Applications of Diodes:** Half-Wave Diode Rectifier, Full-Wave Rectifier, Clippers and Clampers (Elementary treatment only).

[T1][T2][T3][No. of Hours: 11]

Unit – III

Bipolar junction transistor: Introduction of transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations, Eber-moll's model.

[T1][T2][T3][No. of Hours: 11]

Unit – IV

Application of BJT: CB, CE, CC configurations, hybrid model for transistor at low frequencies, Introduction to FETs and MOSFETs.

Fundamentals of digital electronics: Digital and analog signals, number systems, Boolean algebra, logic gates with simple applications, logic gates, karnaugh maps.

[T1][T2][T3][No. of Hours: 11]

Text Books

[T1] S. Salivahanan, N. Suresh Kr. & A. Vallavaraj, "Electronic Devices & Circuit", Tata McGraw Hill, 2008
[T2] Millman, Halkias and Jit, "Electronic devices and circuits" McGraw Hill
[T3] Boylestad & Nashelsky, "Electronic Devices & Circuits", Pearson Education, 10TH Edition.

Reference Books

[R1] Sedra & Smith, "Micro Electronic Circuits" Oxford University Press, VI Edition
[R2] Robert T. Paynter, "Introducing Electronic Devices & Circuits", Pearson Education, VII Edition, 2006

INTRODUCTION TO PROGRAMMING

Paper Code: ETCS-108	**L**	**T**	**C**
Paper: Introduction to Programming	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS:	**Maximum Marks : 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks	

Objective: The objective of the paper is to facilitate the student with the basics of programming aspects, using C as the primary language. This course focuses on the programming constructs which are used in other languages as well. This is the first course on programming and does not assume any prerequisite.

UNIT I

Concept of algorithms, Flow Charts, Overview of the compiler (preferably GCC) , Assembler, linker and loader , Structure of a simple Hello World Program in C ,Overview of compilation and execution process in an IDE (preferably Code Block)

[T1],[T2], [R4][R5][No. of hrs 8]

UNIT II

Programming using C: Preprocessor Directive, C primitive input output using get char and put char , simple I/O Function calls from library , data type in C including enumeration , arithmetic, relational and logical operations, conditional executing using if, else, switch and break .Concept of loops , for, while and do-while , Storage Classes: Auto, Register, Static and Extern

[T1], [T2], [R7][No. of hrs 8]

UNIT III

Arrays (one and two dimensional), 2-d arrays used in matrix computation. Concept of Sub-programming, functions. Parameter transmission schemes i.e. call by value and call by reference, Pointers, relationship between array and pointer, Argument passing using pointers, Array of pointer, passing arrays as arguments

[T2], [R1], [R7][No. of hrs 8]

UNIT IV

Structure and unions , Strings and C string library, File Handling in C Using File Pointers,fopen( ), fclose( ),Input and Output using file pointers, Character Input and Output with Files , String Input / Output Functions , Formatted Input / Output Functions,Block Input / Output Functions, Sequential Vs Random Access Files , Positioning the File Pointer

[T1], [T2],[R2][R7][No. of hrs 8]

Text Books:

[T1] Herbert Schildt, “C: The Complete Reference”, OsbourneMcgraw Hill, 4th Edition, 2002.
[T2] Forouzan Behrouz A. “Computer Science: A Structured Programming Approach Using C, Cengage Learning 2/e

Reference Books:

[R1] Kernighan & Ritchie, “C Programming Language”, The (Ansi C version), PHI, 2/e
[R2] K.R Venugopal, “Mastering C ”, TMH
[R3] R.S. Salaria "Application Programming in C " Khanna Publishers4/e
[R4] Yashwant Kanetkar “ Test your C Skills ” , BPB Publications
[R5] http://www.codeblocks.org/
[R6] http://gcc.gnu.org/
[R7] Programming in ANSI C, E. Balagurusamy; Mc Graw Hill, 6th Edition.

ENGINEERING MECHANICS

Paper Code: ETME 110 | **L** 2 | **T** 1 | **C** 3
Paper: Engineering Mechanics

Paper Code: ETME 110	**L**	**T**	**C**
Paper: Engineering Mechanics	**2**	**1**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

OBJECTIVE: THE OBJECTIVE OF THE PAPER IS TO GIVE THE BASIC PRINCIPLES OF MECHANIC APPLIED IN DIFFERENT DISCIPLINES OF ENGINEERING.

UNIT- I

Force system: Free body diagram, Parallel force system, concurrent force system, Equilibrium equations and applications in different force systems.

Friction: Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, Belt drive- derivation of equation $T_1/T_2 = e^{\mu\theta}$ and its application, M.A, V.R and Efficiency of Screw Jack, Application of friction in pivot and collar bearing..

[T1, T2, R1, R2, R4, R5][No. of Hrs. 08]

UNIT- II

Structure: Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section, graphical method.

Distributed Force: Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of inertia.

[T1, T2, R1, R2, R4, R5][No. of Hrs. 08]

Unit-III

Kinematics of Particles: Rectilinear motion, plane curvilinear motion-rectangular coordinates, normal and tangential component.

Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum, conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.

[T1, T2, R1, R2, R4, R5][No. of Hrs. 08]

Unit-IV

Kinematics of Rigid Bodies: Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, instantaneous center of velocity, Velocity polygons for four bar mechanism and single slider mechanism.

Kinetics of Rigid Bodies: Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.

Shear force and bending Moment Diagram. **[T1, T2, R1, R2, R4, R5][No. of Hrs. 08]**

Text Books:

[T1] Engg Mechanics by A.K.Tayal (Umesh Publications).
[T2] Engg Mechanics by Basudeb Bhattacharya (Oxford university Press)

Reference Books:

[R1] Engg Mechanics by Irving H. Shames (Pearson publications).
[R2] Engg Mechanics by U.C.Jindal (Galgotia Publications).
[R3] Engg Mechanics by Beer & Johnston(TMH).
[R4] Engg Mechanics by K.L.Kumar (TMH).
[R5] Engg Mechanics by Sadhu Singh (Khanna Publishers).

COMMUNICATION SKILLS

Paper Code: ETHS – 112 | **L** 2 | **T** 1 | **C** 3
Paper: Communication Skills

Paper Code: ETHS – 112	**L**	**T**	**C**
Paper: Communication Skills	**2**	**1**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXMIUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To enhance the language and communication competence of professional students with emphasis on English for Specific Purposes (ESP) through communication skills related activities.

UNIT-I

I. **Basic Remedial Grammar** (Errors in Parts of Speech, Tenses, Verbs and Modal; Reported Speech; Active and Passive Voice; Conditional clauses; Question Tags and Short Responses)

[T1],[R2],[R3]**[No. of hrs 06]**

UNIT-II

II. **Vocabulary and usage** (Synonyms and Antonyms; Suffixes and Prefixes; Homophones and Homonyms; One-word substitution; Prepositions; Phrasal verbs and Idioms, Indianism)

[T1],[R2],[R3]**[No. of hrs 06]**

UNIT-III

(A)

I. Types of writing (Expository, Descriptive, Narrative, Analytical and Argumentative)
II. Definition, description and explanation of scientific objects, instruments and processes etc.
III. Interpretation and use of charts, graphs and tables in technical writing.[T1],[R1]

(B)

I. Paragraph writing
II. Precis writing
III. Comprehension [T1],[R2],[R3]

[No. of hrs 10]

UNIT-IV

I. Reading different types of texts (speed and purpose)[T1]
II. Reading five essays [T2]
III. E.M. FORSTER, ***What I Believe*** (Pg-123)
IV. JAMES BRYCE, ***Some Hints on Public Speaking*** (Pg-135)
V. L.A. HILL, ***Principles of Good Writing*** (Pg-150)
VI. A.P.J. ABDUL KALAM, ***Work Brings Solace*** (Pg-207)
VII. SALIM ALI, ***Man and Nature in India: The Ecological Balance*** (Pg-213)

[No. of hrs 10]

TEXT BOOKS

[T1] Technical Communication: Principles and practice (OUP), (Meenakshi Raman and Sangeeta Sharma) OXFORD UNIVERSITY PRESS
[T2] Communication Skills for Engineers, Murli Krishna, Pearson.
[T3] Wren and Martin: High School English Grammar and Composition; S. Chand
[T4] Exploration of Ideas; An Anthology of Prose: Orient Blackswan.

REFERENCE BOOKS:

[R1] Professional Communication: Aruna Koneru, MCGRAW HILLS EDUCATION PVT. LTD
[R2] Wren and Martin: High School English Grammar and Composition; S. Chand
[R3] Advanced English Grammar and Composition: Gurudas Mukherjee & Inidbar Mukherjee; (ANE BOOKS PVT. LTD.)

ENVIRONMENTAL STUDIES

	L	T	C
Paper Code: ETEN-114	**L**	**T**	**C**
Paper : Environmental Studies	**2**	**1**	**3**

INSTRUCTIONS TO PAPER SETTER: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Each unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: *The objective of this course is to make students environment conscious. They will be exposed through the fundamental concepts of environment and ecosystem so that they can appreciate the importance of individual and collective efforts to preserve and protect our environment. This course must raise various questions in student's mind that how our environment is inter dependent on various factors and how human being must care for their natural surroundings.*

UNIT I: Environmental Studies: Ecosystems, Bio-diversity and its Conservation

(i) The Multidisciplinary Nature of Environmental Studies-

Definition, scope and importance of Environmental Studies. Biotic and a biotic component of environment, need for environmental awareness.

(ii) Ecosystems

Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structures and function of the following ecosystem:

(a) Forest ecosystem
(b) Grassland ecosystem
(c) Desert ecosystem
(d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

(iii) Bio-diversity and its Conservation

Introduction to biodiversity —definition: genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity : Habitat loss, Poaching of wildlife, man-wildlife conflicts, rare endangered and threatened species(RET) endemic species of India, method of biodiversity conservation: *In-situ* and *ex-situ* conservation.

[T1], [R3][No. of hrs. 08]

UNITII: Natural Resources: problems and prospects

(i) Renewable and Non-renewable Natural Resources

Concept and definition of Natural Resources and need for their management

- *Forest resources:* Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
- *Water resources:* Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems, Water conservation, rain water harvesting, watershed management.
- *Mineral resources**:*** Uses are exploitation, environmental effects of extracting and using mineral resources, case studies.
- *Food resources:* World food problems, changes causes by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- *Energy resources**:*** Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Urban problems related to energy, case studies.
- *Land resources**:*** Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

[T1], [R3][No. of hrs. 08]

UNIT III: Environmental Chemistry and Pollution Control

(i) *Chemistry of Environment*

(a) Green Technology

Principles of Green technology, Zero Waste Technology, Green Chemistry & Its basic principles, Atom Economy, Green Methodologies. clean development mechanisms (CDM), concept of environmental impact assessment,

(b) Eco-Friendly polymers

Environmental degradation of polymers, Biodegradable, Photo-biodegradable polymers, Hydrolysis & Hydrobiodegradable, Biopolymers & Bioplastics: polylactic acid, polyhydroxybutyrate, polycaprolactone,. Concept of bioremediation.

(ii)Environmental Pollution

Definition, types, causes, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution, (g) Nuclear hazards. Pollution case studies. Solid waste and its management: causes, effects and control measures of urban and industrial waste.

Chemical toxicology-Terms related to toxicity, impact of chemicals (Hg, As, Cd, Cr, Pb) on environment.

[T1], [R3][No. of hrs. 08]

UNIT IV: Disaster Management, Social Issues, Human Population and the Environment

(i) Disaster Management

Disaster management: floods, earthquake, cyclone and land-slides, nuclear accidents and holocaust, *case studies*.

(ii) Social Issues, Human Population and the Environment

Sustainable development, Climate change, global warming, acid rain, ozone layer depletion, Environmental ethics: Issues and possible solutions, Consumerism and waste products, , Wasteland reclamation. Population growth, problems of urbanisation.

Environment Protection Act, 1986; Air (Prevention and Control of Pollution) Act, 1981; Water (Prevention and Control of Pollution) Act, 1974; Wildlife Protection Act, 1972; Forest Conservation Act, 1980; Environmental management system standards-ISO 14000 series.

[T1][No. of hrs. 08]

Text Books:

[T1] E. Barucha, *Textbook of Environmental Studies for Undergraduate Courses*, Universities Press (India) Pvt. Ltd., 2005.

[T2] S. Chawla, *A Textbook of Environmental Studies*, McGraw Hill Education Private Limited, 2012

References Books:

[R1] G. T. Miller, *Environmental Science*, Thomas Learning, 2012

[R2] W. Cunningham and M. A. Cunningham, *Principles of Environment Science: Enquiry and Applications*, Tata McGraw Hill Publication, N. Delhi, 2003.

[R3] R. Rajagopalan, *Environmental Studies*: From Crisis to Cure, 2nd Edition, Oxford University Press, 2011.

[R4] A.K. De, *Environmental Chemistry*, New Age Int. Publ. 2012,,

[R5] A. Kaushik and C.P. Kaushik, Perspectives in Environment Studies, 4th Edition, New Age International Publishers,2013

[R6] Environmental Engineering by Gerard Kiely, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2010.

APPLIED PHYSICS LAB – II

Paper Code: ETPH-152 | **P** 2 | **C** 1
Paper: Applied Physics Lab – II

	P	C
Paper Code: ETPH-152		
Paper: Applied Physics Lab – II	**2**	**1**

LIST OF EXPERIMENTS

1. To determine the e/m ratio of an electron by J.J. Thomson method.
2. To measure the frequency of a sine-wave voltage obtained from signal generator and to obtain lissajous pattern on the CRO screen by feeding two sine wave signals from two signal generators.
3. To determine the frequency of A.C. mains by using Sonometer .
4. To determine the frequency of electrically maintained tuning fork by Melde's method.
5. Computer simulation (simple application of Monte Carlo): Brownian motion, charging & discharging of a capacitor.
6. To study the charging and discharging of a capacitor and to find out the time constant.
7. To study the Hall effect.
8. To verify Stefan's law.
9. To determine the energy band gap of a semiconductor by four probe method/or by measuring the variation of reverse saturation current with temperature.
10. To study the I-V characteristics of Zener diode.
11. To find the thermal conductivity of a poor conductor by Lee's disk method.
12. To study the thermo emf using thermocouple and resistance using Pt. Resistance thermometer.

Suggested Books:

[T1] C. L. Arora 'B. Sc. Practical Physics' S. Chand, Latest edition.

Note: Any 8-10 experiments out of the list may be chosen. Proper error – analysis must be carried out with all the experiments.

Electronic Devices

Paper Code: ETEC-156 **P 2** **C 1**
Paper: Electronic Devices Lab

Paper Code: ETEC-156	P	C
Paper: Electronic Devices Lab	2	1

LIST OF EXPERIMENTS

1. Introduction to C.R.O, Function Generator& Bread Board Kit & to generate different types of waveform with the help of Function Generator & to calculate their frequency, amplitude AC & DC voltage.
2. Identification & testing of Active & passive components
3. To plot V-I characteristics of a semiconductor diode & Calculate Static & Dynamic Resistance
4. To Study the Reverse characteristics of Zener diode
5. To Study the Rectifier circuit.
   a) Half Wave Rectifier
   b) Centre Tapped Rectifier.
   c) Bridge Rectifier.
6. To Study the output waveforms of different Filter Ckts of Rectifier.
7. To Plot Input & Output characteristics CB transistor.
8. To Plot Input & Output characteristics of CE transistor.
9. Realization of basic gates.
10. Implementation of Boolean functions (two or three variables).
11. Few experiments mentioned above to be performed on P-spice.
12. To develop a working model of any electronic circuit.

Note:- Any 8-10 Experiments out of the list may be chosen.

ENGINEERING MECHANICS LAB

Paper Code: ETME-158 **P** **C**
Paper: Engineering Mechanics Lab **2** **1**

LIST OF EXPERIMENTS:

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane.
4. To find the forces in the members of Jib Crane.
5. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the Wheel and Axle
7. To determine the MA, VR, □□of Worm Wheel (2-start)
8. Verification of force transmitted by members of given truss.
9. To verify the law of moments using Bell crank lever
10. To find CG and moment of Inertia of an irregular body using Computation method.

Note:- Any 8-10 Experiments out of the list may be chosen.

PROGRAMMING LAB

Paper Code	**:**	**ETCS 154**	**P**	**C**
Paper	**:**	**Programming Lab**	**2**	**1**

LIST OF EXPERIMENTS

For program development an IDE e.g. CodeBlock[a] , Eclipse CDT [b], Netbeans[c] is recommended

1. Write a program to find divisor or factorial of a given number.
2. Write a program to find sum of a geometric series
3. Write a recursive program for tower of Hanoi problem
4. Write a recursive program to print the first m Fibonacci number
5. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices

Addition of two matrices
Subtraction of two matrices
Finding upper and lower triangular matrices
Transpose of a matrix
Product of two matrices.

6. Write a program to copy one file to other, use command line arguments.
7. An array of record contains information of managers and workers of a company. Print all the data of managers and workers in separate files.
8. Write a program to perform the following operators an Strings without using String functions
   To find the Length of String.
   To concatenate two string.
   To find Reverse of a string.
   To Copy one sting to another string.
9. Write a Program to store records of an student in student file. The data must be stored using Binary File.Read the record stored in "Student.txt" file in Binary code.Edit the record stored in Binary File.Append a record in the Student file.
10. Write a programmed to count the no of Lowercase, Uppercase numbers and special Characters presents in the contents of File.
11. Two Mini Projects based on the skills learned in experiments 1-10 [These mini projects may be done in a group not exceeding group size of 4]
    [a] http://www.codeblocks.org/
    [b] http://www.eclipse.org/cdt/
    [c] https://netbeans.org/features/cpp/
    Note:- Any 8-10 Experiments out of the list may be chosen.

ENVIRONMENTAL STUDIES LAB

Paper Code –ETEN-160 **P** **C**
Paper : Environmental Studies Lab **2** **1**

LIST OF EXPERIMENTS

1. Determination of pH, conductivity and turbidity in drinking water sample.
2. Determination of pH and conductivity of soil/sludge samples.
3. Determination of moisture content of soil sample.
4. Determination of Total Dissolved Solids (TDS) of water sample.
5. Determination of dissolved oxygen (DO) in the water sample.
6. Determination of Biological oxygen demand (BOD) in the water sample.
7. Determination of Chemical oxygen demand (COD) in the water sample.
8. Determination of Residual Chlorine in the water sample.
9. Determination of ammonia in the water sample.
10. Determination of carbon dioxide in the water sample.
11. Determination of nitrate ions or sulphate ions in water using spectrophotometer.
12. Determination of the molecular weight of polystyrene sample using viscometer method.
13. Base catalyzed aldol condensation by Green Methodology.
14. Acetylation of primary amines using eco-friendly method.
15. To determine the concentration of particulate matter in the ambient air using High Volume Sampler.

P.S.: For better understanding of various aspects of environment visits to local areas, depending upon easy access and importance may be planned to any nearby river, forest, grassland, hills and students should write a report based on their observations.

Suggested Books:

1. A. I. Vogel, G. H. Jeffery, *Vogel's Text Book of Quantitative Chemical Analysis*, Published by Longman Scientific & Technical, 5th Edition, 1989.
2. dst.gov.in/green-chem.pdf (monograph of green chemistry laboratory experiments).
3. S. Chawla, *Essentials of Experimental Engineering Chemistry*, Dhanpat Rai & Co., 3rd Edition, 2008.
4. S. Rattan, *Experiments in Applied Chemistry*, Published by S.K.Kataria & Sons, 2nd Edition, 2003.
5. W. Cunningham and M. A. Cunningham, *Principles of Environment Science: Enquiry and Applications*, Tata McGraw Hill Publication, N. Delhi, 2003.
6. A. Kaushik and C. P. Kaushik, *Perspectives in Environment Studies*, 4th Edition, New Age International Publishers, 2013.

Note:- Any 8-10 Experiments out of the list may be chosen.

APPLIED MATHEMATICS-III

Paper Code: ETMA-201 **L** **T** **C**
Paper: Applied Mathematics-III **3** **1** **4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives: The objective of this course is to teach the students the applications of fourier series, fourier transform, difference equation and numerical methods to solve various engineering problems.

UNIT-I

Fourier series: Definition, Euler's formula, conditions for Fourier expansion, functions having points of discontinuity, change of intervals, even and odd functions ,half range series, Harmonic analysis. Fourier Transforms: Definition, Fourier integral, Fourier transform, inverse Fourier transform, Fourier sine and cosine transforms, properties of Fourier transforms (linearity, scaling, shifting, modulation), Application to partial differential equations.

[T2][No. of hrs 11]

UNIT-II

Difference equation: Definition, formation, solution of linear difference equation with constant coefficients ,simultaneous difference equations with constant coefficients, applications of difference equations .Z- transform: Definition, Z- transform of basic functions, properties of Z-transform (linearity, damping, shifting, multiplication),initial value theorem, final value theorem, convolution theorem, convergence of Z- transform, inverse of Z- transform, Application to difference equations.

[T2][No. of hrs 11]

UNIT-III

Numerical Methods: Solution of algebraic and transcendental equations using bisection method, Regula-Falsi method and Newton – Raphson method. Solution of linear simultaneous equations using Gauss-Jacobi's iteration method and Gauss-Seidal's iteration methods.Finite differences: Forward differences, backward differences and Central differences. Interpolation: Newton's interpolation for equi-spaced values. Stirling's central difference interpolation formula, Divided differences and interpolation formula in terms of divided differences , Lagrange's interpolation formula for unequi-spaced values.

[T1,T2] [No. of hrs 11]

UNIT-IV

Numerical Differentiation, maxima and minima of a tabulated function. Numerical Integration: Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's one-third rule and Simpson's three-eighth rule .Numerical solution of ordinary differential equations: Picard's method, Taylor's method,Euler's method, modified Euler's method, Runge-Kutta method of fourth order.

[T1,T2][No. of hrs 11]

Text Books:

[T1] R.K. Jain and S.R.K. Iyengar," Numerical methods for Scientific and Engineering Computation", New Age Publishing Delhi-2014.
[T2] B. S. Grewal,"Higher Engineering Mathematics" Khanna Publications, 2014 Edition.

Reference Books:

[R1] E. kresyzig, "Advance Engineering Mathematics", Wiley publications
[R2] P. B. Patil and U. P. Verma, " Numerical Computational Methods", Narosa
[R3] Partial Differential Equations" Schaum's Outline Series, McGraw Hill.
[R4] Michael Greenberg, " Advance Engineering mathematics" , Pearson.
[R5] Schaum's Outline on Fourier Analysis with Applications to Boundary Value Problem, Tata McGraw-Hill

ANALOG ELECTRONICS-I

Paper Code: ETEC-203 | **L** 3 | **T** 1 | **C** 4
Paper: Analog Electronics-I

Paper Code: ETEC-203	**L**	**T**	**C**
Paper: Analog Electronics-I	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The objective of teaching this subject is to impart in depth understanding of the concepts of biasing in active circuits and employing simple models to represent nonlinear and active elements in circuits. It also includes the operation of the circuits at high frequencies and effects of feedback. The analysis of power amplifier & tuned amplifiers is also dealt with.

UNIT – I

Review of diode and BJT, Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self-bias, bias stability with respect to variations in I_{CO}, V_{BE} & β, Stabilization factors, thermal stability. Bias compensation techniques.

Small signal amplifiers: CB, CE, CC configurations, hybrid model for transistor at low frequencies, RC coupled amplifiers, mid band model, gain & impedance, comparisons of different configurations, Emitter follower, Darlington pair(derive voltage gain, current gain, input and output impedance). Hybrid-model at high frequencies (π model).

[T1,T2,T3][No. of Hours: 11]

UNIT – II

Multistage Amplifiers: Cascade and cascode amplifiers, Calculations of gain, impedance and bandwidth. Design of multistage amplifiers.

Feedback Amplifiers: Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different configurations. Analysis of feedback Amplifiers.

[T1,T2,T3][No. of Hours: 11]

UNIT – III

Field Effect Transistor: Introduction, Classification, FET characteristics, Operating point, Biasing, FET small signal Model, enhancement & Depletion type MOSFETS, MESFET, FET Amplifier configurations (CD,CG and CS).

Introduction to UJT, SCR, Triac and Diac (working, construction, characteristics and application),UJT relaxation oscillator.

[T1,T2,T3][No. of Hours: 11]

UNIT – IV

Power Amplifiers: Power dissipations in transistors, Amplifiers Classification, (Class-A, Class-B, Class-C, Class-AB) Efficiency analysis, Push-pull and complementary Push-pull amplifiers,cross over distortion and harmonic distortion in push pull amplifier. Tuned amplifiers(single,double & stagger tuned amplifier).

[T1,T2,T3][No. of Hours: 11]

Text Books:

[T1] Boylestad & Nashelsky, “Electronic Devices & Circuit Theory” PEARSON PUBLICATION.
[T2] Salivahanan, Suresh Kumar, Vallavaraj, “Electronic devices and circuits” TMH, 1999.
[T3] J. Millman and Halkias, “Integrated Electronics, Analog & Digital Circuits & Systems” TMH – 2000.

Reference Books:

[R1] Sedra & Smith, “Micro Electronic Circuits” Oxford University Press, 2000
[R2] B.Kumar & Shail Bala Jain, “Electronic Devices And Circuits” PHI
[R3] David A Bell, “Electronic Devices and Circuits” , Oxford University Press, 2000.
[R4] Albert Malvino, David J.Bates, “Problems and Solutions in Basic Electronics” ,TMH.

SWITCHING THEORY AND LOGIC DESIGN

	L	T/P	C
Paper Code: ETEC-205	**L**	**T/P**	**C**
Paper: Switching Theory and Logic Design	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the knowledge of Logic Systems and Circuits, thereby enabling the student to obtain the platform for studying Digital Systems and Computer Architecture.

UNIT- I

Number Systems and Codes:- Decimal, Binary, Octal and Hexadecimal Number systems, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.

Switching Theory: - Boolean Algebra- Postulates and Theorems, De' Morgan's Theorem, Switching Functions- Canonical Forms- Simplification of Switching Functions- Karnaugh Map and Quine Mc-Clusky Methods.

Combinational Logic Circuits:- Review of basic gates- Universal gates, Adder, Subtractor ,Serial Adder, Parallel Adder- Carry Propagate Adder, Carry Look-ahead Adder, Carry Save Adder, Comparators, Parity Generators, Decoder and Encoder, Multiplexer and De-multiplexer, ALU, PLA and PAL.

[T2,T3][No. of Hrs. 14]

UNIT- II

Integrated circuits: - TTL and CMOS logic families and their characteristics. Brief introduction to RAM and ROM.

Sequential Logic Circuits: - Latches and Flip Flops- SR, , D, T and MS-JK Flip Flops, Asynchronous Inputs.

Counters and Shift Registers:- Design of Synchronous and Asynchronous Counters:- Binary, BCD, Decade and Up/Down Counters , Shift Registers, Types of Shift Registers, Counters using Shift Registers- Ring Counter and Johnson Counter.

[T2,T3][No. of hrs. 10]

UNIT- III

Synchronous Sequential Circuits:- State Tables State Equations and State Diagrams, State Reduction and State Assignment, Design of Clocked Sequential Circuits using State Equations.

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and merger chart methods-concept of minimal cover table.

[T1][No. of hrs. 10]

UNIT- IV

Algorithmic State Machine: Representation of sequential circuits using ASM charts synthesis of output and next state functions, Data path control path partition-based design.

Fault Detection and Location: Fault models for combinational and sequential circuits, Fault detection in combinational circuits; Homing experiments, distinguishing experiments, machine identification and fault detection experiments in sequential circuits.

[T1][No. of hrs. 10]

Text Book:

[T1] Zyi Kohavi, "Switching & Finite Automata Theory", TMH, 2nd Edition

[T2] Morris Mano, Digital Logic and Computer Design", Pearson

[T3] R.P. Jain, "Modern Digital Electronics", TMH, 2nd Ed,

Reference Books:

[R1] A Anand Kumar, "Fundamentals of Digital Logic Circuits", PHI

[R2] Taub ,Helbert and Schilling, "Digital Integrated Electronics", TMH

ELECTRONIC INSTRUMENTS AND MEASUREMENTS

Paper Code : ETEC-207	**L**	**T/P**	**C**
Paper: Electronic Instruments and Measurements	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: Electronic Instruments are being used in industries and in Labs. The subject provides material for a first course on electronic instruments. It details the basic working and use of different instruments.

UNIT – I Introduction to Metering

Performance Characteristics of Instruments: Static Characteristics, Dynamic Characteristics.
Errors in Measurement: Types of Static Errors, Gross Errors, Systematic Errors, Random Errors, Sources of Errors.
Basic Meter Movement: Moving Coil and Moving Iron type of instruments.
Display Devices: Digital display system and indicators, Classification of displays, Light Emitting Diodes (LED), Liquid Crystal Display (LCD).
Printers: Classification of Printers, Drum Printer, Dot-Matrix, ink-jet & Laser-jet Printers.
Electrical Standards & Calibration.

[T1,T2][No. of Hrs.: 10]

UNIT – II Basic Instruments

DC Ammeter, Multi range ammeters, Extending of ammeter ranges, RF Ammeter, Effect of frequency on calibration. DC Voltmeter, Multi range voltmeter, extending Voltmeter ranges, Transistor Voltmeter, Chopper type DC amplifier Voltmeter (Micro-voltmeter), Solid-State Voltmeter, AC Voltmeter using rectifiers, True RMS Voltmeter.
Digital Metering: Dual slope integrating type DVM (Voltage to Time conversion), Integrating type DVM (Voltage to Frequency Conversion), Resolution and sensitivity of digital meters, General specifications of a DVM, Digital Multimeters, Digital frequency meter, Digital measurement of time, Universal counter, Electronic counter, Digital tachometer, Digital pH meter, Digital phase meter, Digital capacitance meter.

[T1 T2][No. of Hrs: 14]

UNIT – III Cathode Ray Oscilloscope

Basic Principle, CRT features, Block diagram of oscilloscope, single/dual beam CRO, dual trace oscilloscope, (VHF) sampling oscilloscope, storage oscilloscope (For VLF Signal). Measurement of phase and frequency by Lissajous figures method. Oscilloscope as a Bridge Null detector, standard specifications of a single beam CRO, probes for CRO, Digital Storage Oscilloscope (DSO), Fiber Optic CRT recording oscilloscope.

[T1 T2][No. of Hrs: 10]

UNIT – IV Electronic Instruments

Fixed / Variable Frequency AF Oscillator, Signal Generator, Function Generator, (sine, square and triangular wave generator), Frequency selective and Heterodyne Wave Analyzer.
Digital Data Recording, Potentiometric Recorder (Multipoint), Digital Memory Waveform Recorder (DWR), Introduction to transducers, Data Acquisition System: Introduction, Objective of a DAS, Single Channel Data Acquisition System, Multi-Channel DAS.

[T1 T2][No. of Hrs: 10]

Text Books:

[T1] A. K. Shawney - Electrical & Electronic Measurement & Instruments, Dhanpat Rai & Sons Publication
[T2] H.S. Kalsi, "Electronic Instrumentation" Tata McGraw-Hill.

Reference Books:

[R1] W. D. Cooper, "Modern Electronics Instrumentation & Measurement Techniques" PHI, 1998.
[R2] E. W. Gloding and F. C. Widdis - Electrical Measurements and measuring Instruments, Wheeler Publishing, fifth Edition.
[R3] Reissland, M. U. "Electrical Measurements: Fundamentals, Concepts, Applications", New age International (P) Limited, Publishers.

DATA STRUCTURES

Paper Code: ETCS-209	**L**	**T**	**C**
Paper: Data Structures	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, the student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To understand the programming and the various techniques for enhancing the programming skills for solving and getting efficient results.

UNIT – 1:

Introduction to programm ing methodologies and design of algorithms. Abstract Data Type, array, array organization, sparse array. Stacks and Stack ADT, Stack Manipulation, Prefix, infix and postfix expressions, their interconversion and expression evaluation. Queues and Queue ADT, Queue manipulation. General Lists and List ADT, List manipulations, Single, double and circular lists.

[T1,T2][No. of hrs. 12]

UNIT – II:

Trees, Properties of Trees, Binary trees, Binary Tree traversal, Tree manipulation algorithms, Expreession trees and their usage, binary search trees, AVL Trees, Heaps and their implementation.

[T1,T2][No. of hrs. 12]

UNIT – III:

Multiway trees, B-Trees, 2-3 trees, 2-3-4 trees, B* and B+ Trees. Graphs, Graph representation, Graph traversal.

[T1,T2][No. of hrs. 12]

UNIT – IV:

Sorting concept, order, stability, Selection sorts (straight, heap), insertion sort (Straight Insertion, Shell sort), Exchange Sort (Bubble, quicksort), Merge sort (only 2-way merge sort). Searching – List search, sequential search, binary search, hashing concepts, hashing methods (Direct, subtraction, modulo-division, midsquare, folding, pseudorandom hashing), collision resolution (by open addressing: linear probe, quadratic probe, pseudorandom collision resolution, linked list collision resolution), Bucket hashing.

[T1,T2][No. of hrs. 12]

Text Books:

[T1] R. F. Gilberg, and B. A. Forouzan, “Data structures: A Pseudocode approach with C”, Thomson Learning.
[T2] A .V. Aho, J . E . Hopcroft, J . D . Ulman “Data Structures and Algorithm”, Pearson Education.

Reference Books:

[R1] S. Sahni and E. Horowitz, “Data Structures”, Galgotia Publications.
[R2] Tanenbaum: “Data Structures using C”, Pearson/PHI.
[R3] T .H . Cormen, C . E . Leiserson, R .L . Rivest “Introduction to Algorithms”, PHI/Pearson.
[R4] A.K.Sharma, “Data Structures”, Pearson
[R5] Ellis Horowitz and Sartaz Sahani “Fundamentals of Computer Algorithms”, Computer Science Press.

SIGNALS AND SYSTEMS

Paper Code: ETEC-211	**L**	**T/P**	**C**
Paper: Signals and Systems	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: This is the first course for representation of various types of electronic signals and LTI systems. Applications of Fourier series, understanding of Fourier transforms and sampling of various signals. Analysis of various systems using the Z transforms, Laplace transforms.

UNIT- I

Continuous And Discrete Time Signals: Definition of signal**,** Classification of Signals: Periodic and Aperiodic, Even and Odd, Energy and Power signals**,** Deterministic and Random signals**.**

Singular Functions: Unit impulse, unit step, unit ramp, complex and exponential, parabolic, Signum, Sinc etc. Properties of unit impulse in continuous and discrete domain, properties of basic functions w.r.t. orthogonality.

Transformation in independent variable of signals: Time scaling, Time shifting, Amplitude scaling. Representation of signals in terms of singular function and orthogonal functions.

Systems: Definition of system, types of systems: Linear and nonlinear, static and dynamic, causal and non-causal, time variant and invariant, invertible and non-invertible, stable and non-stable. System described by differential equation and difference equation.

LTI System: Properties of LTI System, impulse response, convolution and its properties in continuous and discrete domain with proof. Linear convolution in continuous and discrete domain using graphical method, using general formula and matrix method.

[T1, T2] [No. of Hrs. 12]

UNIT- II

Fourier series: Need and application of Fourier series. Fourier series representation of continuous time and discrete time signals using exponential method and trigonometric method. Magnitude and Phase spectrum of signals.

Fourier Transform: Properties of the Continuous time and discrete time Fourier Transform. Magnitude and Phase representations of frequency response of LTI systems Analysis and characterization of LTI systems using Differential Equations and Difference equation. **[T1,T2][No. of Hrs. 11]**

UNIT- III

Magnitude- Phase Representation of Frequency Response of LTI System: Linear phase, concept of phase delay and group delay. All pass system.

Laplace Transform: Properties of Laplace transform, concept of ROC and its properties. Computation of impulse response & transfer function using Laplace transform. Inverse-Laplace transforms. Computation of impulse response, total response (zero state and zero input response) & transfer function using Laplace transform**.**

[T1, T2] [No. of Hrs. 11]

UNIT- IV

Sampling: Sampling of low pass signals, ideal sampling, Aliasing effect, Nyquist rate, reconstruction of signal. Sampling of discrete time signals**.**

Z Transform: Region of convergence – properties of ROC, Properties of Z-transform.

Inverse Z-transform using contour integration - Residue theorem, Power series expansion and partial fraction expansion. Relationship between Z-transform, Fourier transform and Laplace transform. Computation of impulse response, total response (Zero state and Zero input response) & Transfer function using Z-Transform. Stability of discrete-time LTI System.

[T1, T2] [No. of Hrs. 10]

Text Books:

[T1] AlanV.Oppenheim, Alan S.Willsky, S.Hamid Nawab, “Signals & Systems”, 2nd edition, Pearson Education, 1997.

[T2**]** Simon Haykin and Barry Van Veen, “Signals and Systems”, John Wiley, 1999.

Reference Books:

[R1] M.J.Roberts, “Signals and Systems Analysis using Transform Method and MATLAB”, TMH 2003.

[R2] Tarun kumar rawat “signals and systems “, Oxford University Press, Incorporated, 2010

[R3] A. Anand kumar, “signals and systems” 3rd edition , PHI

[R4] Ramesh Babu and R.Anandanatrajan ,”Signals and system”, 4th edition Sci Tech ,2013

[R5] Moman .H. Hays, “Digital Signal Processing”, Schaum’s outlines, Tata McGraw-Hill2004.

[R6] John G.Proakis and Dimitris G.Manolakis, “Digital Signal Processing, Principles, Algorithms and Applications”, 3rd edition. PHI, 2000.

ANALOG ELECTRONICS-I LAB

	L	T/P	C
Paper Code: ETEC-251	**L**	**T/P**	**C**
Paper: Analog Electronics-I Lab	**0**	**2**	**1**

List of Experiments:

1. Plotting input and output characteristics and calculation of parameters of a transistor in common emitter conf iguration
2. Transistor biasing circuit. Measurement of operating point (Ic and Vce) for a :-
   i. fixed bias circuit
   ii. Potential divider biasing circuit.
3. Plot the FET characteristics & MOSFET characteristics.
4. Two Stage R.C. Coupled Amplifier.
   i. To measure the overall gain of two stages at 1 KHz and compare it with gain of Ist stage, Also to observe the loading effect of second stage on the first stage.
   ii. To plot the frequency response curve of two stage amplifier.
5. To study Emitter follower circuit & measurement of voltage gain and plotting of frequency response Curve.
6. Feedback in Amplifier. Single stage amplifier with and without bypass capacitor, measurement of voltage gain and plotting the frequency response in both cases.
7. To determine and plot firing characteristics of SCR by varying anode to cathode voltage, and varying gate current.
8. To note the wave shapes and voltages at various points of a UJT relaxation oscillator circuit.
9. Transistorized push pull amplifier & Measurement of optimum load, maximum undistorted power (by giving maximum allowable signal) Efficiency and percentage distortion factor.
10. To study the characteristics of single tuned & double tuned amplifier.

Note: It is advised to use PSPICE software and the hardware design for performing and evaluation of the above circuits.

NOTE: - At least 8 Experiments out of the list must be done in the semester

SWITCHING THEORY AND LOGIC DESIGN LAB

Paper Code: ETEC-253	**L**	**T/P**	**C**
Paper: Switching Theory and Logic Design Lab	**0**	**2**	**1**

List of Experiments:

1. Realize all gates using NAND & NOR gates
2. Realize Half Adder, Full Adder, Half subtracter, Full subtracter
3. Realize a BCD adder
4. Realize a Serial Adder
5. Realize a four bit ALU
6. Realize Master-Save J K Flip-Flop, using NAND/NOR gates
7. Realize Universal Shift Register
8. Realize Self-Starting, Self Correcting Ring Counter
9. Realize Multiplexer and De-Multiplexer
10. Realize Carry Look ahead Adder / Priority Encoder
11. Simulation of PAL and PLA
12. Simulation Mealy and Moore State machines

NOTE: - At least 8 Experiments out of the list must be done in the semester

ELECTRONIC INSTRUMENTS AND MEASUREMENTS LAB

	L	T/P	C
Paper Code: ETEC - 257	**L**	**T/P**	**C**
Paper: Electronic Instruments and Measurements Lab	**0**	**2**	**1**

List of Experiments

1. Study and demonstration of different types of display devices.
2. Measurement of resistance, voltage and current using digital multimeter / clamp meter.
3. Calibration of Ammeter and Voltmeter.
4. Measurement of resistance, inductance and capacitance using digital RLC meter.
5. Measurement of frequency and time period using digital frequency meter.
6. Study and demonstration of universal frequency counter.
7. Study and measurement of voltage, frequency and phase difference of a.c. quantities using C.R.O.
8. Measurement of inductance and capacitance using C.R.O.
9. Study and measurement of quantities using D.S.O.
10. Study of function generator.
11. Study and use of different types of transducers.
12. Study of different types of recorders /Printers.
13. To study and use different types of ADC and DAC.
14. To study functioning and applications of Wave Analyzer.

NOTE: - At least 8 Experiments out of the list must be done in the semester

DATA STRUCTURES LAB

Paper Code: ETCS-255	**L**	**T/P**	**C**
Paper: Data Structures Lab	**0**	**2**	**1**

List of Experiments:

1. Perform Linear Search and Binary Search on an array.
   Description of programs:
   a. Read an array of type integer.
   b. Input element from user for searching.
   c. Search the element by passing the array to a function and then returning the position of the element from the function else return -1 if the element is not found.
   d. Display the position where the element has been found.
2. Implement sparse matrix using array.
   Description of program:
   a. Read a 2D array from the user.
   b. Store it in the sparse matrix form, use array of structures.
   c. Print the final array.
3. Create a linked list with nodes having information about a student and perform
   I. Insert a new node at specified position.
   II. Delete of a node with the roll number of student specified.
   III. Reversal of that linked list.

4. Create doubly linked list with nodes having information about an employee and perform Insertion at front of doubly linked list and perform deletion at end of that doubly linked list.
5. Create circular linked list having information about an college and perform Insertion at front perform Deletion at end.
6. Create a stack and perform Pop, Push, Traverse operations on the stack using Linear Linked list.
7. Create a Linear Queue using Linked List and implement different operations such as Insert, Delete, and Display the queue elements.
8. Create a Binary Tree (Display using Graphics) perform Tree traversals (Preorder, Postorder, Inorder) using the concept of recursion.
9. Implement insertion, deletion and display (inorder, preorder and postorder) on binary search tree with the information in the tree about the details of a automobile (type, company, year of make).
10. To implement Insertion sort, Merge sort, Quick sort, Bubble sort, Bucket sort, Radix sort, Shell sort, Selection sort, Heap sort and Exchange sort using array as a data structure.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

SIGNALS AND SYSTEMS LAB

Paper Code: ETEC-259	**L**	**T/P**	**C**
Paper: Signals and Systems Lab	**0**	**2**	**1**

List of Experiments

1. Introduction to MATLAB and its basic commands.
2. Plot unit step, unit impulse, unit ramp, exponential, parabolic functions and sinusoidal signals
3. Plot the linear convolution of two sequences.
4. Plot the correlation of two sequences.
5. Plot the magnitude and phase spectra of a signal using Fourier transforms.
6. Plot the magnitude and phase spectrum of signal using Fourier series.
7. Find out the Z transform of a signal and check the stability using pole zero location.
8. Plot the spectra of ideally sampled signal w.r.t. sampling of Discrete time signals.
9. Verification of few properties of Fourier transform.
10. Evaluate the DTFS coefficients of a signal and plot them.
11. Plot the step response for any impulse response entered by user.

NOTE: - At least 8 Experiments out of the list must be done in the semester

APPLIED MATHEMATICS – IV

Paper Code: ETMA-202	**L**	**T/P**	**C**
Paper: Applied Mathematics –IV	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Objective: To equip the students with the mathematical tools for problem solving in various engineering disciplines.

UNIT – I
Partial Differential Equation: linear partial differential equations with constant coefficient, homogeneous and non homogeneous linear equations. Method of separation of variables. Laplace equation, wave equation and heat flow equation in Cartesian coordinates only with initial and boundary value.

[T1][No. of Hrs. 12]

UNIT II:
Probability Theory: Definition, addition law of probability, multiplication law of probability, conditional probability, Baye’s theorem, Random variable: discrete probability distribution, continuous probability distribution, expectation, moments, moment generating function, skewness, kurtosis, binomial distribution, Poisson distribution, normal distribution.

[T1, T2][No. of Hrs. 11]

UNIT-III:
Curve Fitting: Principle of least square Method of least square and curve fitting for linear and parabolic curve, Correlation Coefficient, Rank correlation, line of regressions and properties of regression coefficients. Sampling distribution: Testing of hypothesis, level of significance, sampling distribution of mean and variance, Chi-square distribution, Student’s T- distribution, F-distribution, Fisher’s Z- distribution.

[T1, T2][No. of Hrs. 12]

UNIT IV
Linear Programming: Introduction, formulation of problem, Graphical method, Canonical and Standard form of LPP, Simplex method, Duality concept, Dual simplex method, Transportation and Assignment problem.

[T1][No. of Hrs. 11]

Text Books:
[T1] B. S. Grewal, “Higher Engineering Mathematics”, Khanna Publications.
[T2] N.M. Kapoor, “Fundamentals of Mathematical Statistics”, Pitambar Publications

References Books:
[R1] E. Kresyzig,” Advance Engineering Mathematics”, Wiley publications
[R2] Miller and Freund, “Probability and statistics for Engineers” , PHI
[R3] Gupta and Kapoor, “Fundamentals of Mathematical Statistics” Sultan Chand and Sons
[R4] G. Hadley, “Linear Programming”, Narosa.
[R5] Schaum’s Outline on “Probability and Statistics” Tata McGraw-Hill
[R6] Gupta and Manmohan, “Problems in Operations Research”, Sultan Chand and Sons.
[R7] R.K. Jain and S.R.K. Iyengar,”Advanced Engineering Mathematics” Narosa Publications.

ANALOG ELECTRONICS – II

Paper Code: ETEC-204	**L**	**T/P**	**C**
Paper: Analog Electronics – II	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Objective:- The objective of teaching this subject is to give students in depth knowledge of design and analysis of analog IC (OP-AMP, OTA), The internal details of OP-AMP and measurement of its parameters is elaborated. The linear and nonlinear applications, useful for practical circuits, are detailed. Some important and widely used ICs such as 555 timer IC,PLL & VCO, Voltage Regulator IC etc., are also included.

Unit – I

Introduction to Op-Amp : Differential amplifier using BJT, Block diagram of op-amp, pin diagram of 741 IC, characteristics of ideal Op-Amp, equivalent circuit of Op-Amp, ideal voltage transfer curve, Op-Amp ac and dc parameters. Building blocks of Analog ICs: Differential amplifier using single and two op-amp, virtual ground, circuit for improving CMRR, Wilson & Widlar Current mirrors, Active loads, Level shifters and output stages, instrumentation amplifier using Op-Aamp.

[T1,T2][No. of Hours: 11]

Unit – II

Linear & Non Linear Wave shaping: , Inverting and non-inverting amplifiers, voltage follower, difference amp, adders, Voltage to current with floating & grounded load, current to voltage converter, practical integrator & differentiator, Clipping & Clamping circuits, Comparators, log/antilog circuits using Op-Amps, precision rectifiers(half & full wave),peak detector, Inverting & non inverting Schmitt trigger circuit.
waveform generations: Sine wave generator (Phase shift, Wein bridge, Hartley & Colpitts), Barkhausen criteria of oscillations, conditions for oscillation, cystal oscillator.

[T1,T2][No. of Hours: 11]

Unit – III

Waveform generators: Square and triangular waveform generators (determine period and frequency), saw tooth wave generator, Astable multi-vibrator, Monostable and Bistable Multivibrator.
Active RC Filters: Idealistic & Realistic response of filters (LPF, BPF, HPF, BRF), Butter worth & Chebyshev approximation filter functions All pass, Notch Filter.

[T1,T2][No. of Hours: 11]

Unit – IV

Introduction to 555 Timer IC: Functional and block diagram of 555 timer, Application of 555 timer as astable and monostable multivibrator. Operational transconductance amplifier (OTA)-C filters.OTA integrator & differentiator, Introduction to current conveyer. Applications of IC Analog Multiplier: IC phase locked loops, IC voltage regulators, IC VCO.

[T1,T2][No. of Hours: 11]

Text Books:

[T1] S Salivahanan, V S Kanchana Bhaaskaran, “Linear Integrated Circuits” TMH.
[T2] Op - Amps And Linear Integrated Circuits, Ramakant A Gayakwad,PHI.

Reference Books:

[R1] D. Roy Choudhary, Shail B Jain, “Linear Integrated Circuits” New Age Publisher, 1999.
[R2] M.Rashid , “Microelectronic Circuit”, Cengage Learning Publication.
[R3] Sedra & Smith, “Micro Electronic Circuits” Oxford University Press, 2000
[R4] David A Bell, “Operational Amplifiers and Linear IC’s”, PHI.

NETWORK ANALYSIS AND SYNTHESIS

Paper Code: ETEC-206	**L**	**T/P**	**C**
Paper: Network Analysis and Synthesis	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: *The purpose of this course is for each student to learn and further explore the techniques of advanced circuit analysis. The concepts and analytical techniques gained in this course (e.g., signals, Laplace transformation, and frequency response) will enable students to build an essential foundation of many fields within electrical engineering, such as control theory, analog electronic circuits, signal processing.*

UNIT-I

Review of signals & systems and their classification, periodic waveforms and signal synthesis, properties and applications of Laplace transform of complex waveform. Concept of generalized frequency, circuit representation & their response in terms of generalized frequency.

[T1, T2] [No. of Hours: 10]

UNIT-II

System modeling in terms of differential equations and transient response of R, L, C, series and parallel circuits for impulse, step, ramp, sinusoidal and exponential signals by classical method and using Laplace transform.

[T1, T2] [No. of Hours: 12]

UNIT-III

Two port networks – Introduction of two port parameters and their interconversion, interconnection of two 2-port networks, open circuit and short circuit impedances and ABCD constants relation between image impedances and short circuit and open circuit impedances.

[T1,T2] [No. of Hours: 10]

UNIT IV

General Network Functions: Concepts of Network functions (driving point and transfer function), concept of minimum phase analysis of Lattice T and Bridged T networks. Concept of poles & zeros. Hurwitz polynomial, positive real function and synthesis of LC, RC, RL Networks in Foster's I and II, Cauer's I & II forms, Introduction of passive filter and their classification, frequency response, characteristic impedance of low pass and high pass prototype section.

[T1,T2][No. of Hours: 12]

Text Books:

[T1] W. H. Hayt "Engineering Circuit Analysis" TMH Eighth Edition
[T2] Valkenburg, "Network analysis" PHI,

Reference Books

[R1] S Salivahanan, "Circuit Theory ", Vikas Publishing House 1st Edition 2014
[R2] D. R. Choudhary, "Networks and Systems" New Age International, 1999.
[R3] Bhise, Chadda, Kulshreshtha, " Engineering network analysis and filter design" Umesh Publication, 2000.
[R4] Kuo, "Network analysis and synthesis" John Weily and Sons, 2nd Edition.
[R5] Allan H Robbins, W.C.Miller "Circuit Analysis theory and Practice", Cengage Learning Pub 5th Edition 2013
[R6] Bell "Electric Circuit" Oxford Publications 7th Edition

COMMUNICATION SYSTEMS

Paper Code: ETEC-212 | **L** 3 | **T/P** 1 | **C** 4

Paper: Communication Systems

INSTRUCTIONS TO PAPER SETTERS:	**Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Objective: This is the first course which introduces the concepts of communication systems, channels and various analog modulation methods. Further, an insight into the behavior of noise is dealt.

UNIT I

Introduction: Overview of Communication system, Communication channels, Mathematical Models for Communication Channels

Introduction of random Variables: Definition of random variables, PDF, CDF and its properties, joint PDF, CDF, Marginalized PDF, CDF, WSS wide stationery, strict sense stationery, non stationery signals, UDF, GDF, RDF, Binomial distribution, White process, Poisson process, Wiener process.

[T1, T2][No. of Hrs. 11]

UNIT II

Amplitude Modulation: Need for modulation, Representation of Band Pass signals and systems: Hilbert Transform, In-phase, Quad-phase representations, Power relation, modulation index, Bandwidth efficiency, AM: modulation and demodulation, DSB-SC: Modulation and demodulation, SSB: modulation and demodulation, VSB: modulation and demodulation.

[T1, T2][No. of Hrs. 11]

UNIT III

Angle Modulation Systems: Frequency Modulation, Types of Frequency Modulation, Generation of NBFM, WBFM, Transmission BW of FM Signal, Phase Modulation, Relationship between PM& FM.

Radio Receivers: Functions & Classification of Radio Receivers, Tuned Radio Frequency (TRF) Receiver, Superheterodyne Receiver, Basic Elements, Receiver Characteristics, Frequency Mixers, AGC Characteristics.

[T1, T2][No. of Hrs. 11]

UNIT IV

Noise Theory: Noise, Types of noise, Addition of Noise due to several sources in series and parallel, Generalized Nyquist Theorem for Thermal Noise, Calculation of Thermal Noise for a Single Noise Source, RC Circuits & Multiple Noise sources. Equivalent Noise Bandwidth, Signal to Noise Ratio, Noise-Figure, Noise Temperature, Calculation of Noise Figure

Performance of Communication Systems: Receiver Model, Noise in DSB-SC Receivers, Noise in SSB-SC Receivers, Noise in AM receiver (Using Envelope Detection), Noise in FM Receivers, FM Threshold Effect, Threshold Improvement through Pre-Emphasis and De-Emphasis, Noise in PM system – Comparison of Noise performance in PM and FM, Link budget analysis for radio channels.

[T1, T2][No. of Hrs. 11]

Text Books

[T1] John G. Proakis & Masoud Salehi, "Communication System Engineering", Pearson Education.
[T2] Haykin, S., "Communication Systems", John Wiley (2009) 4th ed.

Reference Books

[R1] Taub, H., "Principles of Communication Systems", McGraw-Hill (2008) 3rd ed.
[R2] Kennedy, G., "Electronic Communication Systems", McGraw-Hill (2008) 4th ed.
[R3] V. Chandra Sekar "Analog Communication", Oxford University Press, Incorporated, 2010
[R4] John G Proakis, M.Salehi and G.Bauch "Modern Communication System Using MATLAB" Cengage Learning, 3rd edition, 2013
[R5] J. C. Hancock, "An Introduction to the Principles of Communication Theory", TMH, 1998.
[R6] Peebles, "Probability and Stochastic Process" Prentice Hall; 3 edition

ELECTROMAGNETIC FIELD THEORY

Paper Code: ETEE-210	**L**	**T/P**	**C**
Paper: Electromagnetic Field Theory	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: To list Maxwell's equations and solve them for specific regular geometries , understand general electromagnetic wave propagation and how the plane wave solution can be used to approximate real situation, describe the boundary conditions for electric and magnetic fields at dielectric interfaces ,interpret the effects of lossy and low loss dielectrics upon the propagation of electromagnetic waves, and predict this process in specific applications and solve the performance of specific transmission lines.

UNIT I

Introduction: Review of scalar and vector field, Dot and Cross products, Coordinate Systems-Cartesian, cylindrical and spherical. Vector representation of surface, Physical interpretation of gradient divergence and curl, Transformation of vectors in different co-ordinate systems, dirac-delta function.

Electrostatics: Electric field due to point-charges, line charges and surface charges, Electrostatic potential, Solution of Laplace and Poisson's equation in one dimension, M-method of image applied to plain boundaries, field mapping and conformal transformation, Electric flux density, Boundary conditions. Capacitance: calculation of capacitance for simple rectangular, cylindrical and spherical geometries, Electrostatic energy.

[T1,T2][No. of Hrs. : 10]

UNIT II

Magnetostatics : Magnetic Induction and Faraday's Law, Magnetic Flux Density, Magnetic Field Strength H, Ampere, Gauss Law in the Differential Vector Form, Permeability, Energy Stored in a Magnetic Field, Ampere's Law for a Current Element, Volume Distribution of Current , Ampere's Law Force Law, Magnetic Vector Potential, The Far Field of a Current Distribution, Maxwell's Equations: The Equation of Continuity for Time Varying Fields, Inconsistency of Ampere's Law, Maxwell's Equations, Conditions at a Boundary Surface.

[T1,T2][No. of Hrs. : 10]

UNIT III

Electromagnetic Waves: Continuity equations, Displacement current, Maxwell's equation, Boundary conditions, Plane wave equation and its solution in conducting and non-conducting media, Phasor notation, Phase velocity, Group velocity, Depth of penetration, Conductors and dielectrics, Impedance of conducting medium. Polarization, Reflection and refraction of plane waves at plane boundaries, Poynting vectors, and Poynting theorem.

[T1,T2][No. of Hrs. : 10]

UNIT IV

Transmission Lines: Transmission line equations, Characteristic impendence, Distortion-less lines, Input impendence of a loss less line, computation of primary and secondary constants, Open and Short circuited lines, Standing wave and reflection losses, Impedance matching, Loading of lines, Input impedance of transmission lines, RF lines, Relation between reflection coefficient and voltage standing wave ratio (VSWR), Lines of different lengths – $\lambda/2$, $\lambda/4$, $\lambda/8$ lines, Losses in transmission lines, Smith chart and applications, impedance matching Single stub, Double stub..

[T1,T2][No. of Hrs. : 10]

Text Books:-

[T1] Matthew N. O. Sadiku , "Elements of Electromagnetics", Oxford University Press
[T2] E. C. Jordon, K. G. Balman, "Electromagnetic Waves & Radiation System" PHI – 2nd Edition

Reference Books:

[R1] William H. Hayt, "Engineering Electromagnetics", TMH
[R2] J.D. Kraus, "Electromagnetics", TMH
[R3] David K. Cheng," Field and Wave Electromagnetic", 2nd Edition, Pearson Education Asia,2001
[R4] John R. Reitz, "Foundations of Electromagnetic Theory". Pearson

COMPUTER ORGANIZATION & ARCHITECTURE

	L	T/P	C
Paper Code: ETCS-204	**L**	**T/P**	**C**
Paper: Computer Organization & Architecture	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To understand the architecture and organization of computer in depth.

UNIT- I

Basic Computer Organization and Register transfer language:

Over view of basic digital building blocks, Basic structure of a digital computer: Von-Neuman architecture, Introduction to types of buses, Bus and memory transfer, Bus architecture using multiplexer and tri-state buffer, register transfer language, Micro operation: arithmetic, logical, shift micro operation with hardware implementation, Arithmetic Logic Shift Unit.

Levels of programming languages: Machine language, Assembly language, High level language, programme development steps: compiling and assembling programmes.

[T1,T2][No. of hrs. 10]

UNIT- II

Computer Design and Instruction set architecture

Instruction codes, General computer registers with common bus system, addressing modes, computer instructions: Memory Reference, Register reference, Input-Output Instructions, Instruction cycle, Input-Output configuration and interrupt cycle.

Internal architecture of 8085 microprocessor: Pin diagram, 8085 instruction set.

[T1,T2][No. of hrs. 12]

UNIT- III

CPU Design:

Hardwired Control Unit, Timing and control, Micro Programmed Control Unit: Control memory and address sequencing.

Pipelining: Introduction to Flynn's classification, arithmetic pipeline, instruction pipeline, pipeline conflict and hazards.

Computer arithmetic: Unsigned, Signed 1's, 2's compliment notations, addition, subtraction, multiplication and division (Hardware implementation), introduction to floating point notation: IEEE 754 standard.

[T1,T2][No. of hrs. 11]

UNIT- IV

Memory & Input/output organization: Memory Hierarchy, Main Memory (RAM and ROM Chips), Virtual memory, Cache memory and mappings.

Input/Output interface: I/O bus and interface modules, I/O bus Vs memory bus, Isolated Vs Memory mapped I/O, Bus arbitration, modes of transfer.

[T1,T2][No. of hrs. 11]

Text Books:

[T1] M. Morris, Mano, "Computer System Architecture", PHI 3rd Edition 2007.
[T2] Carl Hamacher, "Computer Organization", McGraw Hill, 5th Edition 2002.

Reference Books:

[R1] W. Stallings, "Computer organization and Architecture", PHI, 7th ed, 2005.
[R2] R. Gaonker, "MicroProcessor Architecture, Programming and Application with the 8085, 5th Edition
[R3] J. D. Carpinelli, "Computer Systems Organization and Architecture", Pearson Education, 2006.
[R4] J. P. Hayes, "Computer Architecture and Organization", McGraw Hill, 1988.
[R5] J. L Hennessy and D. A. Patterson, "Computer Architecture: A quantitative approach", Morgon Kauffman, 1992.

APPLIED MATHEMATICS LAB

	L	T/P	C
Paper Code: ETMA-252	**L**	**T/P**	**C**
Paper: Applied Mathematics Lab	**0**	**2**	**1**

List of Experiments:-

1. Solution of algebraic and transcendental equation.
2. Algebra of matrices: Addition, multiplication, transpose etc.
3. Inverse of a system of linear equations using Gauss-Jordan method.
4. Numerical Integration.
5. Solution of ordinary differential equations using Runge-Kutta Method.
6. Solution of Initial value problem.
7. Calculation of eigen values and eigen vectors of a matrix.
8. Plotting of Unit step function and square wave function.

It is expected that atleast 12 experiments be performed, including the above specified 8 experiments which are compulsory. The remaining experiments may be developed by faculty and students based on applications of Mathematics in Real Life problem.

Text Books:

1. B.S. Grewal., "Numerical Methods in Engg. And Science", Khanna Publications
2. P. Dechaumphai & N. Wansophark, "Numerical Methods in Engg.: Theories with Matlab, Fortran, C & Pascal Programs", Narosa Publications

Reference Books:

1. P.B. Patil & U.P. Verma, "Numerical Computational Methods", Narosa Publications
2. John C. Polking & David Arnold, "Ordinary Differential Equations using MATLAB", Pearson Publications
3. Rudra Pratap, "Getting Started With MatLab" Oxford University Press
4. Byrom Gottfried, "Programming With C" Shaum's Outline
5. Santosh Kumar, "Computer based Numerical & Statistical Techniques", S. Chand Publications.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

NETWORK ANALYSIS AND SYNTHESIS LAB

Paper Code: ETEC-258	**L**	**T/P**	**C**
Paper: Network Analysis and Synthesis Lab	**0**	**2**	**1**

List of Experiments

1. Study the transient response of series RLC circuit for different types of waveforms on CRO and verify using MATLAB
2. Study the time response of a simulated linear system and verify the unit step and square wave response of first order and second order, type 0,1 system
3. Using MATLAB determine current in various resistors connected in network using mesh current and node voltage analysis.
4. To determine Z and Y parameters of the given two port network.
5. To determine ABCD parameters of the given two port network.
6. To verify Reciprocity Theorem for the given two port network.
7. To determine Hybrid parameters of the given two port network.
8. To design Cascade Connection and determine ABCD parameters of the given two port network.
9. To design Series-Series Connection and determine Z parameters of the given two port network.
10. To design Parallel-Parallel Connection and determine Y parameters of the given two port network.
11. To design Series-Parallel Connection and determine h parameters of the given two port network
12. Study the frequency response of different filter circuits.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

COMMUNICATION SYSTEMS LAB

Paper Code: ETEC-256	**L**	**T/P**	**C**
Paper: Communication Systems Lab	**0**	**2**	**1**

List of Experiments:

1. Generation of DSB-SC AM signal using balanced modulator.
2. To study amplitude demodulation by linear diode detector
3. Generation of SSB AM signal.
4. To study envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.
5. To generate FM signal using voltage controlled oscillator.
6. To generate a FM Signal using Varactor & reactance modulation.
7. Detection of FM Signal using PLL & foster seelay method.
8. To study Super heterodyne AM receiver and measurement of receiver parameters viz.sensitivity, selectivity & fidelity.
9. To study Pre-emphasis and De-emphasis in FM.
10. Generation of Phase modulated and demodulated signal.

Simulations study of some of the above experiments using P-spice or Multisim softwares

NOTE:- At least 8 Experiments out of the list must be done in the semester.

ANALOG ELECTRONICS-II LAB

Paper Code: ETEC-254	**L**	**T/P**	**C**
Paper: Analog Electronics-II Lab	**0**	**2**	**1**

List of Experiments:

1. To study the op-amp (IC 741) as inverting and non-inverting amplifier and calculate its gain.
2. Observe and plot the output Wave shape of Op-Amp R-C differentiating circuits, R-C integrating circuits for square wave input
3. To study the op-amp (IC 741) as adder, subtractor and voltage follower, calculate its output voltage..
4. Construct biased and unbiased series and shunt clipping circuits & combinational clipper circuit for positive and negative peak clipping of a sine wave.
5. To study RC phase shift/Wien Bridge oscillator measurement of frequency and amplitude of oscillations using Op-Amp.
6. To study the waveform of square wave generator using 741 Op-Amp IC.
7. To study the waveform of Schmitt Trigger circuit & Precision Rectifier using 741 OP-AMP IC.
8. To make and test the operations of Monostable Multivibrator circuits using 555 timer.
9. To make and test the operations of Astable Multivibrator circuits using 555 timer.
10. To study the Sallen Key Voltage controlled voltage source active filters.

NOTE: - At least 8 Experiments out of the list must be done in the semester

COMPUTER ORGANISATION AND ARCHITECTURE LAB

	L	T/P	C
Paper Code: ETCS-260	**L**	**T/P**	**C**
Paper: Computer Organisation and Architecture Lab	**0**	**2**	**1**

List of Experiments:
Based on 8085 simulator

1. To draw and explain
   i. Block diagram and pin diagram of 8085.
   ii. Instruction set of 8085.
2. Write a program to perform :
   i. Addition of two 8 bit numbers without carry.
   ii. Addition of two 8 bit numbers with carry
3. Write a program to perform:
   i. Subtraction of two 8 bit numbers without borrows.
   ii. Subtraction of two 8 bit numbers with borrows.
4. Write a program to find 1’s complement of an 8 bit number.
5. Write a program to find 2’s complement of an 8 bit number.
6. Write a program to perform Multiplication of two 8 bit numbers.
7. Write a program to find to find the smallest and largest number from the given series.
8. Write a program to find sum of series of n consecutive numbers.
9. Write a program to find factorial of a number.
10. Write a program to reverse an 8 bit number.
11. Write a program to sort array in ascending/ descending order.
12. Write a program to perform division of two 8 bit numbers.

The instructor is advised to develop lab programs based on the learning concepts of architecture and insight into operating systems.

NOTE: - At least 8 Experiments from the syllabus must be done in the semester

COMMUNICATION SKILLS FOR PROFESSIONALS

Paper Code: ETHS-301	**L**	**T/P**	**C**
Paper: Communication Skills for Professionals	**2**	**0**	**1**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To develop communication competence in prospective engineers so that they are able to communicate information as well as their thoughts and ideas with clarity and precision. This course will also equip them with the basic skills required for a variety of practical applications of communication such as applying for a job, writing reports and proposals. Further, it will make them aware of the new developments in communication that have become part of business organisations today.

UNIT I

Organizational Communication: Meaning, importance and function of communication, Process of communication, Communication Cycle - message, sender, encoding, channel, receiver, decoding, feedback, Characteristics, Media and Types of communication, Formal and informal channels of communication, 7 C's of communication, Barriers to communication, Ethics of communication (plagiarism, language sensitivity)

Soft Skills: Personality Development, Self Analysis through SWOT, Johari Window, Interpersonal skills -Time management, Team building, Leadership skills. Emotional Intelligence.Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, Career planning, Self esteem.

[T1,T2][No. of Hrs. 08]

UNIT II

Introduction to Phonetics: IPA system (as in Oxford Advanced Learner's Dictionary), Speech Mechanism, The Description of Speech Sounds, Phoneme, Diphthong, Syllable, Stress, Intonation, Prosodic Features; Pronunciation; Phonetic Transcription - Conversion of words to phonetic symbols and from phonetic symbols to words. British & American English (basic difference in vocabulary, spelling, pronunciation, structure)

Non-Verbal Language: Importance, characteristics, types – Paralanguage (voice, tone, volume, speed, pitch, effective pause), Body Language (posture, gesture, eye contact, facial expressions), Proxemics, Chronemics, Appearance, Symbols.

[T1,T2][No. of Hrs. 08]

UNIT III

Letters at the Workplace – letter writing (hard copy and soft copy): request, sales, enquiry, order, complaint.
Job Application -- resume and cover letter

Meeting Documentation-- notice, memo, circular, agenda and minutes of meeting.

Report Writing - Significance, purpose, characteristics, types of reports, planning, organizing and writing a report, structure of formal report. Writing an abstract, summary, Basics of formatting and style sheet (*IEEE Editorial Style Manual)*, development of thesis argument, data collection, inside citations, bibliography; Preparing a written report for presentation and submission. Writing a paper for conference presentation/journal submission.

[T1,T2][No. of Hrs. 08]

UNIT IV

Listening and Speaking Skills: Importance, purpose and types of listening, process of listening, difference between hearing and listening, Barriers to effective listening, Traits of a good listener, Tips for effective listening. Analytical thinking; Speech, Rhetoric, Polemics; Audience analysis. Telephone Skills - making and receiving calls, leaving a message, asking and giving information, etiquettes.

Presentations: Mode, mean and purpose of presentation, organizing the contents, nuances of delivery, voice and body language in effective presentation, time dimension.

Group Discussion: Purpose, types of GDs, strategies for GDs, body language and guidelines for group discussion.

Interview Skills: Purpose, types of interviews, preparing for the interview, attending the interview, interview process, employers expectations, general etiquettes.

[T1,T2][No. of Hrs. 07]

Text Books:

[T1] Anna Dept. Of English. Mindscapes: English for Technologists & Engineers PB. New Delhi: Orient Blackswan.

[T2] Farhathullah, T. M. Communication Skills for Technical Students. Orient Blackswan, 2002.

References Books:

[R1] Masters, Ann and Harold R. Wallace. Personal Development for Life and Work, 10th Edition.Cengage Learning India, 2012.

[R2] Institute of Electrical and Electronics Engineers. IEEE Editorial Style Manual. IEEE, n.d. Web. 9 Sept. 2009.

[R3] Sethi and Dhamija. A Course in Phonetics and Spoken English. PHI Learning, 1999.

[R4] Khera, Shiv. You Can Win. New York: Macmillan, 2003.

DIGITAL COMMUNICATION

Paper Code: ETEC-303	**L**	**T/P**	**C**
Paper: Digital Communication	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To enable the students

1. *To distinguish between analog and digital communication.*
2. *To understand the concept of digital communication system.*
3. *To understand the concept of random variables and random process.*
4. *To learn the digital modulation techniques.*

UNIT- I Introduction to Digital Communication:

Line coding: NRZ, RZ, Manchester encoding, differential Manchester encoding, AMI coding, high density bipolar code, binary with n-zero substitution codes,

Review of Sampling theorem, uniform and non-uniform quantization, companding, μ-Law and A-Law compressors, Concept and Analysis of PCM, DPCM, DM and ADM modulators and demodulators, M-ary waveforms, S/N ratio for all modulation, probability of error for PCM in AWGN Channel and other modulation techniques, Duo Binary pulse.

[T1, R2][No. of Hours: 11]

UNIT- II Random Signal Theory:

Probability, Concept of Random variable (Stationary, Non stationary, WSS, SSS), Random process, CDF, PDF, Joint CDF, Joint PDF, marginal PDF, Mean, Moments, Central Moment Auto-correlation & Cross-correlation, covariance functions, ergodicity, power spectral density, Gaussian distribution, Uniform distribution, Rayleigh distribution, Binomial distribution, Poission distribution, Weiner distribution, Wiener-Khinchin theorem, Central limit theorem.

[T1, T2, R2] [No. of Hours: 11]

UNIT- III Designing of Receiver:

Analysis of digital receiver, Prediction Filter, Design and Property of Matched filter, Correlator Receiver, Orthogonal Signal, Gram-Schmidt Orthogonalization Procedure, Maximum likelihood receiver, Coherent receiver design, Inter Symbol Interference, Eye Pattern.

[T1, T2, R1, R2] [No. of Hours: 11]

UNIT- IV Digital modulation schemes:

Coherent Binary Schemes: ASK, FSK, PSK, QPSK, MSK, G-MSK. Coherent M-ary Schemes, Incoherent Schemes (DPSK and DEPSK), Calculation of average probability of error for different modulation schemes, Power spectra of digitally modulated signals, Performance comparison of different digital modulation schemes. Review of 2 Latest Research Paper.

[T1, T2, R2][No. of Hours: 11]

Text Books:

[T1] Simon Haykin, "Communication Systems" John Wiley & Sons, Inc 4th Edition.
[T2] Taub Schilling, "Principles of Communication Systems" TMH, 2nd Edition

Reference Books:

[R1] George Kennedy, "Communication System" TMH – 4th Edition
[R2] B. P. Lathi, "Modern Digital and Analog Communication System" Oxford University Press – 3rd Edition.
[R3] Digital Communications by John G.Proakis; McGraw Hill.

MICROPROCESSORS AND MICROCONTROLLERS

Paper Code: ETEC-305	**L**	**T/P**	**C**
Paper: Microprocessors and Microcontrollers	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: The objective of the paper is to facilitate the student with the knowledge of microprocessor systems and microcontroller.

UNIT- I

Introduction to Microprocessor Systems: Architecture and PIN diagram of 8085, Timing Diagram, memory organization, Addressing modes, Interrupts. Assembly Language Programming.

[T1][No. of hrs. 10]

UNIT- II

8086 Microprocessor: 8086 Architecture, difference between 8085 and 8086 architecture, generation of physical address, PIN diagram of 8086, Minimum Mode and Maximum mode, Bus cycle, Memory Organization, Memory Interfacing, Addressing Modes, Assembler Directives, Instruction set of 8086, Assembly Language Programming, Hardware and Software Interrupts.

[T2][No. of hrs. :12]

UNIT- III

Interfacing of 8086 with 8255, 8254/ 8253, 8251, 8259: Introduction, Generation of I/O Ports, Programmable Peripheral Interface (PPI)-Intel 8255, Sample-and-Hold Circuit and Multiplexer, Keyboard and Display Interface, Keyboard and Display Controller (8279), Programmable Interval timers (Intel 8253/8254), USART (8251), PIC (8259), DAC, ADC, LCD, Stepper Motor.

[T1][No. of hrs. :12]

UNIT-IV

Overview of Microcontroller 8051: Introduction to 8051 Micro-controller, Architecture, Memory organization, Special function registers, Port Operation, Memory Interfacing, I/O Interfacing, Programming 8051 resources, interrupts, Programmer's model of 8051, Operand types, Operand addressing, Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions, Timer & Counter Programming, Interrupt Programming.

[T3][No. of hrs. 11]

Text Books:

[T1] Muhammad Ali Mazidi, "Microprocessors and Microcontrollers", Pearson, 2006
[T2] Douglas V Hall, "Microprocessors and Interfacing, Programming and Hardware" Tata McGraw Hill, 2006.
[T3] Ramesh Gaonkar, "MicroProcessor Architecture, Programming and Applications with the 8085", PHI

References Books:

[R1] Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. MCKinlay "The 8051 Microcontroller and Embedded Systems", 2nd Edition, Pearson Education 2008.
[R2] Kenneth J. Ayala, "The 8086 Microprocessor: Programming & Interfacing The PC", Delmar Publishers, 2007.
[R3] A K Ray, K M Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill, 2007.
[R4] Vaneet Singh, Gurmeet Singh, "Microprocessor and Interfacing", Satya Prakashan, 2007.

CONTROL SYSTEMS

Paper Code: ETEL-307	**L**	**T/P**	**C**
Paper: Control Systems	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: *To teach the fundamental concepts of Control systems and mathematical modeling of the system. To study the concept of time response and frequency response of the system. To teach the basics of stability analysis of the system*

UNIT I : Control Systems - - Basics & Components

Introduction to basic terms, classifications & types of Control Systems, block diagrams & signal flow graphs. Transfer function, determination of transfer function using block diagram reduction techniques and Mason's Gain formula. Control system components: Electrical/ Mechanical/Electronic/A.C./D.C. Servo Motors, Stepper Motors, Tacho Generators, Synchros, Magnetic Amplifiers, Servo Amplifiers,

[T1,T2][No. of Hrs. : 11]

UNIT II : Time – Domain Analysis

Time domain performance specifications, transient response of first & second order systems, steady state errors and static error constants in unity feedback control systems, response with P, PI and PID controllers, limitations of time domain analysis.

[T1,T2][No. of Hrs. : 10]

UNIT III : Frequency Domain Analysis

Polar and inverse polar plots, frequency domain specifications and performance of LTI systems, Logarithmic plots (Bode plots), gain and phase margins, relative stability. Correlation with time domain performance closes loop frequency responses from open loop response. Limitations of frequency domain analysis, minimum/non-minimum phase systems.

[T1,T2][No. of Hrs. : 10]

UNIT IV : Stability & Compensation Techniques

Concepts, absolute, asymptotic, conditional and marginal stability, Routh–Hurwitz and Nyquist stability criterion, Root locus technique and its application.

Concepts of compensation, series/parallel/ series-parallel/feedback compensation, Lag/Lead/Lag-Lead networks for compensation, compensation using P, PI, PID controllers.

[T1,T2][No. of Hrs. : 11]

Text Books:

[T1] B. C. Kuo, "Automatic control system", Prentice Hall of India, 7th edition 2001.
[T2] Nagraath Gopal "Control Systems Engineering -Principles and Design" New Age Publishers

Reference Books:

[R1] Norman S. Nise, "Control systems engineering" John Wiley & Sons (Asia) Singapore.
[R2] Raymond T. Stefani, Design of Feedback Control System, Oxford University Press.
[R3] K. Ogata, "Modern control engineering", Pearson 2002.
[R4] S. P.Eugene Xavier, "Modern control systems", S. Chand & Company.
[R5] M. Gopal "Control Systems-Principles and Design" TMH 4th Edition 2012

DIGITAL SYSTEM DESIGN

Paper Code: ETEC-309	L	T/P	C
Paper: Digital System Design	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To enhance the knowledge and skill of the students in digital system design with emphasis on Hardware Description Language (VHDL HDL)

UNIT I

Introduction to VHDL, design units, data objects, signal drivers, inertial and transport delays, delta delay, VHDL data types, concurrent and sequential statements. Subprograms – Functions, Procedures, attributes, generio, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration**.**

[T1][No. of Hrs.: 12]

UNIT II

Combinational logic circuit design and VHDL implementation of following circuits –first adder, Subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits.

[T1][No. of Hrs.: 10]

UNIT III

Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (Pseudorandom and CRC).

[T2][No. of Hrs.: 10]

UNIT IV

Asynchronous sequential circuit design – primitive flow table, concept of race, critical race and hazards, design issues like metastability, synchronizers, clock skew and timing considerations

Introduction to place & route process, Introduction to ROM, PLA, PAL, Architecture of CPLD (Xilinx/Altera).

[T2][No. of Hrs.: 12]

Text Books:

[T1] Douglas Perry ,"VHDL" 4th Edition, TMH

[T2] Stephen Brown, Zvonko Vranesic, "Fundamentals of Digital Logic with VHDL design", TMH.

Reference Books:

[R1] Charles. H.Roth ,"Digital System Design using VHDL", PWS (1998)

[R2] John F. Wakerley ,"Digital Design Principles And Practices" ,Pearson Education

[R3] Navabi Z , "VHDL-Analysis & Modelling of Digital Systems",McGraw Hill.

[R4] William I. Fletcher, "An Engineering Approach To Digital Design", Prentice Hall

[R5] Bhasker, "A VHDL Primmer", Prentice Hall 1995.

INDUSTRIAL MANAGEMENT

Paper Code: ETMS-311	L	T/P	C
Paper: Industrial Management	3	0	3

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The course provides a broad introduction to some aspects of business management and running of business organization.

UNIT I

Industrial relations- Definition and main aspects. Industrial disputes and strikes. Collective bargaining.
Labour Legislation- Labour management cooperation/worker's participation in management. Factory legislation. International Labour Organization.

[T1,T2][No. of Hrs. 10]

UNIT II

Trade Unionism- Definition, Origin, Objectives of Trade Unions. Methods of Trade unions. Size and finance of Indian Trade unions-size, frequency distribution, factors responsible for the small size. Finance-sources of income, ways of improving finance.

[T1,T2][No. of Hrs. 10]

UNIT III

Work Study-Method study and time study. Foundations of work study. Main components of method study. Time study standards. Involvement of worker's unions. Work Sampling. Application of work study to office work.

[T1,T2][No. of Hrs. 10]

UNIT IV

Quality Management- What is Quality? Control Charts. Quality is everybody's job. Taguchi Philosophy. Service Quality. What is Total Quality Management (TQM)? Roadmap for TQM. Criticism of TQM. Six Sigma.

[T1,T2][No. of Hrs. 10]

Text Books:

[T1] Sinha, P.R.N., Sinha I.B. and Shekhar S.M.(2013), Industrial Relations, Trade Unions and Labour Legislation. Pearson Education
[T2] Chary, S.N. (2012), Production and Operations Management. Tata McGraw Hill Education.

Reference Books:

[R1] Srivastava, S.C. (2012), Industrial Relations and Labour Laws, Vikas Publishing
[R2] Shankar R (2012), Industrial Engineering and Management. Galgotia Publications
[R3] Telsang, M. (2006), Industrial Engineering and Production Management. S.Chand
[R4] Thukaram, Rao (2004), M.E. Industrial Management. Himalaya Publishing House

COMMUNICATION SKILLS FOR PROFESSIONALS LAB

Paper Code: ETHS-351	**L**	**T/P**	**C**
Paper: Communication Skills for Professionals Lab	**0**	**2**	**1**

Objective: *To develop communication competence in prospective engineers so that they are able to communicate information as well as their thoughts and ideas with clarity and precision .These activities will enhance students' communication skills with a focus on improving their oral communication both in formal and informal situations. They will develop confidence in facing interviews and participating in group discussions which have become an integral part of placement procedures of most business organisations today.*

Lab Activities to be conducted:

1. **Listening and Comprehension Activities** – Listening to selected lectures, seminars, news (BBC, CNN, etc.). Writing a brief summary or answering questions on the material listened to.
2. **Reading Activities** -- Reading different types of texts for different purposes with focus on the sound structure and intonation patterns of English. Emphasis on correct pronunciation.
3. **Conversation Activities**-- Effective Conversation Skills; Formal/Informal Conversation; Addressing higher officials, colleagues, subordinates, a public gathering; Participating in a video conference.
4. **Making an Oral Presentation**–Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Connecting with the audience during presentation; Projecting a positive image while speaking; Emphasis on effective body language.
5. **Making a Power Point Presentation** -- Structure and format; Covering elements of an effective presentation; Body language dynamics.
6. **Making a Speech** -- Basics of public speaking; Preparing for a speech; Features of a good speech; Speaking with a microphone. Famous speeches may be played as model speeches for learning the art of public speaking. Some suggested speeches: Barack Obama, John F Kennedy, Nelson Mandela, Mahatma Gandhi, Jawahar Lal Nehru, Atal Bihari Vajpayee, Subhash Chandra Bose, Winston Churchill, Martin Luther King Jr.
7. **Participating in a Group Discussion** -- Structure and dynamics of a GD; Techniques of effective participation in group discussion; Preparing for group discussion; Accepting others' views / ideas; Arguing against others' views or ideas, etc.
8. **Participating in Mock Interviews** -- Job Interviews: purpose and process; How to prepare for an interview; Language and style to be used in an interview; Types of interview questions and how to answer them.

Suggested Lab Activities:

1. Interview through telephone/video-conferencing
2. Extempore, Story Telling, Poetry Recitation
3. Mock Situations and Role Play; Enacting a short skit
4. Debate (Developing an Argument), News Reading and Anchoring.

Reference Books:

1. Patnaik, Priyadarshi. *Group Discussion and Interview Skills*: *With VCD*. Cambridge University Press India (Foundation Books), 2012 edition.
2. Kaul,Asha. *Business Communication.* PHI Learning: 2009.
3. Hartman and Lemay. *Presentation Success: A Step-by-Step Approach*. Thomson Learning, 2000.

Note: The Communication Skills Lab should be equipped with computers, microphones, an internet connection, overhead projector, screen, sound system, audio/video recording facilities, and seating arrangement for GDs and mock interviews. The student activities may be recorded and students may replay them to analyse and improve their pronunciation, tone, expressions, body language, etc.

Traditional language lab softwares are not mandatory and may be used by students to practice and enhance their language competence. Such softwares are usually elementary in nature and are mostly based on British/American English (pronunciation, accent and expression). They should preferably be in Indian English.

DIGITAL SYSTEM DESIGN LAB

Paper Code: ETEC-351	**L**	**T/P**	**C**
Paper: Digital System Design Lab	**0**	**2**	**1**

List of Experiments:

1. Design all gates using VHDL.
2. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   i) half adder
   ii) full adder
3. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   i) multiplexer
   ii) demultiplexer
4. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   i) decoder
   ii) encoder
5. Write a VHDL program for a comparator and check the wave forms and the hardware generated
6. Write a VHDL program for a code converter and check the wave forms and the hardware generated
7. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
8. Write a VHDL program for a counter and check the wave forms and the hardware generated
9. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   i) ALU
   ii) shift register

NOTE: - At least 8 Experiments out of the list must be done in the semester

CONTROL SYSTEMS LAB

Paper Code: ETEL-355	**L**	**T/P**	**C**
Paper: Control Systems Lab	**0**	**2**	**1**

List of Experiments:

1. Comparison of open loop & closed loop control in speed control of D.C. motor & to find the transfer function.
2. To study the characteristics of positional error detector by angular displacement of two servo potentiometers
   a. excited with dc
   b. excited with ac
3. To study synchro transmitter in terms of position v/s phase and voltage magnitude with respect to rotor voltage magnitude /phase.
4. To study remote position indicator systems using synchro transmitter/receiver.
5. To plot speed- torque curves for ac servomotor for different voltages.
6. To study ac motor position control system & to plot the dynamic response & calculate peak time, settling time, peak overshoot, damping frequency, steady state error etc.
7. To study the time response of simulated linear systems.
8. To study the performance of PID Controller.
9. Plot impulse response, unit step response, unit ramp response of any 2nd order transfer function on same graph using MATLAB.
10. To draw the magnetization (Volt Amps) characteristics of the saturable core reactor used in the magnetic amplifier circuits.
11. Plot root locus for any 2nd order system (with complex poles). For Mp=30%, find the value of K using MATLAB.
12. To design lead-lag compensator for the given process using Bode plots in MATLAB.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

MICROPROCESSORS AND MICROCONTROLLERS LAB

Paper Code: ETEC-355	**L**	**T/P**	**C**
Paper: Microprocessors and Microcontrollers Lab	**0**	**2**	**1**

List of Experiments:

1. Write a program to add and subtract two 16-bit numbers with/ without carry using 8086.
2. Write a program to multiply two 8 bit numbers by repetitive addition method using 8086.
3. Write a Program to generate Fibonacci series.
4. Write a Program to generate Factorial of a number.
5. Write a Program to read 16 bit Data from a port and display the same in another port.
6. Write a Program to generate a square wave using 8254.
7. Write a Program to generate a square wave of 10 kHz using Timer 1 in mode 1(using 8051).
8. Write a Program to transfer data from external ROM to internal (using 8051).
9. Design a Minor project using 8086 Micro processor (Ex: Traffic light controller/temperature controller etc)
10. Design a Minor project using 8051 Micro controller

NOTE: - At least 8 Experiments out of the list must be done in the semester.

DIGITAL COMMUNICATION LAB

Paper Code: ETEC–357	**L**	**T/P**	**C**
Paper: Digital Communication Lab	**0**	**2**	**1**

List of Experiments: MATLAB/ LABVIEW based practical on:

1. To Study Sampling Theorem.
2. To Study of Pulse Code Modulation and Probability of error.
3. To calculate S/N ratio and Probability of error of Differential Pulse Code Modulation.
4. To calculate S/N ratio and Probability of error of Delta Modulation.
5. To calculate S/N ratio and Probability of error of Adaptive Delta Modulation.
6. To calculate S/N ratio and Probability of error of Amplitude Shift Keying (ASK).
7. To calculate S/N ratio and Probability of error of Phase Shift Keying (PSK).
8. To calculate S/N ratio and Probability of error of frequency Shift Keying (FSK).
9. To calculate S/N ratio and Probability of error Differential Phase Shift Keying Modulation (DPSK).
10. To calculate S/N ratio and Probability of error of Quadrature Phase Shift Keying Modulation (QPSK).
11. To calculate S/N ratio and Probability of error of QAM
12. Faculty can opt for practical of Digital Communication to be performed on Kit.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

MICROWAVE ENGINEERING

Paper Code: ETEC-302 **L** 3 **T/P** 1 **C** 4
Paper: Microwave Engineering

Paper Code: ETEC-302	L	T/P	C
Paper: Microwave Engineering	3	1	4

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objectives: To study different components which support the microwaves to carry from one point to other, generation of microwaves, measurements of microwave signal power, reflection coefficients etc., and application of microwaves.

UNIT-1
Introduction of microwaves: Maxwell`s equation, wave equation and their solution (in rectangular and circular coordinates), boundary conditions, Poynting theorem, application of microwaves.
Waveguide: Rectangular waveguide: TE and TM modes, field configurations, dominant and degenerative modes, propagation characteristics. Power transmission and power loss in waveguide, Excitation of waveguide.
Circular waveguide: TE and TM modes, field configuration.
Introduction of planar transmission lines, micro strip line, strip line and coplanar line, comparison of coaxial, waveguide and planar transmission line.

[T1][T2][R1][R2][No. of Hrs. 11]

UNIT-II
Microwave Network Analysis: limitation of Z, Y and H parameters for microwave circuits, scattering matrix representation for microwave network, properties of S- matrix.
Microwave resonators: rectangular and circular cavity resonator (resonant frequency and wavelength), Introduction of Re-entrant cavity resonator and toroidal resonator.
Waveguide components: E -plane Tee, H-plane - Tee, Magic-Tee, RAT-RACE circuit, application of Tee junctions, directional coupler and its application.
Construction, working, S-matrix and application of attenuators, phase shifters, iris, corners, bends, twists.
Introduction of ferrite devices and its application in isolator, circulator, gyrator.

[T1][T2][R1][R2] [No. of Hrs. 11]

UNIT-III
Linear Beam tubes: Two cavity klystron (working, principle, velocity modulation, bunching process) Reflex klystron (working principle, bunching process, condition of oscillation), application of klystrons. Travelling Wave tube, slow wave structure, helix TWT (construction and working).
Cross field tubes: Cylindrical magnetron (construction, working principle, Hull cut-off Equations), application of magnetron.
Microwave solid state devices: Transferred Electron Devices, Gunn diode (introduction, Gunn Effect, RWH theory, two-valley model, Gunn oscillation modes), condition of oscillation in negative resistance devices, Tunnel diode, PIN diode.

[T1][T2][R3][No. of Hrs. 12]

UNIT-IV
Avalanche transit time devices: Introduction of READ diode, IMPATT, TRAPATT.
Parametric Devices: Varactor diode, Manley-Rowe relation, Parametric up and down convertors.
Microwave Measurements: VSWR meter, detectors and frequency meters.
Measurement of Impedance, Frequency, VSWR and Microwave power.

[T1][T2][R3][No. of Hrs. 10]

Text Books:
[T1] S.Y Liao, "Microwave devices and Circuits" Pearson publications
[T2] R.E Collin, "Foundation for Microwave Engineering", Wiley Publications.

Reference Books:
[R1] D.M Pozar, "Microwave Engineering", Wiley Publications.
[R2] M.L. Sisodia, "Microwave Active Devices", New Age International Publications.
[R3] G.S Raghuvanshi, "Microwave Engineering" Cengage publications.

INFORMATION THEORY AND CODING

Paper Code: ETEC-304 **L** 3 **T/P** 1 **C** 4
Paper: Information Theory and Coding

	L	T/P	C
Paper Code: ETEC-304	**L**	**T/P**	**C**
Paper: Information Theory and Coding	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: In this course the students will study a number of efficient encoding/decoding strategies which have proven important in practice with a categorization on the notion of decoding.

UNIT-I

Review of Probability Theory, Random Variables and Random Process. Information Theory Introduction, Uncertainty, Information, and Entropy, Information Rate, Conditional and Joint Entropies. Source Coding Theorem, Data Compaction, Prefix Coding, Kraft McMillan Inequality, Huffman Coding, Lempel Ziv Coding, Discrete Memoryless Channels, Mutual Information, Markov Sources, Channel Capacity.

[T1] [T2][No. of Hrs. 12]

UNIT-II

Channel Coding Theorem, Differential Entropy and Mutual Information for Continuous Ensembles, Information Capacity Theorem and its implications, Information Capacity of a colored noise channel. Discrete Memoryless Channels and Channel Coding Theorem revisited.

[T1][T2][R1][R5][No. of Hrs.10]

UNIT-III

Linear Block codes, Repetition Codes, Syndrome Decoding, Hamming Codes, Dual Code, Cyclic Codes, Maximal Length Codes, CRC Codes, BCH Codes, Reed-Solomon Codes, Golay Codes, Convolutional Codes: Code Tree, Trellis and State Diagram.

[T1] [R2][R4][No. of hrs.11]

UNIT-IV

Decoding of Convoltutional Codes: Maximum Likelihood decoding, Viterbi's algorithm, free distance of a convolutional code. Turbo Codes: Turbo Encoder and Decoder, Puncturing, Performance of Turbo Codes. Introduction to Cryptography.

[T1] [R2] [R3][R5] [No. of Hrs.11]

Text Books:

[T1] Simon Haykins, "Communication Systems", 4th edition Wiley, 2001.
[T2] J G Proakis, "Digital Communications", Mc Graw Hill, 2001.

Reference Books:

[R1] T M Gover, J M Thomos, "Elements of Information Theory", Wiley, 1999.
[R2] Arijit Saha, Nilotpal Manna, Surajit Mandal, "Information Theory, Coding and Cryptography", Pearson Education, 2013.
[R3] Schaum's Outlines, Analog and Digital Communications, Second Edition.
[R4] Amitabha Bhattacharya, "Digital Communication", TMH 2006.
[R5] J. H. Van Lint.. "Introduction to Coding Theory", Springer -Verlag.

DIGITAL SIGNAL PROCESSING

Paper Code: ETEC-306	**L**	**T/P**	**C**
Paper: Digital Signal Processing	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: *The aim of this course is to provide in depth knowledge of various digital signal processing techniques and design of digital filters, learn the concept of DFT FFT algorithms, and design of digital filters using different approximations, DSP processor and architecture. The prerequisites of this subject are basic knowledge of signal and systems.*

UNIT–I :

Frequency Domain Sampling: The Discrete Fourier Transform, Properties of the DFT, Linear filtering methods based of the DFT.
Efficient computation of the DFT: Principal Of FFT, Fast Fourier Transform Algorithms, Applications of FFT Algorithms, A linear filtering approach to computation of the DFT.
Application of DFT, Design of Notch filter

[T2,T1][No. of Hours: 11]

UNIT–II:

Design & Structure of IIR filters from analog filters: Impulse Invariance; Bilinear transformation and its use in design of Butterworth and Chebyshev IIR Filters; Frequency transformation in Digital Domain, Direct, Cascade, Parallel & transposed structure
Design & structure of FIR filters: Symmetric and anti-symmetric FIR filters; Design of Linear Phase FIR filters using windows, Frequency Sampling Method of FIR design, Direct, Cascade, Frequency Sampling, transposed structure

[T1,T2] [No. of Hours: 11]

UNIT–III:

Implementation of Discrete Time Systems:
Lattice structures, Lattice and Lattice-Ladder Structures, Schur - Cohn stability Test for IIR filters; Discrete Hilbert Transform.
Linear predictive Coding:
Lattice filter design, Levension Darwin Technique, Schur Algorithm

[T1,T2] [No. of Hours: 10]

UNIT–IV:

Quantization Errors in Digital Signal Processing: Representation of numbers, Quantization of filter coefficients, Round-off Effects in digital filters.
Multirate Digital Signal Processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Frequency domain characterization of Interpolator and Decimator; Polyphase decomposition.

[T1, T2][No. of Hours: 10]

Text Books:

[T1] Oppenheim & Schafer, Digital Signal Processing, PHI-latest edition.
[T2] Proakis and Manolakis, Digital Signal Processing, PHI Publication

Reference Books:

[R1] S. K. Mitra, Digital Signal Processing, TMH edition 2006
[R2] Johny. R. Johnson, Introduction to Digital Signal Processing, PHI-latest edition
[R3] R.Babu ,Digital Signal Processing , Scitech Publication.

VLSI DESIGN

Paper Code: ETEC-308 | **L** 3 | **T/P** 1 | **C** 4
Paper: VLSI Design

Paper Code: ETEC-308	**L**	**T/P**	**C**
Paper: VLSI Design	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The prerequisite are analog devices, STLD, Digital system design and micro-electronics. The students are introducing to MOS technology, design rules and some applications.

UNIT I

Evolution of VLSI, MOS transistor theory, MOS structure, enhancement & depletion transistor, threshold voltage, MOS device design equations, MOSFET scaling and small geometry effects, MOSFET capacitances.
NMOS inverter, CMOS inverter, DC characteristics, static load MOS inverter, pull up/pull down ratio, static & dynamic power dissipation, CMOS & NMOS process technology – explanation of different stages in fabrication, body effect, latch up in CMOS.

[T1,T2][No. of Hours: 11]

UNIT II

Stick diagram and design rules, lambda based design rules, switching characteristics & inter connection effects: rise time, fall time delays, noise margin.
CMOS logic gate design: NAND, NOR, XOR and XNOR gates, Transistor sizing, combinational MOS logic circuits: pass transistor and transmission gate designs, Pseudo NMOS logic.

[T1,T2][No. of Hours: 11]

UNIT III

Sequential MOS logic circuits: SR latch, clocked latch and flip flop circuits, CMOS D latch and edge triggered flip flop, dynamic logic circuits; basic principle, non ideal effects, domino CMOS logic, high performance dynamic CMOS circuits, clocking issues, clock distribution.

[T1,T2][No. of Hours: 11]

UNIT IV

VLSI designing methodology, design flow, design Hierarchy, concept of regularity, modularity & locality, VLSI design style, Design quality, computer aided design technology, adder design and multiplier design examples. Low power design concepts using CMOS Technology.

[T1,T2][No. of Hours: 11]

Text Books:

[T1] Basic VLSI Design - Pucknell Douglas A., Eshraghian Kamran, PHI Learning Pvt Limited, 2013.
[T2] N. Weste and D. Harris, "CMOS VLSI Design: A Circuits and Systems Perspective - 4th Edition", Pearson Education, India.

Reference Book:

[R1] S. M. Kang, Y. Lebiebici, “CMOS digital integrated circuits analysis & design” Tata McGraw Hill, 3rd Edition.
[R2] Digital Integrated Circuit Design- Ken Martin, Oxford University Press
[R3] The MOS Transistor- Yaniiis Tsividis and Colin Mcandrew, Oxford University Press, 2013
[R4] J. M. Rabaey, “Digital Integrated Circuits” PHI Learning Pvt Limited, India
[R5] J. P. Uyemura, “Introduction to VLSI Circuits and Systems”, John Wiley & Sons, Inc., New York, NY
[R6] Neelam Sharma, "Digital Logic Design", Ashirwad Publication 2013-14

DATA COMMUNICATION & NETWORKS

	L	T/P	C
Paper Code: ETEC-310	**L**	**T/P**	**C**
Paper: Data Communication & Networks	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives: The objective of the paper is to provide an introduction to the fundamental concepts on data communication and the design, deployment, and management of computer networks.

UNIT- I
Data Communications : Components, protocols and standards, Network and Protocol Architecture, Reference Model ISO-OSI, TCP/IP-Overview ,topology, transmission mode, digital signals, digital to digital encoding, digital data transmission, DTE-DCE interface, interface standards, modems, cable modem, transmission media-guided and unguided, transmission impairment, Performance, wavelength and Shannon capacity. Review of Error Detection and Correction codes.
Switching: Circuit switching (space-division, time division and space-time division), packet switching (virtual circuit and Datagram approach), message switching.

[T1, T2, R1, R4] [No. of Hours: 11]

UNIT- II
Data Link Layer: Design issues, Data Link Control and Protocols: Flow and Error Control, Stop-and-wait ARQ. Sliding window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point-to –Point Access: PPP Point –to- Point Protocol, PPP Stack,

Medium Access Sub layer: Channel allocation problem, Controlled Access, Channelization, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, high-speed LANs, Token ring, Token Bus, FDDI based LAN, Network Devices-repeaters, hubs, switches bridges.

[T1, T2,R1][No. of Hours: 11]

UNIT- III
Network Layer: Design issues, Routing algorithms, Congestion control algorithms,
Host to Host Delivery: Internetworking, addressing and routing, IP addressing (class full & Classless), Subnet, Network Layer Protocols: ARP, IPV4, ICMP, IPV6 ad ICMPV6.

[T1, T2,R1][No. of Hours: 11]

UNIT- IV
Transport Layer: Process to Process Delivery: UDP; TCP, congestion control and Quality of service.

Application Layer: Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP), file transfer (FTP), HTTP and WWW.

[T2, T1, R1, R4][No. of Hours: 11]

Text Books:

[T1] A. S. Tannenbum, D. Wetherall, "Computer Networks", Prentice Hall, Pearson, 5th Ed
[T2] Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, 4th Ed

Reference Books:

[R1] Fred Halsall, "Computer Networks", Addison – Wesley Pub. Co. 1996.
[R2] Larry L, Peterson and Bruce S. Davie, "Computer Networks: A system Approach", Elsevier, 4th Ed
[R3] Tomasi, "Introduction To Data Communications & Networking", Pearson 7th impression 2011
[R4] William Stallings, "Data and Computer Communications", Prentice Hall, Imprint of Pearson, 9th Ed.
[R5] Zheng , "Network for Computer Scientists & Engineers", Oxford University Press
[R6] Data Communications and Networking: White, Cengage Learning

ANTENNA AND WAVE PROPAGATION

Paper Code: ETEC-314	**L**	**T/P**	**C**
Paper: Antenna and Wave Propagation	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objectives: To study the antenna fundamentals, various types of antennas and wave propagation.

UNIT –I
Introduction of antenna: radiation mechanism, single wire, two wire, dipole, current distribution of thin wire antenna.
Fundamental parameters of antenna: radiation pattern, isotropic, directional and omni directional pattern, principal patterns, radiation patterns lobes, field regions, radian and steradian, Radiation power density, radiation intensity, directivity, gain, antenna efficiency, half power beam width, beam efficiency, bandwidth efficiency, input impedance, antenna radiation efficiency, antenna aperture, effective height.

[T1][T2][No. of Hrs. 11]

UNIT-II
Vector potential for an electric and magnetic current source, electric and magnetic fields for electric and magnetic current source, far field radiation, Duality theorem, reciprocity theorem.
Linear wire antenna: infinitesimal dipole, radiation field (with derivation), directivity, near field, intermediate field, far field ,power density, small/short dipole, half wavelength dipole. folded dipole.
Antenna Array: Two element arrays, N-element linear array, broadside array, ordinary endfire array, phased array.

[T1][T2][R1][R2]No. of Hrs. 11]

UNIT-III
Types of antenna:
Travelling wave antenna: long wire, V antenna, rhombic antenna.
Broadband antenna: helical antenna, Yagi-Uda antenna.
Frequency independent antenna: log periodic antenna.
Introduction of Microstrip patch antenna (MPA), basic characteristics, feeding method, microstrip rectangular patch antenna and its design using transmission line model, smart antennas.

[T1][T2][R1][R2] [No. of Hrs. 11]

UNIT-IV
Wave propagation: Ground wave, sky wave, space wave, ionosphere, reflection and refraction by ionosphere, critical frequency, virtual height, MUF (max. usable frequency), skip distance, troposphere and duct propagation.
Antenna measurements: Measurement of reflection coefficient and radiation pattern, Introduction of Anechoic chamber and Vector Network Analyzer.

[T1][R2][No. of Hrs. 11]

Text Books
[T1] Edward Conrad Jordan, Keith George Balmain, Electromagentic waves and raditing systems, Prentice Hall,1968
[T2] J.D. Kraus, RJ. Marhefka and Ahmad S. Khan, "Antennas and Wave Propagation" Tata Mcgraw Hill publications, New Delhi, 4th ed., (Special Indian Edition), 2010.
[T2] Constantine A. Balanis, " Antenna Theory Analysis and Design", 3rd Edition, Wiley Publications.

Reference Books
[R1] S. Das and A. Das, "Antennas and Wave Propagation", Tata Mcgraw Hill publications.
[R2] A.R. Harish and M. Sachidananda, "Antenna and wave Propagation", Oxford Publications.
[R3] G.S.N.Raju, Antenna Wave Propagation, Pearson Education, 2004

MICROWAVE ENGINEERING LAB

Paper Code: ETEC-352	**L**	**T/P**	**C**
Paper: Microwave Engineering Lab	**0**	**2**	**1**

List of Experiments:

1. To measure the frequency and wavelength using slotted line section and frequency meter.
2. To measure the Isolation and Insertion loss of Isolator and Circulator.
3. To study E-plane, H-plane and Magic Tee.
4. To measure Coupling Factor, Directivity and Isolation of directional coupler.
5. To measure VSWR and Reflection coefficient of different loads.
6. To study the characteristics of Klystron and Gunn diode.
7. Simulation of Transmission line: Waveguide and Coaxial line.*
8. Simulation of directional coupler.*
9. Simulation of E-plane and H-plane Tee.*
10. Study of micro strip line and LPF using MIC kit/Software.*
11. Study of BPF using MIC kit/ Software.*

*** These experiments may be performed using simulation software like HFSS, CST or IE3D (for planar circuits) etc.**

NOTE:- At least 8 Experiments out of the list must be done in the semester.

VLSI DESIGN LAB

Paper Code: ETEC-354 **L** **T/P** **C**
Paper: VLSI Design Lab **0** **2** **1**

List of Experiments:

1) To study the MOS characteristics and introduction to tanner EDA software tools.
2) To design and study the DC characteristics of PMOS and NMOS.
3) To design and study the DC characteristics of resistive inveter.
4) To design and study the transient and DC characteristics of CMOS inverter.
5) To design and study the characteristics of CMOS NAND and NOR gate.
6) To design and study the characteristics of CMOS multiplexer.
7) To design any Boolean function using transmission gates.
8) To design and study the characteristics of CMOS Full adder.
9) To design and study the characteristics of CMOS D Flip Flop.
10) To design and study the transient characteristics of CMOS XOR/XNOR.
11) To design and study the characteristics of Schmitt trigger circuit.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

DIGITAL SIGNAL PROCESSING LAB

Paper Code: ETEC-356	**L**	**T/P**	**C**
Paper: Digital Signal Processing Lab	**0**	**2**	**1**

List of Experiments:

Software Experiments:

1. Generation of basic signals sine, cosine, ramp, step, impulse and exponential in continuous and discrete domains using user defined functions.
2. Write a MATLAB program to find convolution (linear/circular) and correlation of two discrete signals.
3. Perform linear convolution using circular convolution and vice versa.
4. Write a MATLAB program to
   a. Find 8 point DFT, its magnitude and phase plot and inverse DFT.
   b. Find 16 point DFT, its magnitude and phase plot and inverse DFT.
5. Perform the following properties of DFT-
   a. Circular shift of a sequence.
   b. Circular fold of a sequence.
6. Write a MATLAB Program to design FIR Low pass filter using
   a. Rectangular window
   b. Hanning window
   c. Hamming window
   d. Bartlett window
7. Write a MATLAB program to
   a. Implement a Low pass / High pass / Band pass / Band stop IIR Filter using Butterworth approximation.
   b. Implement a Low pass / High pass / Band pass / Band stop IIR Filter using Chebyshev approximation.

Hardware Experiments using Texas Instruments Kits-DSK 6713:

8. Introduction to Code composer Studio.
9. Write a program to generate a sine wave and see the output on CRO
10. Write a Program to Generate ECHO to give audio file.
11. Write a program to demonstrate Band Stop filter by FIR.

Additional Experiments:

12. Write a program to generate a cos wave and see the output on CRO
13. Write a program to blink the LED
14. Write a program to display a string on LCD.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

DATA COMMUNICATION & NETWORKS LAB

Paper Code: ETEC-358	**L**	**T/P**	**C**
Paper: Data Communication & Networks Lab	**0**	**2**	**1**

List of Experiments:

1. Introduction to Computer Network laboratory
   Introduction to Discrete Event Simulation
   Discrete Event Simulation Tools - ns2/ns3, Omnet++
2. Using Free Open Source Software tools for network simulation – I Preliminary usage of the tool ns3
   Simulate telnet and ftp between N sources - N sinks (N = 1, 2, 3). Evaluate the effect of increasing data rate on congestion.
3. Using Free Open Source Software tools for network simulation - II
   Advanced usage of the tool ns3
   Simulating the effect of queueing disciplines on network performance - Random Early Detection/Weighted RED / Adaptive RED (This can be used as a lead up to DiffServ / IntServ later).
4. Using Free Open Source Software tools for network simulation - III
   Advanced usage of the tool ns3 Simulate http, ftp and DBMS access in networks
5. Using Free Open Source Software tools for network simulation - IV
   Advanced usage of the tool ns3
   Effect of VLAN on network performance - multiple VLANs and single router.
6. Using Free Open Source Software tools for network simulation - IV
   Advanced usage of the tool ns3
   Effect of VLAN on network performance - multiple VLANs with separate multiple routers.
7. Using Free Open Source Software tools for network simulation - V
   Advanced usage of the tool ns3
   Simulating the effect of DiffServ / IntServ in routers on throughput enhancement.
8. Using Free Open Source Software tools for network simulation - VI
   Advanced usage of the tool ns3
   Simulating the performance of wireless networks
9. Case Study I : Evaluating the effect of Network Components on Network Performance
   To Design and Implement LAN With Various Topologies and To Evaluate Network Performance Parameters for DBMS etc)
10. Case Study II : Evaluating the effect of Network Components on Network Performance
    To Design and Implement LAN Using Switch/Hub/Router As Interconnecting Devices For Two Different LANs and To Evaluate Network Performance Parameters.
11. Mini project - one experiment to be styled as a project of duration 1 month (the last month)

NOTE:- At least 8 Experiments out of the list must be done in the semester.

EMBEDDED SYSTEMS

Paper Code: ETEC-401 **L** **T/P** **C**
Paper: Embedded Systems **3** **1** **4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks	

Objective: The objective of the paper is to enable a student to design an embedded system for specific tasks.

UNIT- I

Overview of Embedded Systems: Characteristics of Embedded Systems. Comparison of Embedded Systems with general purpose processors. General architecture and functioning of micro controllers. 8051 micro controllers.

PIC Microcontrollers: Architecture, Registers, memory interfacing, interrupts, instructions, programming and peripherals.

[T1][No. of hrs. 12]

UNIT- II

ARM Processors: Comparison of ARM architecture with PIC micro controller, ARM 7 Data Path, Registers, Memory Organization, Instruction set, Programming, Exception programming, Interrupt Handling, Thumb mode Architecture.

Bus structure: Time multiplexing, serial, parallel communication bus structure. Bus arbitration, DMA, PCI, AMBA, I2C and SPI Buses.

[T2][No. of hrs. 12]

UNIT- III

Embedded Software, Concept of Real Time Systems, Software Quality Measurement, Compilers for Embedded System.

[T3][No. of hrs. 10]

UNIT-IV

RTOS: Embedded Operating Systems, Multi Tasking, Multi Threading, Real-time Operating Systems, RT-Linux introduction, RTOS kernel, Real-Time Scheduling.

[T3][No. of hrs. 10]

Text Book:

[T1] Design with PIC Microcontrollers, John B. Peatman, Pearson Education Asia, 2002
[T2] ARM System Developer's Guide: Designing and Optimizing System Software, Andrew N. Sloss, Dominic Symes, Chris Wright, Morgan Kaufman Publication, 2004.
[T3] Computers as components: Principles of Embedded Computing System Design, Wayne Wolf, Morgan Kaufman Publication, 2000

References Books:

[R1] The Design of Small-Scale embedded systems, Tim Wilmshurst, Palgrave2003
[R2] Embedded System Design , Marwedel ,Peter , Kluwer Publishers , 2004.

OPTOELECTRONICS AND OPTICAL COMMUNICATION

Paper Code: ETEC-403	**L**	**T/P**	**C**
Paper: Optoelectronics and Optical Communication	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Objective: The objective of this paper is to introduce the student about Optical Fiber, Wave propagation, Detectors and its structures and functions.

UNIT - I

Introduction: Optical Fiber: Structures, Wave guiding and Fabrication – Nature of light, Basic optical laws and Definition, Optical fiber modes and Configuration, Mode theory for circular waveguides, Single mode fibers, Graded index fiber, Fiber materials, Fabrication and mechanical properties, Fiber optic cables, Basic Optical Communication System, Advantage of Optical Communication System .

[T1, T2][No. of Hrs.10]

UNIT – II

Attenuation in Optical Fibers: Introduction, Absorption, Scattering, Very Low Loss Materials, All Plastic & Polymer-Clad-Silica Fibers.

Wave Propagation: Wave propagation in Step-Index & Graded Index Fiber, Overall Fiber Dispersion-Single Mode Fibers, Multimode Fibers, Dispersion-Shifted Fiber, Dispersion, Flattened Fiber, Polarization.

[T1, T2][No. of Hrs.11]

UNIT – III

Source & Detectors: Design & LED's for Optical Communication, Semiconductor Lasers for Optical Fiber Communication System and their types, Semiconductor Photodiode Detectors, Avalanche Photodiode Detector & Photo multiplier Tubes. Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling. Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors. Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers .

[T1, T2][No. of Hrs.11]

UNIT – IV

Optical Fiber Communication Systems: Data Communication Networks – Network Topologies, Mac Protocols, Analog System. Advanced Multiplexing Strategies – Optical TDM, Sub carrier Multiplexing, WDM Network. Architectures: SONET/SDH. Optical Transport Network, Optical Access Network, Optical Premise Network. **Applications**-Military Applications, Civil, Consumer & Industrial Applications.

[T1, T2][No. of Hrs.12]

Text Books:

[T1] J. Gowar, "Optical Communication System", IEEE Press – 2nd Edition.
[T2] R.P.Khare, "Fiber Optics and Opto Electronics" Oxford Publication

Reference Books:

[R1] Optical Information Processing – F. T. S. Yu – Wiley, New York, 1983
[R2] G. P. Agrawal, Fiber optic Communication Systems, John Wiley & sons, New York, 1992
[R3] A. Ghatak, K. Thyagarajan, "An Introduction to Fiber Optics", Cambridge University Press
[R4] J. H. Franz & V. K. Jain, "Optical Communication Components & Systems", Narosa Publish, 2013
[R5] John M. Senior, "Optical Fiber Communications", Pearson, 3rd Edition, 2010.

WIRELESS COMMUNICATION

Paper Code: ETEC-405	**L**	**T/P**	**C**
Paper: Wireless Communication	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTER: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the course is to introduce various wireless networks, mobile networks and their basic architecture starting from 2G through to 3G and 4G.

UNIT – I

Introduction To Wireless Communication Systems: Evolution of mobile radio communications; examples of wireless comm. systems; paging systems; Cordless telephone systems; overview of generations of cellular systems, comparison of various wireless systems.
Introduction to Personal Communication Services (PCS): PCS architecture, Mobility management, Networks signaling. A basic cellular system, multiple access techniques: FDMA, TDMA, CDMA.
Introduction to Wireless Channels and Diversity: Fast Fading Wireless Channel Modeling, Rayleigh/Ricean Fading Channels, BER Performance in Fading Channels, Introduction to Diversity modeling for Wireless Communications

[T1,T2][No. of Hrs. 11]

UNIT - II

2G Networks: Second generation, digital, wireless systems: GSM, IS_136 (D-AMPS), IS-95 CDMA. Global system for Mobile Communication (GSM) system overview: GSM Architecture, Mobility Management, Network signaling, mobile management, voice signal processing and coding. **Spread Spectrum Systems-** Cellular code Division Access Systems-Principle, Power Control, effects of multipath propagation on code division multiple access.

[T1,T2][No. of Hrs. 11]

UNIT - III

2.5G Mobile Data Networks: Introduction to Mobile Data Networks, General Packet Radio Services (GPRS): GPRS architecture, GPRS Network nodes, EDGE,Wireless LANs, (IEEE 802.11), Mobile IP.
Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G, Introduction to 4G.

[T1,T2][No. of Hrs. 11]

UNIT – IV

Wireless Local Loop (WLL): Introduction to WLL architecture, WLL technologies. Wireless personal area networks (WPAN): Blue tooth, IEEE 802.15, architecture, protocol stack. Wi-Max, introduction to Mobile Adhoc Networks.
Global Mobile Satellite Systems, Case studies of IRIDIUM and GLOBALSTAR systems.

[T1,T2][No. of Hrs. 11]

Text Books:

[T1] Raj Pandya, "Mobile & Personnel communication Systems and Services", Prentice Hall India, 2001.
[T2] Theodore S. Rappaport, "Wireless Communication- Principles and practices," 2nd Ed., Pearson Education Pvt. Ltd, 5th Edition, 2008.

Reference Books:

[R1] T.L.Singhal "Wireless Communication", Tata McGraw Hill Publication.
[R2] Jochen Schiller, "Mobile communications," Pearson Education Pvt. Ltd., 2002.
[R3] Yi –Bing Lin & Imrich Chlamatac, "Wireless and Mobile Networks Architecture," John Wiley & Sons, 2001.
[R4] Lee, W.C.Y., "Mobile Cellular Telecommunication", 2nd Edition, McGraw Hill,1998.
[R5] Smith & Collins, "3G Wireless Networks," TMH, 2007
[R6] Schiller, Jochen, "Mobile Communications", 2nd Edition, Addison Wesley

ADVANCED DIGITAL SIGNAL PROCESSING

Paper Code: ETEC-407	L	T/P	C
Paper: Advanced DSP	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Objectives: The prerequisites are signals and systems, analog and digital communication, digital signal processing. The objective of the paper is to learn the advanced techniques used in DSP.

UNIT-I

Multirate DSP: Overview of Mathematical description of change of sampling rate, Filter design & implementation for sampling rate conversion, Multistage implementation of sampling rate conversion ,Sampling rate conversion of band pass signal, sampling rate conversion by an arbitrary factor, Application of multi rate signal processing, poly phase structures, multirate identities, quadrature mirror filter& perfect reconstruction, calculation of amplitude & Phase distortion.

Adaptive System

Definition and Characteristics, Areas of Application, Example of an Adaptive System, Adaptive Linear Combiner and The Performance Function; Gradient and Minimum Mean-Square Error, Alternative Expression of the Gradient, De-correlation of Error and Input Components.

[T1, T2, R2] [No. of Hours 12]

UNIT II

Spectrum Estimation: Estimation of spectra from finite duration signals,

Non-Parametric Methods-Correlation Method - Periodogram Estimator, Performance Analysis of Estimators, Unbiased consistent Estimators, Modified periodogram, Bartlett and Welch methods, Blackman - Tukey method

Parametric Methods - AR - MA - ARMA model based spectral estimation, Parameter Estimation, Yule-Walker equations, Solutions using Durbin's algorithm

[T1, T2, R2] [No. of Hours 11]

UNIT III

Wiener Filter: Linear Optimum Filtering, Principle of Orthogonally, Minimum Mean Square Error, Wiener-Hopf Equation, Error Performance Surface.

Linear Prediction: Forward Linear Prediction, Backward Linear Predict ion, Properties of Prediction Error Filters

Method of Steepest Descent: Basic Idea of Steepest-Descent Algorithm, Steepest-Descent Algorithm Applied to Wiener Filter, Stability of Steepest-Descent Algorithm, and Limitations of Steepest-Descent Algorithm.

[T1] [No. of Hours 11]

UNIT IV

Least-Mean Square Adaptive Filter: Overview, LMS Adaptation Algorithm, Application, Comparison of LMS with Steepest-Descent Algorithm.

Normalized Least-Mean Square Adaptive Filter: Normalized LMS Filter as the Solution to Constrained Optimization Problem, Stability of the NLMS.

[T1, R1] [No. of Hours 10]

Textbooks:

[T1] Simon Haykin, Adaptive Filter Theory, 4th Edn. Pearson Education

[T2] John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing Principal Algorithm & Application,3rd Edition, Pearson Education, 2002

Reference Book:

[R1] Bernard Widrow and Samuel D. Stearns, Adaptive Signal Processing, Pearson Education

[R2] Monson H. Hayes, Statistical Digital Signal processing and Modeling, John Wiley and Sons, Inc., Singapore, 2002.

INTRODUCTION TO MEMS

Paper Code: ETEC-409	**L**	**T/P**	**C**
Paper: Introduction to MEMS	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTER: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the paper is to introduce the introductory ideas of micro electro mechanical switches, filters, phase shifters, antennas and their applications.

UNIT- I:

Introduction: Introduction and origin of MEMS, Micro fabrications for MEMS, Electromechanical transducers, Electrothermal actuators, Microsensing for MEMS, Materials for MEMS, fabrication techniques, Semiconductors, Electrical and chemical properties, Growth and deposition, Thin films for MEMS and their deposition techniques, Oxide film formation by thermal oxidation, Deposition of silicon dioxide and silicon nitride, Bulk micromachining for silicon-based MEMS, Isotropic and orientation-dependent wet etching, Dry etching, Silicon surface micromachining, scanning method.

[T1,T2][No. of Hrs. 12]

UNIT- II:

RF MEMS elements: Switches, Mechanical switches, Electronic switches, Switches for RF and microwave applications, Micro relays; Bistable micro relays and micro actuators, MEMS inductors and capacitors, Modeling and design issues.

[T1,T2][No. of Hrs. 10]

UNIT- III:

Micromachined RF filters: General considerations and modeling, Micromechanical filters, Electrostatic comb drive, Micromechanical filters using comb drives, Micromechanical filters using electrostatic coupled beam structures, Surface acoustic wave filters, Design of interdigital transducers, Single-phase unidirectional transducers, Bulk acoustic wave filters, Micromachined filters for millimeter wave frequencies.

[T1,T2][No. of Hrs. 10]

UNIT- IV:

MEMS phase shifters transmission lines, components and Antenna: phase shifters and their limitations, Micromachined transmission lines, Losses in transmission lines, Overview of microstrip antenna, Integration and packaging for RF MEMS devices, Role of MEMS packages.

[T1,T2][No. of Hrs. 10]

Text books:

[T1] Vijay K. Varadan K.J. Vinoy and K.A. Jose, “RF MEMS and Their Applications”, John Wiley USA
[T2] Mohamed Gad-el-Hak, “MEMS Design and Fabrication Edited”, Taylor and Francis.

Reference Books:

[R1] Mohamed Gad-el-Hak, “MEMS Introduction and Fundamentals Edited”, Taylor and Francis
[R2] Christian C. Enz and Andreas Kaiser, “MEMS-based Circuits and Systems for Wireless Communication”, Springer
[R3] P Rai Choudhury, “MEMS and MOEMS Technology and applications” –PHI Learning Pvt Ltd, India
[R4] Sergey Y.Yurish and Maria Teresa S.R. Gomes, “Smart Sensors and MEMS”, Kluwer Academic Publisher
[R5] Mohamed Gad-el-Hak, Taylor and Francis MEMS Applications, The MEMS handbook .

ADVANCE VLSI DESIGN

Paper Code: ETEC-411 | **L** 3 | **T/P** 0 | **C** 3
Paper: Advance VLSI Design

	L	T/P	C
Paper Code: ETEC-411	**L**	**T/P**	**C**
Paper: Advance VLSI Design	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTER: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the paper is to study the advance VLSI design. The students are introducing to MOS technology, design rules and some applications.

UNIT I

Small signal & large signal models of MOS & BJT transistor, MOS & BJT transistor Amplifiers: single transistor Amplifiers stages: Common Emitter, Common base, Common Collector, Common Drain, Common Gate & Common Source Amplifiers, Frequency response of amplifiers.

Multiple transistor amplifier stages: CC-CE, CC-CC, & Darlington configuration, Cascode configuration, Active Cascode, Differential amplifiers: Differential pair & DC transfer characteristics.

[T1,T2][No. of Hours: 11]

UNIT II

Current Mirrors, Active Loads & References, current mirrors, simple current mirror, Cascode current mirrors Widlar current mirror, Wilson Current mirror, Active loads, Analysis of differential amplifier with active load, supply and temperature independent biasing techniques.

[T1,T2][No. of Hours: 11]

UNIT III

Operational Amplifier: applications of operational Amplifier, theory and Design; Definition of Performance Characteristics; Design of two stage MOS Operational amplifier, two stage MOS operational amplifier with cascodes, MOS telescopic-cascode operational amplifiers, MOS folded-cascode operational amplifiers, Bipolar operational amplifiers, Frequency response & compensation.

[T1,T2][No. of Hours: 11]

UNIT IV

Voltage controlled oscillator, Comparators, Source follower, Phase locked techniques; Phase Locked Loops (PLL), closed loop analysis of PLL. Digital-to-Analog (D/A) and Analog-to-Digital (A/D) Converters, OTA Amplifiers, Switched Capacitor Filters.

[T1,T2][No. of Hours: 11]

Text books:

[T1] P. R. Gray, P. J. Hurrt, S. H. Lweic, RoG. Meyer, "Analysis and Design of Analog Integrated Circuits" John Wiley and Sons Inc. 2001.

[T2] P. E. Allen, D. R. Holberg, "CMOS Analog Circuit Design" Oxford University Press 2002.

Reference Books:

[R1] B. Razavi, "Design of Analog CMOS Integrated Circuits", TMH – 2002.

[R2] R. J. Baker, H. W. Li and D. E. Boyce, "CMOS Circuit Design, Layout and Simulation", PHI

[R3] Ken Martin, "Digital Integrated Circuit Design", Oxford University Press.

[R4] Yaniiis Tsividis and Colin Mcandrew, "The MOS Transistor", Oxford University Press, 2013

[R5] Geiger, Allen, Strader "VLSI Design Techniques for Analog and Digital Circuits" McGraw Hill, 1990

BIOMEDICAL INSTRUMENTATION

Paper Code: ETIC-403 | **L** 3 | **T/P** 0 | **C** 3
Paper: Biomedical Instrumentation

	L	T/P	C
Paper Code: ETIC-403			
Paper: Biomedical Instrumentation	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**
1.. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective:-The objective of teaching this subject is to make students understand the applications of electronics in diagnostic and therapeutic area. Further the methods of recording various bio potentials; measurement of biochemical and physiological information are explained. The topics such as Patient Monitoring systems, Audiometers, imaging systems, Patients safety are also included. The emerging Computer Applications in Biomedical field are also dealt with.

UNIT I
Biomedical signals & Physiological transducers: Source of biomedical signal, Origin of bioelectric signals, recording electrodes, Electrodes for ECG, EMG & EEG .Physiological transducers: Pressure, Temperature, photoelectric & ultrasound Transducers. Measurement in Respiratory system**:** Physiology of respiratory system, Measurement of breathing mechanics Spiro meter, Respiratory therapy equipments Inhalators ventilators & Respirators , Humidifiers , Nebulizers Aspirators, Biomedical recorders: ECG, EEG & EMG.

[T1, T2][No of Hours:-11]

UNIT II
Patient Monitoring systems & Audiometers: Cardiac monitor, Bedside patient monitor, measurement of heart rate, blood pressure, temperature, respiration rate, Arrhythmia monitor, Methods of monitoring fatal heart rate, Monitoring labor activity . Audiometers: Audiometers, Blood cell counters, Oximeter, Blood flow meter, cardiac output measurement, Blood gas analyzers.

[T1, T2][No of Hours:-11]

UNIT III
Modern Imaging systems: Introduction, Basic principle & Block diagram of x-ray machine, x- ray Computed Tomography (CT), Magnetic resonance imaging system (NMR), ultrasonic imaging system. Eco-Cardiograph, Eco Encephalography, Ophthalmic scans, MRI. Therapeutic Equipments: Cardiac pacemakers, cardiac defibrillators, Hemodialysis machine, Surgical diathermy machine.

[T1, T2][No of Hours:-11]

UNIT III
Patients safety & Computer Applications in Biomedical field: Precaution, safety codes for electro medical equipment, Electric safety analyzer, Testing of biomedical equipment, Use of microprocessors in medical instruments, Microcontrollers, PC based medical instruments, Computerized Critical care units, Planning & designing a computerized critical care unit. Physiotherapy: Software Diathermy, microwave diathermy, Ultrasound therapy unit. Electrotherapy Equipments, Ventilators.

[T1, T2][No of Hours:-11]

Text Books:
[T1] Joseph J. Carr & John M. Brown, “Introduction to Biomedical Equipment Technology”, Pearson.
[T2] Shakti Chatterjee, “Textbook of Biomedical Instrumentation System”, Cengage Learning

Reference Books:
[R1] R.S.Khandpur, “Hand book of Biomedical Instrumentation”, TMH
[R2] Walter Welko- Witiz and Sid Doutsch, “Biomedical Instruments: Theory and Design” Wiley
[R3] Lesile Cromwell, Fred J. Weibell & Erich A. Pfeiffer, “Biomedical Instrumentation & Measurements”, PHI

PLC & SCADA SYSTEMS

Paper Code: ETEE-413	**L**	**T/P**	**C**
Paper: PLC & SCADA Systems	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of this paper is to introduce the students about the knowledge of programmable logic controller, principles of PLC and functions and SCADA and its elements and functions.

UNIT-I

Programmable Logic Controller (PLC) Basics: Introduction, Parts of PLC, Principles of operation, PLC size and applications, PLC Advantages and Disadvantages, PLC Manufacturers, PLC hardware components, I/O section, Analog I/O modules, Digital I/O modules, CPU- Processor memory module, Programming devices, Devices which can be connected to I/O modules, Relay, Contactor, SPST, Push Buttons, NO/NC Concept

[T1,T2] [No of Hrs 10]

UNIT-II

Programming of Programmable Logic Controller: General PLC Programming Procedures, Contacts and Coils, Program SCAN, Programming Languages, Ladder Programming, Relay Instructions, Instruction Addressing, Concept of Latching, Branch Instructions, Contact and Coil I/O Programming Examples, Relation of Digital Gate Logic to Contact/Coil Logic.

[T1,T2] [No of Hrs 12]

UNIT-III

Programmable Logic controller Functions: Timer Instructions: ON DEAY Timer and OFF DELAY timer, Counter Instructions: UP/DOWN Counters, Timer and Counter Applications, Program Control Instructions: Master Control Reset, Jump and Subroutine,
Math Instructions- ADD, SUB. Data Handling: Data Move, Data Compare, Data Selection, Electro-pneumatic Sequential Circuits and Applications.

[T1,T2] [No of Hrs 12]

UNIT-IV

SCADA: Definition of SCADA, Applicable Processes, Elements of SCADA System, A Limited Two-Way System. Real Time Systems: Communication Access and Master-Slave determining scan interval. Introduction to Remote Control, Communications-A/D Conversion, Long Distance Communication, Communication System components in brief- Protocol, Modems, Synchronous/Asynchronous telephone cable/radio, Half Duplex, Full Duplex System, Brief introduction to RTU and MTU, Applications-Automatic Control, Advisory Applications.

[R1] [No of Hrs 10]

Text Books:

[T1] Frank D. Petruzella "Programmable Logic Controllers", McGraw-Hill Book Company.
[T2] John w. Webb and Ronald A. Reis, "Programmable Logic Controllers", PHI

Reference Books:

[R1] Stuart A.Boyer "Supervisors Control and Data Acquisition", ISA
[R2] William I. Fletcher "An Engineering Approach to Digital Design", PHI.
[R3] Simpson, Colin "Programmable Logic Controllers", Englewood Cliffs NJ PHI.
[R4] Gray Dunning, "Introduction to Programmable Logic Controllers", Delmar Thompson Learning
[R5] Stenerson, John "Fundamentals Logic Controllers Sensors, & Communications", Englewood Cliffs, NJ, 1993. Prentice Hall.
[R6] Programmable Logic Controllers, W.Bolton, Elsevier

POWER ELECTRONICS

Paper Code: ETEE-415 **L** **T/P** **C**
Paper: Power Electronics **3** **0** **3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the basics of Power Electronics that are required for an engineering student.

UNIT- I
Introduction
Characteristics and switching behaviour of Power Diode, SCR, UJT, TRIAC, DIAC, GTO, MOSFET, IGBT, MCT and power BJT, two-transistor analogy of SCR, firing circuits of SCR and TRIAC, SCR gate characteristics, SCR ratings. Protection of SCR against over current, over voltage, high dV/dt, high dI/dt, thermal protection, Snubber circuits, Methods of commutation, series and parallel operation of SCR, Driver circuits for BJT/MOSFET.

[T1,T2][No. of hrs. 11]

UNIT- II
A.C. to D.C. Converter: Classification of rectifiers, phase controlled rectifiers, fully controlled and half controlled rectifiers and their performance parameters, .three phase half wave, full wave and half controlled rectifiers and their performance parameters, effect of source impedance on the performance of single phase and three phase controlled rectifiers, single-phase and three phase dual converter.

[T1, T2, T3][No. of hrs. 11]

UNIT- III
D.C. to D.C. Converter: Classification of choppers as type A, B, C, D and E, principle of operation, switching mode regulators: Buck, Boost, Buck-Boost, Cuk regulators.
A.C. to A.C. Converter: AC voltage Controllers**,** Cyclo-converters : single phase to single phase, three phase to single phase, three phase to three phase Cyclo-converter circuit and their operation, Matrix converter.

[T1, T2, T3][No. of hrs. 11]

UNIT-IV
D.C. to A.C. Converter: single phase single pulse inverter: Square wave, quasi square. Three phase single pulse inverters (120° and 180° conduction) Modulation Techniques and reduction of harmonics, PWM techniques, SPWM techniques, SVM, Carrier less modulation. , PWM Inverter, Bidirectional PWM converters, voltage source inverters and current source inverter, Multi level Inverter: cascaded and NPC Inverters.

[T1, T2, T3][No. of hrs. 11]

Text Books:
[T1] M.H. Rashid, "Power Electronics: Circuits, Devices and Applications" Pearson Publications.
[T2] Daniel W. Hart, "Power Electronics "Tata McGraw-Hill
[T3] H.C. Rai, "Power Electronics Devices, Circuits, Systems and Application", Galgotia Publications, 3rd Edition

References Books:
[R1] Singh, Kanchandani, "Power Electronics", Tata McGraw-Hill.
[R2] Ned Mohan, Tore M. Undeland and Robbins, "Power Electronics: Converters, Applications and Design" Wiley India Publication
[R3] V R Moorthi, "Power Electronics: Devices, Circuits and Industrial Applications", Oxford Publication.
[R4] Kassakian, Schlecht, Verghese, "Principles of Power Electronics" , Pearson Publications
[R5] M.S. Jamil Asghar, "Power Electronics" PHI Publication
[R6] P. S. Bimbhra "Power Electronics", Khanna Publishing.

RF DEVICES AND CIRCUITS

Paper Code: ETEC-417	**L**	**T**	**C**
Paper: RF Devices and Circuits	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: To study the various devices and circuits for microwave and RF circuit applications.

UNIT-I
Introduction of RF and Microwaves, RF behavior of Passive components (resistor, capacitor and inductor), **Transmission line**: lumped element circuit model, wave propagation on transmission line, lossless line two wire line, coaxial line, micro strip line, terminated lossless transmission line, short circuit and open circuit terminated transmission line.
Quarter wave transformer (impedance, frequency response and multiple reflections).

[T1, T2, R1][No. of Hrs. 11]

UNIT-II
Smith chart: basic smith chart operation, combined impedance – admittance Smith chart, computation of Impedance of Passive circuits using smith chart (from reflection coefficient to load impedance)
RF network analysis : Scattering matrix, Generalized Scattering Parameters.
Impedance matching and tuning: matching with lumped element(analytic and smith chart solution), single stub tuning, shunt stub and series stub tuning.

[T1, T2, R1][No. of Hrs. 11]

UNIT-III
Power dividers: basic properties of dividers and couplers, TEE junction lossless power divider, waveguide directional coupler.
RF Filter Design : Periodic structures, analysis of infinite periodic structure, terminated periodic structure, k-β diagram and wave velocities, filter design using insertion loss method, characterization of power loss ratio, low pass prototype filter for Butterworth and Chebyshev filters, impedance and frequency transformation(only for LPF).

[T1, T2, R1][No. of Hrs. 10]

UNIT-IV
Microwave Bipolar Transistors: Physical structures, figure of merit of various geometry and power frequency limitation.
RF Field effect Transistors: Construction and functionality of MISFET, MOSFET, MESFET and High electron mobility Transistors (MODFET).

[T1, T3][No. of Hrs. 10]

Text Books:
[T1] S Y Liao, Microwave Devices and Circuits, Pearson Publications.
[T2] R.E. Collin, “Foundation for Microwave Engineering”, Wiley Publications
[T3] Davis, "Radio frequency circuit design", Wiley publication

Reference Books
[R1] Reinhold Ludwig and Gene Bogdanvo, “RF Circuit design Theory and applications”, Pearson Publications.
[R2] D.M Pozar, “Microwave Engineering”, Wiley Publications.

DATABASE MANAGEMENT SYSTEMS

	L	T/P	C
Paper Code: ETCS-425	**L**	**T/P**	**C**
Paper: Database Management Systems	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The concepts related to database, database techniques, SQL and database operations are introduced in this subject. This creates strong foundation for application data design.

UNIT-I : Introductory Concepts of DBMS: Introduction and application of DBMS, Data Independence, Database System Architecture – levels, Mapping, Database users and DBA, Entity – Relationship model, constraints, keys, Design issues, E-R Diagram, Extended E-R features- Generalization, Specialization, Aggregation, Translating E-R model into Relational model.

[T1, T2][No. of Hrs. 10]

UNIT-II : Relational Model: The relational Model, The catalog, Types, Keys, Relational Algebra, Fundamental operations, Additional Operations-, SQL fundamentals, DDL,DML,DCL PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Integrity – Triggers.

[T2, R3][No. of Hrs. 10]

UNIT-III: Functional Dependencies, Non-loss Decomposition, First, Second, Third Normal Forms, Dependency Preservation, Boyce/Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

[T2, R1][No. of Hrs. 10]

UNIT-IV: Transaction Management: ACID properties, serializability of Transaction, Testing for Serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, Database recovery management.

Implementation Techniques: Overview of Physical Storage Media, File Organization, Indexing and Hashing, B+ tree Index Files, Query Processing Overview, Catalog Information for Cost Estimation, Selection Operation, Sorting, Join Operation, Materialized views, Database Tuning.

[T1, T2, R2][No. of Hrs. 12]

Text Books:

[T1] Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, 5th Edition, Tata McGraw Hill, 2006

[T2] Elmsari and Navathe, “Fundamentals of Database Systems”, 4th Ed., A. Wesley, 2004

References Books:

[R1] C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, 8th Edition, Pearson Education, 2006.

[R2] J. D. Ullman, “Principles of Database Systems”, 2nd Ed., Galgotia Publications, 1999.

RENEWABLE ENERGY RESOURCES

Paper Code: ETEE-419	**L**	**T/P**	**C**
Paper: Renewable Energy Resources	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the paper is to introduce the knowledge of upcoming and future promising area of renewable energy resources to the students, which is developing rapidly.

UNIT- I

Solar Energy: radiation – extra terrestrial, spectral distribution, solar constant, solar radiation on earth, measurements; solar thermal system – solar thermal power and its conversion, solar collectors, flat plate, solar concentrating collectors, - types and applications; photovoltaic (PV) technology - photovoltaic effect, efficiency of solar cells, semi-conductor materials, solar PV system, standards and applications, tracking.

[T1][No. of hrs. 10]

UNIT- II

Wind and Small Hydropower Energy: wind data, properties, speed and power relation, power extracted, wind distribution and speed prediction, wind map of India; wind turbines and electric generators. fundamentals – types of machines and their characteristics, horizontal and vertical wind mills, elementary design principle, wind energy farms, off-shore plants; small, mini and micro hydro power plants and their resource assessment, plant layout with major components shown.

[T2][No. of hrs. 10]

UNIT- III

Other Non-conventional Energy Sources: biomass – photosynthesis and origin of biomass energy, resources, cultivated resources, waste to biomass, terms and definitions – incineration, wood and wood waste, harvesting super tree, energy forest, phyrolysis, thermo-chemical biomass conversion to energy, gasification, anaerobic digester, fermentation, gaseous fuel; geothermal – resources, hot spring, steam system, principle of working, site selection, associated problems in development; ocean and tidal energy – principle of ocean thermal energy conversion, wave energy conversion machines, problems and limitations, fundamentals of tidal power, conversion systems and limitations; hydrogen energy – properties of hydrogen, sources, production and storage, transportation, problems for use as fuel; fuel cells – introduction with types, principle of operation and advantages.

[T1,R2][No. of hrs. 12]

UNIT-IV

Grid Connectivity: wind power interconnection requirement - low-voltage ride through (LVRT), ramp-rate limitations, supply of ancillary services for frequency and voltage control, load following, reserve requirement, impact of connection on stead-state and dynamic performance of power system; interfacing dispersed generation of solar energy with the grid, protective relaying, islanding, voltage flicker and other power quality issues; role of non-conventional energy system in smart grid.

[T2,R3][No. of hrs. 10]

Text Books:

[T1] Tiwari and Ghosal, "Renewable Energy Resources: Basic Principle & Application", Narosa Pub.
[T2] S N Bhadra ,D, Kastha,'Wind Electrical Systems" Oxford Publication 2014

References Books:

[R2] John Twidell, "Renewable Energy Sources", Taylor and Francis
[R3] Godfrey Boyle, "Renewable Energy: Power for a Sustainable Future", Oxford University Press
[R4] Ewald F. Fuchs, "Power Conversion of Renewable Energy Systems", Springer
[R5] B. H. Khan, "Non Conventional Energy", Tata McGraw Hill
[R6] D P kothari ,"Wind energy System and applications" Narosa Pub 2014

RADAR AND NAVIGATION

Paper Code: ETEC-419 | **L** 3 | **T/P** 0 | **C** 3
Paper: Radar and Navigation

	L	T/P	C
Paper Code: ETEC-419	**L**	**T/P**	**C**
Paper: Radar and Navigation	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: To study the basic of radar systems and their use in different navigation systems.

UNIT I

Introduction to Radar: Basic Radar – The Origins of Radar, radar system (block diagrams), Radar range Equation, Applications of Radar. Radar types: MTI, Doppler and Pulse, PRF, Delay, Line Cancellers, Staggered Pulse Repetition Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance, Pulse Doppler Radar. Tracking with Radar-Monopulse Tracking, Conical Scan and Sequential Lobing, Limitations to Tracking Accuracy, Low-Angle Tracking - Tracking in Range, Comparison of Trackers, Automatic Tracking with Surveillance Radars.

[T1][R1][No. of Hrs. 11]

UNIT II:

Radar Receiver: Introduction, Superheterodyne Receiver, Receiver noise Figure, Duplexers and Receiver Protectors, Radar Displays. Matched Filter Receiver, Detection Criteria, Detectors, Automatic Detector, Integrators, Constant-False-Alarm Rate Receivers, The Radar operator, Signal Management, Propagation Radar Waves, Atmospheric Refraction, Standard propagation, Nonstandard Propagation, The Radar Antenna, Reflector Antennas, Electronically Steered Phased Array Antennas, Phase Shifters, Frequency-Scan Arrays

[T1][R1][R2][No. of Hrs. 11]

UNIT III

Radar Transmitters- Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources – Other aspects of Radar Transmitter.

Detection of Signals in Noise –Detection of Signals in Noise, Receiver Noise and the Signal-to-Noise Ratio, Probability Density Functions, Probabilities of Detection and False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets, Radar cross Section fluctuations, Transmitter Power.

[T2][R3][No. of Hrs. 11]

UNIT IV

Navigation – Introduction, Four methods of Navigation, Radio Direction Finding, The Loop Antenna, Loop Input Circuits, An Aural Null Direction Finder, The Goniometer, Errors in Direction Finding, Adcock Direction Finders, Direction Finding at Very High Frequencies, Automatic Direction Finders, The Commutated Aerial Direction Finder, Range and Accuracy of Direction Finders, Radio Ranges, Doppler Navigation, component, Beam Configurations, Track Stabilization, introduction to Satellite Navigation System, Global Positioning System(GPS).

[T1][R1][No. of Hrs. 11]

Textbooks:

[T1] Merrill I. Skolnik, "Introduction to Radar Systems", Tata McGraw-Hill (3rd Edition) 2003.
[T2] N.S.Nagaraja, "Elements of Electronic Navigation Systems", 2nd Edition, TMH, 2000.

Reference books:

[R1] Gottapu Sasi Bhushana Rao, "Microwave and RADAR Engineering". Pearson publication.
[R2] Peyton Z. Peebles, "Radar Principles", Johnwiley, 2004
[R3] J.C Toomay, "Principles of Radar", 2nd Edition –PHI, 2004

PROJECT MANAGEMENT

Paper Code: ETMS–421	**L**	**T/P**	**C**
Paper: Project Management	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.	

Objectives: The student is introduced to the concepts of project management which becomes back bone knowledge for an engineer to have a holistic view of executing a project.

UNIT – I
Introduction to Project management: Characteristics of projects, Definition and objectives of Project Management, Stages of Project Management, Project Planning Process, Establishing Project organization.
[T1,T2][No. of Hrs. 11]

UNIT –II
Work definition: Defining work content, Time Estimation Method, Project Cost Estimation and budgeting, Project Risk Management, Project scheduling and Planning Tools: Work Breakdown structure, LRC, Gantt charts, CPM/PERT Networks.
[T1,T2][No. of Hrs. 11]

UNIT – III
Developing Project Plan (Baseline), Project cash flow analysis, Project scheduling with resource constraints: Resource Leveling and Resource Allocation. Time Cost Trade off: Crashing Heuristic.
[T1,T2][No. of Hrs. 10]

UNIT – IV
Project Implementation: Project Monitoring and Control with PERT/Cost, Computers applications in Project Management, Contract Management, Project Procurement Management. Post-Project Analysis.
[T1,T2][No. of Hrs. 10]

Text Books:
[T1] Shtub, Bard and Globerson, Project Management: Engineering, Technology, and Implementation, Prentice Hall, India
[T2] P. K. Joy, Total Project Management: The Indian Context, Macmillan India Ltd.

Reference Books:
[R1] Cleland and King, VNR Project Management Handbook.
[R2] Lock, Gower, Project Management Handbook.
[R3] Wiest and Levy, Management guide to PERT/CPM, Prentice Hall. India
[R4] Horald Kerzner, Project Management: A Systemic Approach to Planning, Scheduling and Controlling, CBS Publishers.
[R5] S. Choudhury, Project Scheduling and Monitoring in Practice.
[R6] John M Nicholas, Project Management for Business and Technology: Principles and Practice, Prentice Hall, India.
[R7] N. J. Smith (Ed), Project Management, Blackwell Publishing.
[R8] Robert K. Wysocki, Robert Back Jr. and David B. Crane, Effective Project Management, John Wiley.
[R9] Jack R Meredith and Samuel J Mantel, Project Management: A Managerial Approach, John Wiley.

ECONOMICS FOR ENGINEERS

Paper Code: ETMS-423	**L**	**T/P**	**C**
Paper: Economics for Engineers	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of this course is to give the working engineer an overview of the economics principles often employed in effective engineering decisions as related to the designing, planning and implementation of successful civil engineering projects.

UNIT – I

Engineering economics and its definition, Nature and scope, Overview of Indian Financial Scenario.
Utility, Theory of demand, law of demand and its exceptions, Elasticity of demand, Law of supply and elasticity of supply, Determination of equilibrium price under perfect competition.
Time value of money-Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence Evaluation of Engineering projects, Concept of Internal rate of return (IRR).

[T1,T2][No. of Hrs: 10]

UNIT – II

Cost Concepts, Elements of costs, Preparation of cost sheet, Segregation of costs into Fixed and variable costs, Break-even Analysis-Linear Approach.
Engineering Accounting, Manufacturing Cost, Manufacturing Cost Estimation, Preparing Financial Business Cases, Profit and loss A/c Balance sheet.
Asset Depreciation and its Impact on Economic Analyses, Depreciation Policy, Straight line method and declining balance method, Economic Justification of Asset Replacements.

[T1,T2][No. of Hrs: 12]

UNIT – III

Types of business ownership: Private ownership- individual, Partnership, Joint stock companies, Co-operative societies, State ownership-government departmental organization, Public corporations, Government companies, Public Private Partnership (PPP) and its management. Store keeping, Elements of Materials management and control polices. Banking: Meaning and functions of commercial banks, Function of Reserve Bank of India.

[T1,T2][No. of Hrs: 10]

UNIT - IV

Asset Depreciation and its Impact on Economic Analyses, Depreciation Policy, Straight line method and declining balance method, Economic Justification of Asset Replacements. Development of business case analyses for new product development projects and the impact of taxes on engineering economic decisions. Inflation and its impact on economy.

[T1,T2][No. of Hrs: 12]

Text Books:

[T1] Sullivan, Wicks, Koelling, “Engineering Economy”, Pearson Education
[T2] S.C. Sharma and T.R. Banga, “Industrial organization and engineering economics”

References Books:

[R1] Riggs, Bedworth and Randhwa, “Engineering Economics”, McGraw Hill Education India.
[R2] C. T. Horngreen, “Cost Accounting”, Pearson Education India.
[R3] R. R. Paul, “Money banking and International Trade”, Kalyani Publuisher, New-Delhi.
[R4] Engineering Economics by Tahir Hussain, University Science Press, 2010
[R5] Engineering Economics by Dr. Rajan Mishra – University Science Press, 2009
[R6] H.L. Ahuja, “Principle of Economics”, S. Chand
[R7] Khan, Siddiquee, Kumar, “Engineering Economy” Pearson Education

GRID COMPUTING

Paper Code: ETIT-425	**L**	**T/P**	**C**
Paper: Grid Computing	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.	

Objective: To enable students to understand the basic concepts of GRID computing with performance issues, Web services, monitoring, optimization, security and resource management.

UNIT I

Fundamentals: Overview of Distributed Systems and it's variants like grid computing, cloud computing, Cluster Computing etc. Introduction to Grid Computing, it's components(Functional View, A Physical View, Service View), key issues and benefits, Characterization and Architecture of Grid, Grid - Types, Topologies, Components, Layers. Grid Computing Standards and Applications.

[T1,T2][No. of Hours: 11]

UNIT II

Web Services and Grid Monitoring : OGSA and WSRF : Overview, Services, Schema and architecture. Grid Monitoring Systems: Overview, architecture, GridICE, JAMM, MDS and Other monitoring Systems (Ganglia and GridMon), Grid portals.

[T1,T2][No. of Hours: 11]

UNIT III

Grid Security and Resource Management -
Grid Security: A Brief Security Primer, PKI, X509 Certificates, Grid Security-
Grid Scheduling and Resource Management: Scheduling Paradigms, Working principles of Scheduling, A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS.

[T1,T2][No. of Hours: 11]

UNIT IV

Data Management and Grid Middleware-
Data Management: Categories and Origins of Structured Data, Data Management, Challenges, Database integration with grid, Architectural Approaches-Collective Data Management Services, Federation Services .
Grid Middleware: List of globally available Middlewares, Globus Toolkit.

[T1,T2][No. of Hours: 11]

Text Books:

[T1] Maozhen Li, Mark Baker, The Grid Core Technologies, John Wiley & Sons.
[T2] Joshy Joseph & Craig Fellenstein, “Grid Computing”, Pearson 2004.
[T3] C.S. R. Prabhu ,”Grid and Cluster Computing’, PHI 2014

Reference Books:

[R1] Ian Foster & Carl Kesselman, The Grid 2 – Blueprint for a New Computing Infrastructure, Morgan Kaufman – 2004.
[R2] Barry Wilkinson , “Grid Computing”, CRC Press.
[R3] Joel M. Crichlow, “Distributed Systems – Computing over Networks”, PHI, 2014.
[R4] RajKumar Buyya, “High Performance Cluster Computing – Volume I Architectures and Systems”, Pearson, 2013.

PARALLEL COMPUTING

Paper Code: ETCS-427 | **L 3** | **T/P 0** | **C 3**
Paper: Parallel Computing

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.	

Objective: The perquisites are Computer Architecture, OS. The student is introduced to the concepts of parallelism which enhances the speed of operations of an OS. Further, various architectures of multiprocessor is taught.

UNIT I

Theory of Parallelism: Parallelism, Reason of parallel processing, Concepts and challenges, applications of parallel processing.

Parallel computer models: The state of computing, Classification of parallel computers, Flynn and Feng's classification, SIMD and MIMD operations, Shared Memory vs. message passing multiprocessors, Distributed shared memory, Hybrid multiprocessors, multiprocessors and multicomputers, Multivector and SIMD computers, PRAM and VLSI Models.

Program and Network Properties: Conditions of parallelism, program partitioning and scheduling, program flow mechanism, system interconnection architecture.

[T1,T2][No. of Hrs. 10]

UNIT II

Memory Hierarchy Design: Memory technologies and optimization, inclusion, coherence and locality, cache memory organization and cache performance optimization, shared memory organization, memory protection, virtual memory technology and introduction to buses, crossbar and multi-stage switches.

Pipelining and ILP: Instruction level parallelism and its exploitation- concepts and challenges, overcoming data hazards with dynamic scheduling. Pipelining, instruction and arithmetic pipelining designs, branch handling techniques, linear and non-linear pipeline processors, superscalar and super pipeline design.

[T1,T2][No. of Hrs. 10]

UNIT III

Parallel architectures: multi-processor system interconnects, cache coherence and synchronization mechanism, message passing mechanism, vector processing principles, multivector multiprocessors, compound vector processing, principles of multithreading, latency hiding techniques- shared virtual memory, prefetching techniques, distributed coherent cache, scalable and multithread architectures, dataflow and hybrid architecture.

[T1,T2][No. of Hrs. 10]

UNIT IV

Parallel Programming Platforms: Implicit Parallelism: Trends in Microprocessor Architectures, limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks.

Parallel Programming Models: Shared variable models, message passing models, parallel languages and complier, code optimization and scheduling, Introduction of shared-memory MIMD machines and message-passing MIMD machines.

[T1,T2][No. of Hrs. 10]

Text Books:

[T1] Introduction to Parallel Computing by Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Pearson Publication.
[T2] Advance computer Architecture by Kai Hwang under Tata McGraw Hill publications.
[T3] Introduction to Parallel Processing: Algorithms and Architectures By Behrooz Parhami in Springer Shop.

Reference Books:

[R1] Introduction to Parallel Processing by P. Ravi Prakash, M. Sasikumar, Dinesh Shikhare By PHI
[R2] Fundamentals of Parallel Processing by Jordan Harry, Alaghband Gita, PHI Publication
[R3] Introduction to Parallel Programming by Steven Brawer.
[R4] Parallel Computers – Architecture and Programming by V. Rajaraman And C. Siva Ram Murthy.

SOCIOLOGY AND ELEMENTS OF INDIAN HISTORY FOR ENGINEERS

	L	T/P	C
Paper Code: ETHS-419	**L**	**T/P**	**C**
Paper: Sociology and Elements of Indian History for Engineers	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of this course is to familiarize the prospective engineers with elements of Indian history and sociological concepts and theories by which they could understand contemporary issues and problems in Indian society. The course would enable them to analyze critically the social processes of globalization, modernization and social change. All of this is a part of the quest to help the students imbibe such skills that will enhance them to be better citizens and human beings at their work place or in the family or in other social institutions.

UNIT I

Module 1A: Introduction to Elements of Indian History: What is History? History Sources-Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography.

[*3 Lectures*]

Module 1B: Introduction to sociological concepts-structure, system, organization, social institution, Culture social stratification (caste, class, gender, power). State & civil society.

[*7 Lectures*]

[T1][No. of Hrs. 10]

UNIT II

Module 2A: Indian history & periodization; evolution of urbanization process: first, second & third phase of urbanization; Evolution of polity; early states of empires; Understanding social structures-feudalism debate.

[*3 Lectures]*

Module 2B: Understanding social structure and social processes: Perspectives of Marx, Weber & Durkheim.

[*7 Lectures*]

[T1][No. of Hrs. 10]

UNIT III

Module 3A: From Feudalism to colonialism-the coming of British; Modernity & struggle for independence.

[3 Lectures]

Module 3B: Understanding social structure and social processes: Perspectives of Marx, Weber & Durkheim.

[9 *Lectures*]

[T1][No. of Hrs. 12]

UNIT IV

Module 4A: Issues & concerns in post-colonial India (upto 1991); Issues & concerns in post-colonial India 2nd phase (LPG decade post 1991).

[*3 Lectures*]

Module 4B: Social change in contemporary India: Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing nature of work and organization.

[*10 Lectures*]

[T1][No. of Hrs. 13]

Text Books:

[T1] Desai, A.R. (2005), Social Background of Indian Nationalism, Popular Prakashan.
[T2] Giddens, A (2009), Sociology, Polity, 6th Edition

Reference Books:

[R1] Guha, Ramachandra (2007), India After Gandhi, Pan Macmillan
[R2] Haralambos M, RM Heald, M Holborn, (2000), Sociology, Collins

SELECTED TOPICS IN ECE

	L	T/P	C
Paper Code: ETEC-429	**L**	**T/P**	**C**
Paper: Selected Topics in ECE	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: The objective of this course is to familiarize the selected vital topics of the electronics and communication engineering.

UNIT I

Introduction to the Verilog Hardware Description Language (HDL), Verilog system design , Module testing, Behaviour Modelling, Tasks and functions, Verilog structure, syntax and semantics, Identifier names, logic values and numbers, data types. Gate level modeling, Generating arrays of instances • Generating arrays of instances Dataflow modelling, Reset function design. Design of digital sequential modules. Examples - Bus design.

[T1,R2][No. of Hrs. 10]

UNIT II

Introduction to System Verilog, System Verilog extensions to Verilog data types, System Verilog enhanced procedural blocks, System Verilog coding styles for top-down design with synthesis and simulation. Blocking and non-blocking assignments affect, simulation and synthesis. Overview of RTL/gate/switch models. Writing verification test benches in Verilog. System verilog interfaces. Using interfaces to simplify inter-module connections, Specifying interface views (modports), using tasks and functions in interfaces

[T1,R2][No. of Hrs. 10]

UNIT III

Introduction to Smart Antenna Systems, Concept and benefits of smart antennas, Fixed weight beam forming basics, Detection and estimation of arrival angle, Adaptive beam forming. Tx-Rx Array processing. Spatial processing for wireless systems. Adaptive antennas. Beam forming networks. Digital radio receiver techniques and software radios. Coherent and non-coherent CDMA spatial processors. Dynamic re-sectoring. Range and capacity extension – multi-cell systems. Spatio – temporal channel models. Environment and signal parameters. Geometrically based single bounce elliptical model.

[T2,R1][No. of Hrs. 10]

UNIT IV

Optimal Spatial filtering – adaptive algorithms for CDMA. Multitarget decision – directed algorithm. DOA estimation – conventional and subspace methods. ML estimation techniques. Estimation of the number of sources using eigen decomposition. Direction finding and true ranging PL systems. Elliptic and hyperbolic PL systems. TDOA estimation techniques. Applications of Smart Antennas in Wireless/Mobile Communications Applications, Smart Antenna Techniques for CDMA (including current applications).

[T2,R1][No. of Hrs. 10]

Textbook:

[T1] SystemVerilog for Verification by Ben Cohen, Srinivasan Venkataramanan, Ajeetha Kumari
[T2] T.S.Rappaport & J.C.Liberti, Smart Antennas for Wireless Communication, Prentice Hall (PTR), 1999.

Reference Books:

[R1] R.Janaswamy, Radio Wave Propagation and Smart Antennas for Wireless Communication, Kluwer, 2001.
[R2] Verilog HDL: A Guide to Digital Design and Synthesis, by Samir Palnitkar Prentice Hall Professional, 2003

OPTICAL AND WIRELESS COMMUNICATION LAB

	L	T/P	C
Paper Code: ETEC-451	**L**	**T/P**	**C**
Paper: Optical and Wireless Communication Lab	**0**	**2**	**1**

List of Experiments:

1. Setting up Fiber Optic Analog and Digital Link.
2. Study of Intensity Modulation Technique using Analog Input Signal.
3. Study of Intensity Modulation Technique using Digital Input Signal.
4. Frequency Modulation System.
5. Pulse width Modulation System.
6. Study of Propagation Loss in Optical Fiber.
7. Study of Bending Loss.
8. Measurement of Optical Power using Optical Power Meter.
9. D. C. Characteristics of PIN and APD photo diode.
10. Measurement of Numerical aperture and Propagation loss in optical fiber.

PSPICE SIMULATION

Operating characteristics of optical devices (LED and photodiode).
DC Characteristics of LED,PIN and APD Photo Diode

NOTE:- At least 8 Experiments out of the list must be done in the semester.

EMBEDDED SYSTEMS LAB

	L	T/P	C
Paper Code: ETEC-453	**L**	**T/P**	**C**
Paper: Embedded Systems Lab	**0**	**2**	**1**

List of Experiments:

1. Introduction to microcontroller and interfacing modules.
2. To interface the seven segment display with microcontroller 8051
3. To create a series of moving lights using PIC on LEDs.
4. To interface the stepper motor with microcontroller.
5. To display character 'A' on 8*8 LED Matrix.
6. Write an ALP to add 16 bits using ARM 7 Processor
7. Write an ALP for multiplying two 32 bit numbers using ARM Processor
8. Write an ALP to multiply two matrices using ARM processor

NOTE:- At least 8 Experiments out of the list must be done in the semester.

BIOMEDICAL INSTRUMENTATION

Paper Code: ETEC-455	**L**	**T/P**	**C**
Paper: Biomedical Instrumentation	**0**	**2**	**1**

List of Experiments:

1. To study various transducers for biomedical applications
2. To study various functions of Bedside & Central Patient Monitoring Unit.
3. To measure blood pressure using Patient Monitoring Unit.
4. To study working principle & measure blood pressure using Sphygmomanometer.
5. To measure percentage amount of oxygenated arterial blood using Patient Monitoring Unit.
6. To measure ECG using Patient Monitoring Unit.
7. To measure body temperature using Patient Monitoring Unit.
8. To study working principle & measure body temperature using Digital Thermometer.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

DATABASE MANAGEMENT SYSTEMS LAB

Paper Code: ETEC-455	**L**	**T/P**	**C**
Paper: Database Management Systems Lab	**0**	**2**	**1**

LAB BASED ON DBMS

Lab includes implementation of DDL, DCL, DML i.e SQL in Oracle.

List of Experiments:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER, UPDATE and DELETE
4. Write the queries to implement the joins
5. Write the queries for implementing the following functions: MAX (), MIN (),AVG (),COUNT ()
6. Write the queries to implement the concept of Integrity constrains
7. Write the queries to create the views
8. Perform the queries for triggers
9. Perform the following operation for demonstrating the insertion, updation and deletion using the referential integrity constraints

TEXT BOOK:

1. SQL/ PL/SQL, The programming language of Oracle, Ivan Bayross, 4th Edition BPB Publications

NOTE:- At least 8 Experiments out of the list must be done in the semester.

HUMAN VALUES & PROFESSIONAL ETHICS – II

Paper Code: ETHS-402 **L T C**
Paper : Human Values & Professional Ethics-II **1 0 1**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks. 3. Two internal sessional test of 10 marks each and one project report* carrying 5 marks.	

Objectives:
1. *The main object of this paper is to inculcate the skills of ethical decision making and then to apply these skills to the real and current challenges of the engineering profession.*
2. *To enable student to understand the need and importance of value-education and education for Human Rights.*
3. *To acquaint students to the National and International values for Global development*

UNIT I - Appraisal of Human Values and Professional Ethics:
Review of Universal Human Values: Truth, Love, Peace, Right conduct, Non violence, Justice and Responsibility. Living in harmony with 'SELF', Family, Society and Nature. Indian pluralism - the way of life of Islam, Buddhism, Christianity, Jainism, Sikhism and Hinduism, Greek - Roman and Chinese cultural values.
Sensitization of Impact of Modern Education and Media on Values:
a) Impact of Science and Technology
b) Effects of Printed Media and Television on Values
c) Effects of computer aided media on Values (Internet, e-mail, Chat etc.)
d) Role of teacher in the preservation of tradition and culture.
e) Role of family, tradition & community prayers in value development.
Review of Professional Ethics: Accountability, Collegiality, Royalty, Responsibility and Ethics Living. Engineer as a role model for civil society, Living in harmony with 'NATURE', Four orders of living, their inter-correctness, Holistic technology (eco-friendly and sustainable technology).
[T1] [T2] [R1] [R5] [R4][No. of Hrs. 03]

UNIT II – Engineers responsibility for safety:
Safety and Risks, Risk and Cost, Risk benefit analysis, testing methods for safety. Engineer's Responsibility for Safety Social and Value dimensions of Technology - Technology Pessimism – The Perils of Technological Optimism – The
Promise of Technology – Computer Technology Privacy
Some Case Studies: Case Studies, BHOPAL Gas Tragedy, Nuclear Power Plant Disasters, Space Shuttle Challenger , Three Mile Island Accident, etc.
[T1] [T2] [R4] [R2][No. of Hrs. 03]

UNIT III – Global Issues:
Globalization and MNCs: International Trade, Issues,
Case Studies: Kelleg's, Satyam, Infosys Foundation, TATA Group of Companies
Business Ethics: Corporate Governance, Finance and Accounting, IPR.
Corporate Social Responsibility (CSR): Definition, Concept, ISO, CSR.
Environmental Ethics: Sustainable Development, Eco-System, Ozone depletion, Pollution.
Computer Ethics: Cyber Crimes, Data Stealing, Hacking, Embezzlement.
[T1] [T2] [R4][No. of Hrs. 05]

UNIT IV - Engineers Responsibilities and Rights and Ethical Codes:
Collegiality and loyalty, Conflict of interests, confidentiality, occupational crimes, professional rights, responsibilities. To boost industrial production with excellent quality and efficiency, To enhance national economy, To boost team spirit, Work Culture and feeling of job satisfaction, National integration, Examples of some illustrious professionals.
Need for Ethical Codes, Study of some sample codes such as institution of Electrical and Electronics Engineers, Computer Society of India etc., Ethical Audit.
Development and implementation of Codes: Oath to be taken by Engineering graduates and its importance**,

[T1] [T2] [R4][R2][No. of Hrs. 05]

Text Books:

[T1] Professional Ethics, R. Subramanian, Oxford University Press.
[T2] Professional Ethics & Human Values: Prof. D.R. Kiran, TATA Mc Graw Hill Education.

References Books:

[R1] Human Values and Professional Ethics: R. R. Gaur, R. Sangal and G. P. Bagaria, Eecel Books (2010, New Delhi). Also, the Teachers‟ Manual by the same author
[R2] Fundamentals of Ethics, Edmond G. Seebauer & Robert L. Barry, Oxford University Press
[R3] Values Education: The paradigm shift, by Sri Satya Sai International Center for Human Values, New Delhi.
[R4] Professional Ethics and Human Values – M.Govindrajan, S.Natarajan and V.S. Senthil Kumar, PHI Learning Pvt. Ltd. Delhi
[R5] A Textbook on Professional Ethics and Human Values – R.S. Naagarazan – New Age International (P) Limited, Publishers New Delhi.
[R6] Human Values & Professional Ethics- S B Gogate- Vikas publishing house PVT LTD New Delhi.
[R7] Mike Martin and Roland Schinzinger, "Ethics in Engineering" McGraw Hill
[R8] Charles E Harris, Micheal J Rabins, "Engineering Ethics, Cengage Learning
[R9] PSR Murthy, "Indian Culture Values and Professional Ethics", BS Publications
[R10] Caroline Whitback< Ethics in Engineering Practice and Research, Cambridgs University Press
[R11] Charles D Fleddermann, "Engineering Ethics", Prentice Hall.
[R12] George Reynolds, "Ethics in Information Technology", Cengage Learning
[R13] C, Sheshadri; The Source book of Value Education, NCERT
[R14] M. Shery; Bhartiya Sanskriti, Agra (Dayalbagh)

*Any topic related to the experience of the B.Tech student in the assimilation and implementation of human values and professional ethics during the past three years of his/her studies in the institute OR A rigorous ethical analysis of a recent case of violation of professional ethics particularly related to engineering profession.

**All students are required to take OATH in writing prior to submission of major project and the record of the same is to be maintained at the college level and/or, this oath may be administered by the head of the institutions during the graduation ceremonies. The draft for the same is available alongwith the scheme and syllabus.

OATH TO BE TAKEN BY ENGINEERING GRADUATES

In a manner similar to the Hippocratic Oath taken by the medical graduates, Oath to be taken by the engineering graduates is as given below.

1. I solemnly pledge myself to consecrate my life to the service of humanity.
2. I will give my teacher the respect and gratitude, which is their due.
3. I will be loyal to the profession of engineering and be just and generous to its members.
4. Whatever project I undertake, it will be for the good of mankind.
5. I will exercise my profession solely for the benefit of humanity and perform no act for criminal purpose and not contrary to the laws of humanity.
6. I will keep away from wrong, corruption and avoid tempting others to vicious practices.
7. I will endeavor to avoid waste and consumption of non-renewable resources.
8. I will speak out against evil and unjust practices whenever and wherever I encounter them.
9. I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my duty and my work, even under threat.
10. I will practice my profession with conscience, dignity and uprightness.
11. I will respect the secrets, which are confided to me.

I make these promises solemnly, freely and upon my honor.

(Name of the Student)

Correspondence Address: ____

____

____

Email: ____

SATELLITE COMMUNICATION

Paper Code: ETEC-404	**L**	**T/P**	**C**
Paper: Satellite Communication	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: To study the most relevant aspects of satellite communication with emphasis on the most recent application & developments. It covers orbital mechanics, launching techniques, satellite link design, earth & space segment, error control coding and different multiple access techniques.

UNIT- I

Principles of Satellite Communication: Evolution & growth of communication satellite, Satellite frequency allocation & Band spectrum, Advantages of satellite communication, Active & Passive satellite, Applications of satellite communication. Synchronous satellite, Satellite Launch.

Satellite Orbits: Introduction, Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits, LEO, MEO, Look Angle Determination- Limits of visibility –eclipse-Sub satellite point –Sun transit outage.

[T1, T2, R1][No. of Hrs. 11]

UNIT- II

Satellite Link Design

Basic transmission, System noise temperature, G/T ratio, design of down links, uplink design, design of specified C/N, Atmospheric Absorption, Rain induced attenuation.

Space Segment: Power Supply, Altitude Control, Station Keeping, Thermal Control, TT&C sub system, Transponders, Antenna Sub system.

Earth Segment: Subsystem of earth station, Transmit-Receive Earth Station, different types of earth stations, frequency coordination.

[T1, T2, R1][No. of Hrs. 11]

UNIT- III

Multiple Access Techniques: FDMA, FDMA down link analysis. TDMA, Satellite-switched TDMA, code division multiple access, DAMA, On board signal processing for FDMA/TDM Operation.

Error Control for Digital Satellite Links: Error detection and correction for digital satellite links, error control coding, Convolutional codes, satellite links concatenated coding and interleaving, Automatic Repeat Request (ARQ).

[T1, T2, R2][No. of Hrs. 10]

UNIT- IV

Interconnection of Satellite Networks: Interconnection with ISDN, Interconnection of television networks.

Satellite Applications: Satellite mobile services, VSAT, GPS, Radarsat, INMARSAT, Satellite navigational system. Direct broadcast satellites (DBS)- Direct to home Broadcast (DTH), Worldspace services, Business TV(BTV)

[T1, R2, R3][No. of Hrs. 10]

Text Books:

[T1] Dennis Roddy, "Satellite Communication", McGraw Hill International.
[T2] T. Pratt, "Satellite Communication", John Willy and Sons (Asia) Pvt. Ltd.

Reference Books:

[R1] T. Ha, "Digital Satellite Communication", McGraw Hill.
[R2] Bruce R. Elbert, "The Satellite Communication Applications Handbook" ,Artech House Boston.
[R3] Mark R. Chartrend, "Satellite Communication" Cengage Learning
[R4] Handbook of Satellite Communication, Wiley.

ADHOC AND SENSOR NETWORKS

Paper Code: ETEC-406	**L**	**T/P**	**C**
Paper: Ad Hoc and Sensor Networks	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTER: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The prerequisites are data communication networks, wireless communication and networks. The objective of the paper is to introduce infrastructure less wireless networking.

UNIT I

Ad Hoc Wireless Networks:

Introduction. Issues in Ad Hoc Wireless Networks. Ad Hoc Wireless Internet.

MAC Protocols for Ad Hoc Wireless Networks:

Introduction, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks. Design Goals of a MAC Protocol for Ad Hoc Wireless Networks. Classifications of MAC Protocols. Contention-Based Protocols. Contention-Based Protocols with Reservation Mechanisms. Contention-Based MAC Protocols with Scheduling Mechanisms. MAC Protocols in Directional Antennas. Other MAC Protocols

[T1, T2][No. of Hrs. 11]

UNIT II

Routing Protocols for Ad Hoc Wireless Networks:

Introduction to Routing algorithm, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks. Classifications of Routing Protocols. Table-Driven Routing Protocols. On-Demand Routing Protocols. Hybrid Routing Protocols. Routing Protocols with Efficient Flooding Mechanisms. Hierarchical Routing Protocols. Power-Aware Routing Protocols.

Transport Layer and Security Protocols for Ad Hoc Wireless Networks:

Introduction. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks. Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks. Classification of Transport Layer Solutions. TCP Over Ad Hoc Wireless Networks. Other Transport Layer Protocols for Ad Hoc Wireless Networks. Security in Ad Hoc Wireless Networks. Network Security Requirements. Issues and Challenges in Security Provisioning. Network Security Attacks. Key Management. Secure Routing in Ad Hoc Wireless Networks.

[T1, T2][No. of Hrs. 12]

UNIT III

Wireless Sensor Networks:

Introduction. Sensor Network Architecture. Data Dissemination. Data Gathering. MAC Protocols for Sensor Networks. Location Discovery. Quality of a Sensor Network. Evolving Standards. Other Issues.

Hybrid wireless Networks:

Introduction. Next-Generation Hybrid Wireless Architectures. Routing in Hybrid Wireless Networks. Pricing in Multi-Hop Wireless Networks. Power Control Schemes in Hybrid Wireless Networks. Load Balancing in Hybrid Wireless Networks.

[T1, T2][No. of Hrs. 11]

UNIT IV

Wireless Geolocation Systems:

Introduction. What is wireless Geolocation? Wireless Geolocation System Architecture. Technologies for Wireless Geolocation. Geolocation Standards for E-911 Services. Performance Measures for Geolocation Systems. Questions. Problems.

Recent Advances in Wireless Networks:

Introduction. Ultra-Wide-Band Radio Communication. Wireless Fidelity Systems. Optical Wireless Networks. The Multimode 802.11 -IEEE 802.11a/b/g. The Meghadoot Architecture, introduction to vehicular sensor networks.

[T1, T2] [No. of Hrs. 11]

Text Books:

[T1] Siva Ram Murthy, C. and Manoj,B. S., Adhoc Wireless Networks Architectures and Protocols, Prentice Hall, PTR, (2004) 2nd ed.

[T2] Perkins, Charles E., Ad hoc Networking, Addison Wesley, (2000) 3rd ed.

Reference Books

[R1] Toh, C. K., Ad hoc Mobile Wireless Networks Protocols and Systems, Prentice Hall, PTR, (2001) 3rd Edition.

[R2] Pahlavan, Kaveh., Krishnamoorthy, Prashant., Principles of Wireless Networks, - A united approach - Pearson Education, (2002) 2nd ed.

[R3] Wang X. and Poor H.V., Wireless Communication Systems, Pearson education, (2004) 3rd ed.

[R4] Schiller Jochen., Mobile Communications, Person Education – 2003, 2nd ed.

[R5] Carlos De Morais Cordeiro and Dharam P Agrawal, "Adhoc and Sensor Networks- Theory & Applications", 2nd Ed, Cambridge Univ Press India Ltd

CONSUMER ELECTRONICS

Paper Code: ETEC-408	**L**	**T/P**	**C**
Paper: Consumer Electronics	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of teaching this subject is to give students in depth knowledge of various electronic audio and video devices and systems. Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices like audio-systems, CD systems, TV, VCR and other items like fax machine washing machine, microwave ovens, digital camera & iPODS etc,. which in-turn will develop in them capabilities of assembling, fault diagnosis and rectification in a systematic way.

UNIT I

Audio System: Microphones, Construction, Working principles and applications of microphone: Carbon, Moving coil, velocity, crystal, condenser type, Cordless microphone, Dynamic & wireless microphone.
Loud Speakers: Direct radiating, horn loaded, woofer, tweeter and squeaker, baffles and enclosures.
Sound recording on magnetic tape its principles, block diagram and tape transport mechanism, Wow, Flutter & Rumble distortion. Relationship between gap width, tape speed and frequency. Optical recording and reproduction system, Blue ray technology,
VCD & DVD system, HI- Fi system, condition for good acoustic features, stereo amplifiers

[T1, T2][No. of Hours: 11]

UNIT II

Television: Monochrome TV Communication**:** Elements of TV communication system; Scanning – its need for picture transmission; Need synchronizing and blanking pulses; Progressive scanning, interlaced scanning, ell effect, resolution and band width requirement, Composite Video signal (CVS)at the end of even and odd fields, advantage & disadvantage of negative modulation, need of pre & post Equalizing pulses; Monochrome picture tube– construction and working, comparison of magnetic and electric of Construction and working of camera tube: vidicon and plumbicon, night vision camera.
Block diagram of a TV receiver: function of each block and wave form at the input and output of each block; Frequency range of various VHF bands and channels used in India, Major specification of the CCIR B standard.
Typical circuits of scanning and EHT stages of TV receiver, keyed AGC,SAW filter; trap circuit, Identification of faulty stage by analyzing the symptoms and basic idea of a few important faults and there remedies.

[T1, T2][No. of Hours: 12]

UNIT III

Color TV: Primary colors, trisimulus values, trichromitc coefficients, concepts of additive and subtracting mixing of colours, concepts of luminance, Hue and saturation, Compatibility of colour TV system with monochrome system. Block diagram of colour TV camera, Construction and working principles of Trinitron, delta gun and PIL types of colour picture tubes. Concepts of degaussing, purity, beam shifting; burst signal and its need, chrominance signal; analysis of G-Y signal is not transmitted, Block diagram of PAL TV receiver.

[T1,T2] [No. of Hours: 11]

UNIT IV

Comparison of digital TV LCD, LED, HDTV, Plasma TV &Three dimension TV.
Cable Television**:** Block diagram and principle of working of STB and DTH, Study of FAX machine,group-3 fax machine, Fuzzy logic washing machine, study of digital camera, RFID & Bluetooth technology, study of iPods,MP4 players & accessories, block diagram of microwave oven and its function of each block.

[T1,T2] [No. of Hours: 11]

Text Books:

[T1] R. R. Gulati, "Modern Television Practice" New Age International, 2nd Edition.
[T2] S. P. Bali, "Consumer Electronics" Pearson Education, 1st Edition.

Reference Books:

[R1] A. Dhake, "Television & Video Engineering" TMH – 2nd Edition.
[R2] R.R. Gulati, "Monochrome & Colour Television" New age International Publisher, 2nd Edition.
[R3] R.G. Gupta, "Audio & Video Systems" TMH – 2nd Edition.

DIGITAL IMAGE PROCESSING

Paper Code: ETIT-418 **L** **T/P** **C**
Paper: Digital Image Processing **3** **0** **3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: The aim of this course is to provide digital image processing fundamentals, hardware and software, digitization, encoding, segmentation, feature extraction etc. It will enhance the ability of students to apply tools in image restoration, enhancement and compression and to apply the techniques in both the spatial and frequency domains. It will enhance the ability of students to identify the quality characteristics of medical images, differences between computer vision and image processing and help in studying the remote sensing images of the environmental studies.

UNIT- I :
Introduction and Digital Image Fundamentals: The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.
Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods**.**

[T1, T2][No. of Hrs: 10]

UNIT- II:
Filtering in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters.
Image Restoration: A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

[T1, T2][No. of Hrs. 12]

UNIT- III:
Image Compression: fundamentals of compression, coding redundancy, Lossy and lossless compression, Spatial and temporal redundancy, Image compression models. Some basic compression methods
Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Region Oriented Segmentation, Motion based segmentation.

[T1, T2][No. of Hrs. 12]

UNIT- IV:
Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.
Object Recognition: Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

[T1, T2][No. of Hrs: 10]

Text Books:
[T1] Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 3Rd edition, Pearson, 2002.
[T2] A.K. Jain, "Fundamental of Digital Image Processing", PHI, 1989.

Reference Books:
[R1] Bernd Jahne, "Digital Image Processing", 5th Ed., Springer, 2002.
[R2] William K Pratt, "Digital Image Processing: Piks Inside", John Wiley & Sons, 2001.

ASIC DESIGN

Paper Code: ETEC-412 **L** 3 **T/P** 0 **C** 3
Paper: ASIC Design

	L	T/P	C
Paper Code: ETEC-412	**3**	**0**	**3**
Paper: ASIC Design			

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To proved basic knowledge of logic synthesis, simulation and testing of integrated circuits.

UNIT- I: Overview of ASIC

Types of ASICs, Design flow, CMOS transistors, and CMOS Design rules, Combinational Logic Cell, Sequential logic Cell, Data path logic Cell, Transistors as Resistors, Transistor Parasitic Capacitance, Logic effort, Library Cell design, Library Architecture. Anti fuse, static RAM, EPROM and EEPROM technology, Xilinx LCA, Altera FLEX, Altera MAX.

[T1, T2][No. of Hrs: 10]

UNIT- II: Logic Synthesis

Xilinx LCA, Xilinx EPLD, Altera MAX 5000 and 7000, Altera MAX 9000, Design system, Logic Synthesis, Half gate ASIC, Schematic entry, Low level design language, PLA tools, EDIF, CFI design representation. Verilog and logic synthesis, VHDL and logic synthesis, Performance-Driven Synthesis.

[T1, T2][No. of Hrs: 11]

UNIT- III: ASIC Physical Design

System Partition: FPGA partitioning, partitioning method, floor planning, placement, physical design flow global routing, detailed routing, special routing, circuit extraction, DRC.

[T1, T2][No. of Hrs: 10]

UNIT- IV: Simulation and Testing

Simulation, Types of Simulation, Cell Models, Delay Models, Switch-Level Simulation, Transistor-Level Simulation, The Importance of Test, Boundary-Scan Test, Faults, Fault Simulation, Automatic Test-Pattern Generation, Scan Test, Built-in Self-test, Physical Design Automation of FPGAs, VHDL, Verilog, Implementation of Simple circuits using VHDL and Verilog.

[T1, T2][No. of Hrs: 10]

Text Books:

[T1] Smith, M.J.S., Application Specific Integrated Circuits, Pearson Education (2006).
[T2] N.A. Sherwani, "Algorithms for VLSI Physical Design Automation", Kluwer Academic publications

Reference Books:

[R1] S. Brown, R. Francis, J. Rose, Z. Vransic, Field Programmable Gate Array, Kluwer Pub, 1992.
[R2] Wayne Wolf, FPGA-Based System Design, Prentice Hall PTR, 2004.

MOBILE COMPUTING

Paper Code: ETIT-402 **L** **T/P** **C**
Paper: Mobile Computing **3** **0** **3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: Should have studied papers such as Communication systems, Data communications and networking and wireless networks. To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture. To have an exposure about wireless protocols –Wireless LAN, Bluetooth, WAP, Zig Bee issues. To Know the Network, Transport Functionalities of Mobile communication. To understand the concepts of Adhoc and wireless sensor networks. Introduce Mobile Application Development environment.

UNIT – I

Mobile Physical layer: Review of generation of mobile services, overview of wireless telephony, cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Mobile computing Architecture: issues in mobile computing, three tier architecture for mobile computing, design considerations, Mobile file systems, Mobile databases. WAP: Architecture, protocol stack, Data gram protocol, Wireless transport layer security, Wireless transaction protocol, wireless session protocol, application environment, and applications.

[T1][T2][T3][No. of Hrs. 12]

UNIT - II

Mobile Data link layer: Wireless LAN over view, IEEE 802.11, Motivation for a specialized MAC, Near & far terminals, Multiple access techniques for wireless LANs such as collision avoidance, polling, Inhibit sense, spread spectrum, CDMA, LAN system architecture, protocol architecture, physical layer MAC layer and management, Hiper LAN.

Blue Tooth: IEEE 802.15 Blue tooth User scenarios, physical, MAC layer and link management.

Local Area Wireless systems: WPABX, IrDA, ZigBee, RFID, WiMax

[T1][T2][T3][No. of Hrs. 10]

UNIT- III

MOBILE IP Network Layer: IP and Mobile IP Network Layer- Packet delivery and Handover Management- Location Management- Registration- Tunnelling and Encapsulation-Route Optimization- Dynamic Host Configuration Protocol, Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), VoIP –IPSec,

Mobile Transport Layer: Traditional TCP/IP, Transport Layer Protocols-Indirect, Snooping, Mobile TCP

[T1][T2][T3][No. of Hrs. 12]

UNIT – IV

Support for Mobility: Data bases, data hoarding, Data dissemination, UA Prof and Caching, Service discovery, Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, Mobile devices and File systems, Data Synchronization, Sync ML.

Introduction to Wireless Devices and Operating systems: Palm OS, Windows CE, Symbion OS, Android, Mobile Agents. Introduction to Mobile application languages and tool kits.

[T1][T2][T3][No. of Hrs. 10]

Text Books:

[T1] J. Schiller, "Mobile Communications", 2nd edition, Pearson, 2011.
[T2] Raj Kamal "Mobile Computing" Oxford Higher Education, Second Edition, 2012.
[T3] Dharam Prakash Agrawal and Qing-An Zeng, "Introduction to Wireless and Mobile Systems" 3rd Edition, Cengage learning 2013.

References Books:

[R1] Asoke K Talukder, Hasan Ahmed,Roopa R Yavagal "Mobile Computing", Tata McGraw Hill, Pub, Aug – 2010

[R2] Pei Zheng, Larry L. Peterson, Bruce S. Davie, Adrian Farrell "Wireless Networking Complete" Morgan Kaufmann Series in Networking , 2009 (introduction, WLAN MAC)

[R3] Vijay K Garg "Wireless Communications & Networking" Morgan Kaufmann Series, 2010

[R4]. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.

[R5]. Charles Perkins, Mobile IP, Addison Wesley.

[R6]. Charles Perkins, Ad hoc Networks, Addison Wesley.

[R7]. Uwe Hansmann, Lothar Merk, Martin S. Nicklous, Thomas Stober, "Principles of Mobile Computing", Springer.

[R8] Evaggelia Pitoura and George Samarus, "Data Management for Mobile Computing", Kluwer Academic Press, 1998

[R9] V. Jeyasri Arokiamary, "Mobile Computing", Technical Publications

Laboratory session: The student is advised to learn any of the following languages and use any one tool kit for generating mobile applications, such as game, Clock, calendar, Convertor, phone book, Text Editor etc.,
Language support: XHTML-MP, WML, WML Script.
Mobile application languages- XML, Voice XML, Java, J2ME, Java Card
TooL Kits: WAP Developer tool kit and application environment, Android Mobile Applications Development Tool kit.

[R1]. Donn Felker, "Android Application Development for Dummies", Wiley, 2010

[R2]. Reto Meier, "Professional Android 2 Application Development", Wrox's Prog. to Programmer Series.

[R3]. Ed Burnette, 'Hello, Android: Introducing Google's Mobile Development Platform' third edition' Pragmatic Programmers, 2012

[R4]. Jerome (J.F) DiMarzio "Android A programmer's Guide" Tata McGraw-Hill 2010 Edition.

[R5] Reza B'Far, "Mobile computing principles: Designing and Developing Mobile Applications with UML and XML", Cambridge University press, 2005.

[R6]. R.Riggs, A. Taivalsaari, M.VandenBrink, "Programming Wireless Devices with Java2 Platform, Micro Edition", ISBN: 0-201-74627-1, Addison Wesley,, 2001.

INTRODUCTION TO NANO TECHNOLOGY

Paper Code: ETEC-416	**L**	**T/P**	**C**
Paper: Introduction to Nano Technology	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The prerequisites are basic electronics, analog and digital electronics, VLSI. The objective of the paper to introduce the relevance and importance of Nano electronics, fabrication techniques and Nano structures.

UNIT – I

Introduction to Modern Electronics, Nanoelectronics, International Technology roadmap, New Concepts in Electronics, Microelectronics and Nanoelectronics.

Basic Concepts of Electromagnetic waves and Quantum Mechanics, Electromagnetic Waves and Maxwell's Equations, Duality of Electron, Schrodinger Equation, Eigenvalue Problem and Electron in Quantum Well, Electrons in Multiple Quantum Wells, Superlattices, Artificial Atoms, Quantum Dots, Molecules, Energy Level Splitting, Chemical Bonds, Optical Transitions and Lasers.

[T1,T2][No. of Hrs: 11]

UNIT – II

Pattern Formation in Nanoelectronics, High Resolution Lithography, Dip-Pin Lithography, NEMS, Nano-Electro-Mechanical Systems, Self-Assembly Structures: Chemically – Directed Self-Assembly, Surface-Layer Proteins in Nanolithography.

[T1,T2][No. of Hrs: 11]

UNIT – III

Traditional Low-Dimensional Systems: Quantum Wells, Cascade Lasers and Other Quantum-Well Devices, Quantum Wires, Quantum Dots and Quantum Dot Molecules, Quantum – Dot – Based Cellular Automata, Coulomb Effects: Single Electron Devices, Nanoscale Sensors and Actuators.

[T1,T2][No. of Hrs: 11]

UNIT – IV

Newly Emerging Nanostructures and Applications: Applications of Inorganic-Organic Heterostructures, Quantum Dots Embedded in Organic Matrix: Organic Light Emitting Diodes, Quantum Wire Interconnects: DNA Computing, Carbons Nanotubes for Data Processing, Molecular Electronics Materials and Biomolecules, Future Integrated Circuits: Quantum Computing using super conductors.

[T1,T2][No. of Hrs: 11]

Text Books:

[T1] C. P. Poole and F. J. Owens, "Introduction to NanoTechnology", John Wiley & Sons, 2003.
[T2] M. A. Ratner and D. Ratner, "Nanotechnology: A gentle introduction to the next big Idea", PHI, 2003.

Reference Books:

[R1] Rainer Waser, "Nanoelectronics and INformation Technology: Advanced Electronic Materials and Novel Devices", John Wiley & sons, 2005.
[R2] Jurgen Schulte, "Nanotechnology: Global Strategies, Industry Trends and Applications", John Wiley, 2004.
[R3] M.A Shah, Tokeer Ahmad, "Principle of Nanoscience and nanotechnology, Narosa Publishing House, India.
[R4] S.E. Lyshevski, "Nano and Micro Electromechanical Systems Fundamentals of Nano and Micro-ENgineering", 2nd Edition, CRC Press, 2004.
[R5] K.K Chattopadhay A.N. Banerjee, "Nanoscience and Nanotechnology" PHI learning Pvt limited, Delhi, 2012.

GPS AND GIS

Paper Code: ETIT-422	**L**	**T/P**	**C**
Paper: GPS and GIS	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: To study the fundamentals and scope of Global Information System and Global Positioning System.

UNIT- I

Global Information System (GIS): Introduction, scope and benefits of GIS; application areas of GIS; functional components and elements of GIS; geographic objects: scale, accuracy and resolution.

GIS Cartography and Maps: Digital cartography: selection, classification and simplification; exaggeration and symbolization for cartographic abstraction; Types of Maps; map elements: projection, direction, scale and co-ordinates; Geodatabases; GIS map outputs; Topographic mapping.

[T1,T2][No. of Hrs: 11]

UNIT- II

Geographic Data: Spatial and attribute data; vector and raster models; points, lines, polygon features; computed and associated attributes; grids, cells and image data; linking spatial and attributed data.

Geoprocessing: Geographic co-ordinate system: latitudes and longitudes; Geoids Spheroids ellipsoids and datum's; projections and transformations.

[T1,T2][No. of Hrs: 10]

UNIT- III

Global Positioning System (GPS): Introduction; GPS components: systems, scales and codes; error and accuracy of GPS observation; Differential GPS.

Fundamentals of Satellite Orbits: Orbital Mechanics, Constellation Design

Remote Sensing (RS): Introduction; application of RS; electromagnetic radiation; spectral signatures; aerial/satellite image characteristics: spatial, spectral, radiometric and temporal.

[T1,T2][No. of Hrs: 11]

UNIT- IV

Statistics: Spatial statistics; independent and dependent variables; continuous data: sampling, correlation, regression, frequency and descriptive analysis; discrete data.

Interpolation: Characteristic interpolators; deterministic interpolators; evaluating interpolators.

[T1,T2][No. of Hrs: 10]

Text Books:

Note: There is no single textbook for this course. Suggested Readings:

[T1] Burrough, P.A. and R.A. McDonnell, Principles of Geographic Information System, Oxford University Press, Oxford.
[T2] Chang, K.T., Introduction to Geographic Information System, Tata Mc Graw-Hill, New Delhi.
[T3] Heywood, I. et. al., An Introduction to Geographic Infomation Systems, Pearson Education, Delhi.
[T4] Clarke, K., Analytical and Computer Cartography. 2nd Ed., Upper Saddle River.
[T5] Garmin Corporation., GPS Guide for Beginners available at: http://www.garmin.com/manuals/gps4beg.pdf.
[T6] LLiffe, J.C., Datum and Map Projections for remote Sensing, GIS and Surveying. New York : CRC Press.
[T7] Curran,Paul J., Principles of Remote Sensing, Longman, London & New York.
[T8] Lillesand, T. and R. Kiefer, Remote Sensing and Image Interpretation, Wiley, New York.

ADAPTIVE SIGNAL PROCESSING

Paper Code: ETEC-424	**L**	**T/P**	**C**
Paper: Adaptive Signal Processing	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: The aim of the Adaptive Signal Processing course is to present its algorithms and architectures and explain their use in real world applications. As prerequisites it is assumed that students have studied Signals and Systems, DSP and introductory linear algebra. Familiarity with random process theory is also helpful.

UNIT- I

Introduction to Adaptive Systems:- Definitions, Characteristics, Applications, Example of an Adaptive System..

Introduction to Adaptive Filters: - Adaptive filter structures:- issues and examples, Applications of adaptive filters: Channel equalization, active noise control, Echo cancellation, beam forming

Discrete time Stochastic Processes:- Review of Probability and random variables, discrete time random processes, Autocorrelation and covariance structures of discrete time random processes, Yule Walker Equation Power spectral density - properties. Eigen-analysis of autocorrelation matrices.

[T1, R1] [No. of Hours: 10]

UNIT- II

Development of Adaptive Filter Theory & Searching the Performance surface: Introduction to Filtering - Smoothing and Prediction , Linear Optimum Filtering:- Problem statement, Principle of Orthogonality - Minimum Mean Square Error, Wiener- Hopf equations, Error Performance - Minimum Mean Square Error.

Searching the Performance Surface – Methods & Ideas of Gradient Search methods - Gradient Searching Algorithm & its Solution - Stability & Rate of convergence - Learning Curves.

Steepest Descent Algorithms: Gradient Search by Newton's Method, Method of Steepest Descent, Comparison of Learning Curve.

[T1, T2, R1][No. of Hours: 12]

UNIT- III

LMS Algorithm & Applications: Overview - LMS Adaptation algorithms, Stability & Performance analysis of LMS Algorithms - LMS Gradient & Stochastic Algorithms - Convergence of LMS algorithm.

Applications: Noise cancellation – Cancellation of Echoes in long distance telephone circuits, Adaptive Beam forming, Adaptive Channel Equalization

Variants of the LMS Algorithm: - The sign-LMS and the normalized LMS algorithm Block LMS Algorithm.

[T1, T2][No. of Hours: 12]

UNIT- IV

General Least Squares Solution: Least squares solution of general adaptive system; QR algorithm solution.

Recursive Least Squares (RLS) algorithm: RLS formulation; forgetting factors; practical implementations; QR based RLS; numerical stability and integrity issues, Kalman filter & Standard Kalman Filter , Filtering Examples using Kalman filtering,

Adaptive Lattice Filters: Gradient lattice, RLS lattice.

[T1, T2][No. of Hours: 10]

Text Books:

[T1] Adaptive Filter Theory - Simon Haykin, 4th Ed., 2002, Pearson Asia.
[T2] Adaptive Filter – Ali H. Sayeed, Wiley-Blackwell, 2008

Reference Books:

[R1] Adaptive Signal Processing - Bernard Widrow, Samuel D.Strearns, 2005, PE.
[R2] Optimum signal processing: An introduction - Sophocles. J. Orfamadis, 2nd Ed.,1988, McGraw-Hill,
[R3] Adaptive signal processing-Theory and Applications - S.Thomas Alexander, 1986, Springer –Verlag.
[R4] Adaptive Filters – Theory and Applications - B. Farhang-Boroujeny, John Wiley and Sons, 1999.

ROBOTICS

Paper Code: ETMT-402 **L** **T/P** **C**
Paper: Robotics **3** **0** **3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks. 2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.	

Objective: To introduce the foundations of robotics. Also, a course on Robotics must use one or more software to not only visualize the motion and characteristics of robots but also to analyzer/synthesize/design robots for a given application.

UNIT - I

Fundamentals of Robot Technology:
Robot definition, automation and robotics, Robot anatomy, Work volume, Drive systems. Control systems and dynamic performance. Accuracy and repeatability. Sensors and actuators used in robotics. Machine Vision, Robot configurations, Path control. Introduction to robot languages. Applications; Types (Mobile, Parallel); Serial: Cartesian, Cylindrical, etc.; Social Issues

[T1,T2,T3][No. of Hrs: 11]

UNIT - II

Robot Kinematics: Mapping, Homogeneous transformations, Rotation matrix, Forward Kinematics (DH Notation) and inverse kinematics: Closed form solution.
Robot Differential Motion: Linear and Angular velocity of rigid link, Velocity along link, Maipulator jacobian, Statics: Use of jacobian.

[T1,T2,T3][No. of Hrs: 11]

UNIT – III

Robot Dynamics: Lagrangian Mechanics, Lagrangian Formulation and numericals. Dynamics, Newton-Euler Recursive Algorithm, Simulation. Euler-Lagrange Equations of motion/Any one other formulation like using Decoupled Natural Orthogonal Complements (DeNOC)
End effectors: Mechanical and other types of grippers. Tools as end effectors. Robot and effector interface. Gripper selection and design.

[T1,T2,T3][No. of Hrs: 12]

UNIT - IV

Applications for Manufacturing. Flexible automation. Robot cell layouts. Machine interference. Other considerations in work cell design. Work cell control, interlocks. Robot cycle time analysis. Mechanical design of robot links.
Typical applications of robots in material transfer, machine loading/unloading; processing operations; assembly and inspection.

[T1,T2,T3][No. of Hrs: 10]

Text Books:

[T1] R.K. Mittal, I.J. Nagrath, “Robotics & Control”, Tata McGraw & Hills, 2005.
[T2] Mikell P Groover , Mitchell Weiss “Industrial Robotics :Technology, Programming and Application” Tata McGraw & Hills, 2009.
[T3] Saha, S.K., Introduction to Robotics, 2nd Edition, McGraw-Hill Education, New Delhi, 2014

Reference Books:

[R1] John J.Craig; “Introduction to Robotics Mechanics & Control”, Pearson Education, 2004.
[R2] Robert J. Schilling, “Fundamentals of Robotics, analysis & Control”, Prentice Hall (I) P. Ltd., 2002
[R3] Mark W. Spong, Seth Hutchinson, M. Vidyasagar “Robot Modeling and Control” John Wiley 2nd Ed
[R4] J Srinivasan, R.V.Dukkipati, K. Ramji, “Robotics control & programming”, Narosa.
[R5] Ghosal, Ashitava, “Robotics: Fundamental Concepts and Analysis,” Oxford University Press, 2006
[R6] M. Murray, M., Li, Zexiang, Sastry, S.S., “A Mathematical Introduction to Robotic Manipulation,” CRC Press, 1994
[R7] Tsai, L.W., “Robot Analysis: The Mechanics of Serial & Parallel Manipulators,” Wiley 1999

[R8] Niku, S. B., "Introduction to Robotics: Analysis, Systems, Applications", Prentice Hall, 2001

COMPUTER GRAPHICS & MULTIMEDIA

	L	T/P	C
Paper Code: ETIC-428	**L**	**T/P**	**C**
Paper: Computer Graphics & Multimedia	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, the student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The objective of this paper is to learn about the computer graphic and multimedia

UNIT- I

Introduction, Applications areas, Components of Interactive Computer Graphics System. Overview of Input devices, Output devices, raster scan CRT displays, random scan CRT displays. DDA and Bresenham's Line Drawing Algorithms, Bresenham's and Mid Point Circle Drawing Algorithms. Homogeneous Coordinate System for 2D and 3D, Various 2D, 3D Transformations (Translation, Scaling, Rotation, Shear).

[T1,T2][No. of Hrs. 12]

UNIT- II

Clipping Algorithms, Sutherland-Cohen line Clipping Algorithm Bezier Curves, B-Spline Curves. Parallel Projection, Perspective Projection, Illumination Model for diffused Reflection, Ambient light, Specular Reflection Model, Reflection Vector.

[T1,T2][No. of Hrs. 10]

UNIT- III

Shading Models, Flat shading, Gourard Shading, Phong Model. Visible surface detection, Back Face Detection, Depth Buffer (Z-Buffer, A-Buffer) Method. Overview of multimedia: Classification, basic concepts of sound/audio MIDI: devices, messages, software. , Authoring tools, Video and Animation: controlling animation, display and transmission of animation

[T1,T2][No. of Hrs. 11]

UNIT- IV

Data Compression: storage space, coding requirements, Basic compression techniques: run length code, Huffman code, Lempel-Ziv JPEG: Image preparation, Lossy sequential DCT, expanded lossy DCT, Lossless mode, Hierarchical mode. MPEG, Media synchronization, Media Integration, Production Standards.

[T1,T2][No. of Hrs. 11]

Text Books:

[T1] Donald Hearn and M.Pauline Baker, "Computer Graphics C version", Second Edition, Pearson
[T2] Ralf Steinmetz & Klara Nahrstedt, "Multimedia Computing Communication & Applications", Pearson

Reference Books:

[R1] C, Foley, VanDam, Feiner and Hughes, "Computer Graphics Principles & Practice", Second Edition
[R2] R. Plastock and G. Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, McGraw Hill, 2nd edition.
[R3] Fred Halsall, "Multimedia Communications Applications, Networks, Protocols & Standards", Pearson
[R4] David F. Rogers, "Procedural elements for computer graphics", McGraw- Hill.

NEXT GENERATION NETWORKS

Paper Code: ETEC-428
Paper: Next Generation Networks

L	T/P	C
3	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of this course is to provide exposure to the new technologies and services that telecommunication operators have as they create new 3G networks and beyond where multimedia coverage is based on packet switched rather than circuit switched Telephony.

UNIT-I
Introduction to next generation networks. Communicating in the new Era, New Era of Networking, Technologies influencing change, IP Everywhere, Optical fiber anywhere, wireless access, building blocks for NGN, IP Networks, VOIP, Multi service Flexible Networks architecture. VPNs, Optical Networks, Wire line & Wireless Networks, NGN Services, Network Infrastructure convergence, services convergence, from technology push to service pull.

[T1,T2] [No. of Hrs. 11]

UNIT-II
IP Networks ,IP past, present and future, IP influence and confluence, IP version 4, I. P. Version 6, IP Network convergence, LAN Technologies, IP Routing, LAN Switching, WAN's, WAN Technologies and Topologies. Wireless IP LANS, Mobility Networks, Global IP Networks, Global capacity, Globally Resilient IP, Internet – A Network of Networks. Beyond IP, Technology Brief – IP Networks, Business Drivers, Success factors, Applications and Service Value.

[T1,T2] [No. of Hrs. 11]

UNIT-III
Muti service Networks Origin of multi service ATM, Next Generation Multi service Networks, Next Generation Multi service ATM switching, Multi protocol Label switching, Networks, Frame Based MPLS, Cell based MPLS, MPLS services and their benefits, multi service provisioning platforms (MSPP) & Multi service switching platform (MSSP).

[T1,T2] [No. of Hrs. 11]

UNIT-IV
NGN Applications Internet connectivity, e-commerce, call center, third party application service provision, UMTS, WAP, WiMAX, integrated billing, security and directory enabled networks.

[T1,T2] [No. of Hrs. 11]

Text Books:
[T1] Neill Wilkinson, "Next Generation Networks Services, Technologies and Strategies", Wiley.
[T2] Robet Wood, "Next Generation Network Services", Pearson

Reference Books
[R1] Next Generation Telecommunications Network, Parliament office of Science and Technology (Postnote). Dec 2007, No. 296, Ref. http://www.parliament.uk/briefing-papers/POST-PN-296.pdf
[R2] Huber, J.F.' " Mobile Next Generation Networks", IEEE Multimedia Vol. 11, Issue I Jan- March 2004.
[R3] J.C. Crimi, "Next Generation Network (NGN) Service", A Telecoolia Technologies white paper; refer www.telecodia.com
[R4] International Conference on Next Generation Networks & Basestations Tackles LTE, WiMAX, Femtocells, Backhaul, Spectum Re-farming and Also Goes. 'Green'.http://www.thefreelibrary.com/International+Conference+on+Next+Generation+Networks+%26+Basestations...-a0176872977
[R5] Carugi, M.; Hirschman, B.; Narita, A., "Introduction to the ITU-T NGN focus group release 1: target environment, services, and capabilities,"Communications Magazine, IEEE , vol.43, no.10, pp. 42-48, Oct. 2005 doi: 10.1109/MCOM.2005.1522123 URL:http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1522123&isnumber=32552http://encyclopedia2.thefreedictionary.com/LTE

[R6] Iti Saha Misra, "Wireless Communication and Networks 3G and beyond", McGraw Hill Edu. (India)
[R7] International Journal of Next - Generation Network (IJNGN), ISSN: 0975-7023 (Online); 0975-7252 (Print); http://www.airccse.org/journal/ijngn/ijngn

SATELLITE AND ANTENNA LAB

	L	T/P	C
Paper Code: ETEC-452	**L**	**T/P**	**C**
Paper: Satellite and Antenna Lab	**0**	**2**	**1**

List of Experiments:

1. To setup an active and passive satellite link and demonstrate Link fails operation.
2. Study base-band Analogue signal parameters in Satellite link.
3. To measure S/N ratio, FM improvement and G/T.
4. To measure propagation delay of signal in a Satcom link.
5. To verify power distance relation.
6. To measure reflection coefficient/return loss of the given antenna.
7. To plot radiation pattern of the antenna.
8. To study Reciprocity Theorem.
9. To study current distribution along the element of an antenna.
10. To study polarization of an antenna.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

COMPUTER GRAPHICS & MULTIMEDIA LAB

	L	T/P	C
Paper Code: ETEC-454(ELECTIVE)	**L**	**T/P**	**C**
Paper: Computer Graphics & Multimedia Lab	**0**	**2**	**1**

List of Experiments

1. Study of Fundamental Graphics Functions.
2. Implementation of Line drawing algorithms: DDA Algorithm, Bresenham's Algorithm
3. Implementation of Circle drawing algorithms: Bresenham's Algorithm, Mid Point Algorithm.
4. Programs on 2D and 3D transformations
5. Write a program to implement cohen Sutherland line clipping algorithm
6. Write a program to draw Bezier curve.
7. Using Flash/Maya perform different operations (rotation, scaling move etc..) on objects
8. Create a Bouncing Ball using Key frame animation and Path animation.

NOTE:- At least 8 Experiments out of the list must be done in the semester.