Proposed Syllabus

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	I		
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
2BS101	Mathematics – I	3	1	4	0	0	0	3	1	4	0	0	0	40	60	100	0	0	0
2ES101	Engineering Graphics	3	0	3	1	0	1	3	0	3	2	0	2	40	60	100	30	20	50
2ES103	Basic Electrical Engineering	3	0	3	1	0	1	3	0	3	2	0	2	40	60	100	30	20	50
2ES109	Basics of Web Technology	2	1	3	1	0	1	2	1	3	2	0	2	40	60	100	30	20	50
2ES110	IT Peripherals & Tools	0	0	0	2	0	2	0	0	0	4	0	4	0	0	0	30	20	50
2HS102	Seminar	0	0	0	2	0	2	0	0	0	4	0	4	0	0	0	30	20	50
2AC103	Environmental Studies and Disaster Management	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0
Total		**11**	**2**	**13**	**7**	**0**	**7**	**13**	**2**	**15**	**14**	**0**	**14**	**160**	**240**	**400**	**150**	**100**	**250**

Audit Course:

- Environmental Studies and Disaster Management should be taught as a mandatory audit subject in either Semester I or II.
- The online courses based on MOOCS are to be considered as an Audit Course.

* To be decided by University

Proposed Syllabus

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	II		
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
2BS102	Mathematics-II	3	1	4	0	0	0	3	1	4	0	0	0	40	60	100	0	0	0
2BS103	Physics	2	0	2	1	0	1	2	0	2	2	0	2	40	60	100	30	20	50
2HS101	Communication Skills	2	0	2	1	0	1	2	0	2	2	0	2	40	60	100	30	20	50
2ES102	Workshop Manufacturing Practice	0	0	0	2	0	2	0	0	0	4	0	4	0	0	0	30	20	50
2ES104	Programming for Problem Solving	2	0	2	2	0	2	2	0	2	4	0	4	40	60	100	30	20	50
2ES111	IT Workshop	0	0	0	2	0	2	0	0	0	4		4	0	0	0	30	20	50
2AC*	Audit Course-II	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0
Total		**9**	**1**	**10**	**8**	**0**	**8**	**11**	**1**	**12**	**16**	**0**	**16**	**160**	**240**	**400**	**150**	**100**	**250**

Audit Course:

- Environmental Studies and Disaster Management should be taught as a mandatory audit subject in either Semester I or II.
- The online courses based on MOOCS are to be considered as an Audit Course.

* To be decided by University

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	I	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2BS101	Subject Name	Mathematics-I

Teaching scheme (Per week)	Lecture(DT)		Practical(Lab.)		Total	Examination scheme (Marks)	CE	SEE	Total
	L	TU	P	TW					
Credit	03	01	--	--	04	Theory	40	60	100
Hours	03	01	--	--	04	Practical	--	--	--

Pre-requisites:

Basic knowledge of Differentiation and Integration

Learning Outcome:

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

- Understand mathematical basic preliminaries.
- Express physical phenomenon in mathematical formulation.
- Apply Differential & Integral Calculus in formal representation of various computing constructs.
- Recognize the importance of mathematics for analysis in engineering problems.

Theory syllabus

Unit	Content	Hrs
1.	**Differential Calculus :** Review of the prerequisites such as limits of sequences and functions, continuity, uniform continuity and differentiability. Successive differentiation, Leibniz's theorem (without proof), Taylor's & Maclaurin's expansions of single variable, Rolle's theorem, Mean value theorems, Indeterminate forms.	**12**
2.	**Partial differentiation and its applications :** Partial and total differential coefficient, Euler's theorem, Transformations, Geometrical interpretation of partial derivatives, Tangent plane and Normal line, Jacobians, Taylor's expansion for two variables, Errors and approximations, Maxima and Minima of functions of two variables ,Lagrange method of undetermined multipliers to determine stationary values.	**11**
3.	**Integral Calculus :** Reduction Formulae: Reduction formulae of the type $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \sin^m x \cos^n x\,dx$, $\int \tan^n x\,dx$ and $\int \cot^n x\,dx$. Beta & Gamma function, Error function, Elliptic integrals. Application of integration- Length of a curve, Area of a bounded region, volume & surface area of a solid of revolution for Cartesian, parametric & polar form.	**12**
4.	**Multiple integrals :** Double integral, change of order of integration, transformation of variables by Jacobian only for double integration, change into polar co-ordinates in double integrals only, Triple integral, Application of multiple integration to find areas, volumes, C.G., M.I. and mean values.	**11**
	TOTAL	46

Practical content

Text Books

1.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
2.	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

Reference Books

1.	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
2.	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
3.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology			Branch/Spec.	ALL
Semester	I			Version	2.0.0.0
Effective from Academic Year		2018-19		Effective from the batch Admitted in	July 2018
Subject code	2ES101	Subject Name		Engineering Graphics	

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:

Learning Outcome:

After learning this course, student should be able to:

- To know and understand the conventions and the method of engineering drawing.
- Interpret engineering drawings using fundamental technical mathematics.
- Construct basic and intermediate geometry.
- To improve their visualization skills so that they can apply these skill in developing new products.
- To improve their technical communication skill in the form of communicative drawings.
- Comprehend the theory of projection.

Theory syllabus

Unit	Content	Hrs
1	**Introduction:** Importance of Engineering Drawing, Engineering Drawing, Instruments and uses, B.I.S and I.S.O. Conventions for drawings, Use of plane scales and Representative Fraction	3
2	**Loci of Point:** Path of the points moving on simple arrangements and simple Mechanism, Slider Crank Mechanism, Four bar Chain Mechanism etc.	4
3	**Engineering Curves:** Classification of Engineering Curves, Construction of Conics curves, Cycloidal Curves, Involutes and Spirals along with normal and tangent to each curve	8
4	**Projection of Points and Straight Lines:** Introduction to principal planes of projections, Notation System- Points in First, Second, Third and Fourth quadrants, Projections of line Parallel to Two and Perpendicular to one of the principal planes, Line parallel to one and inclined to two principal planes, Line inclined to all the three principal planes, True length of the line and its inclination with the reference planes.	5
5	**Projection of Planes:** Concept of different planes, Projections of planes with its inclination to one principal plane and with two principal planes. Concept of auxiliary plane method for projections of the plane.	4
6	**Projection of Solids and Sections of Solids:** Classifications of Solids, Projections of right and regular solids with their axis Parallel to Two and Perpendicular to one of the principal planes, axis parallel to one and inclined to two principal planes, axis inclined to all the three principal planes. Section of solids and the true shape of the section.	6

7	**Development of surfaces:** Methods of development of lateral surface of right solids, Parallel line development, Radial line development.	4
8	**Interpenetration of Solid:** Line of interaction, line/generator method and section plane method, intersection of two prisms, two cylinder, interaction of cone and cylinder.	3
9	**Orthographic Projections & Sectional Orthographic Projections**: Principle of projection, Principal planes of projection, Projections from the pictorial view of the object on the principal planes for View from Front View from Top View from Side using first angle projection method and third angle projection method, Full Sectional View.	4
10	**Isometric Projections and Isometric View or Drawing:** Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing.	4

Practical content
Draw Practice sheet. Draw a sheet on Engineering Curves. Draw a sheet on Orthographic Projection. Draw a sheet on Projection of Point and Line. Draw a sheet on Projection of Plane. Draw a sheet on Isometric projection. Draw a sheet on Free hand Sketch. Draw a sheet on Graph and charts.

Text Books	
1	P. J. Shah "Engineering Graphics"S. Chand & Company Ltd., New Delhi, 2014.
2	P. S. Gill "Engineering Drawing" S.K.Kataria & sons, Delhi, 13th Edition 2016

Reference Books	
1	Arunoday Kumar "Engineering Graphics – I and II", Tech – Max Publication, Pune, 3rd Edition 2010.
2	N. D. Bhatt "Elementary Engineering Drawing", Charotar Publishing House, Anand, 2013.
3	R. K. Dhawan "Engineering Drawing", S.Chand & Company Ltd., New Delhi, 1997.
4	K. Venugopal "Engineering Drawing and Graphics", New Age International Publication, 5th Edition
5	T. Jeyapoovan "Engineering Drawing & Graphics using Auto CAD 2000",Vikas Publishing House Pvt. Ltd., New Delhi, 5th Edition 2011.
6	D. A. Jolhe "Engineering Drawing with an Introduction to AutoCAD", Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2007.

ICT/MOOCs references	
1	https://www.youtube.com/watch?v=n5Ba6OtDpTU (Introduction of Engineering Graphics)
2	https://www.youtube.com/watch?v=VjvAGUkK8Nw (Loci of Point)
3	https://www.youtube.com/watch?v=pr68iKcJy3g&list=PL0onWcajDQkzkvJXJQbyNxZwyOCl5-vn0 (Engineering Carves)
4	https://www.youtube.com/watch?v=L0bkxRl1joI (Projection of Points and Straight line)
5	https://www.youtube.com/watch?v=7-zq81tDwmM&index=2&list=PLIhUrsYr8yHx7TVB51jN3HZVyW3R6RiBg&pbjreload=10 (Projection of Planes)
6	https://www.youtube.com/watch?v=9hD7q2CqAOA (Section of Solid)
7	https://www.youtube.com/watch?v=zIblZ7dt3Dk (Development of Surface)
8	https://www.youtube.com/watch?v=9UMxr7BT8CE (Interpenetration of Solid)
9	https://www.youtube.com/watch?v=f1Hdtf_iAWk (Orthographic Projection Problem)
10	https://www.youtube.com/watch?v=sSuyM60s7eA (Isometric view)

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Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	I / II	Version	2.0.0.0
Effective from Academic Year	2018-2019	Effective for the batch Admitted in	July 2018
Subject code	2ES103	Subject Name	Basic Electrical Engineering

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	3	Practical	30	20	50

Pre-requisites:

-

Learning Outcome:

On successful completion of the subject, students should be able to

- To understand and analyze basic electrical and magnetic circuit.
- Apply basic electric laws in solving circuit problems and able to perform power calculation.
- Identify the types of capacitors and know the practical applications of various types of capacitors.
- Understand the basic concepts of Electromagnetic Induction.
- Understand the working principles of transformer and induction motor.
- To introduce the components of low voltage electrical installation.

Theory syllabus

Unit	Content	Hrs
1	**D.C. Circuits :** Voltage and current Sources, Source Transformation, Star-Delta Transformation, Application of Kirchhoff's Law, Superposition Theorem, Thevenin's Theorem and Norton's Theorem.	**08**
2	**Capacitor :** Types of Capacitor, Capacitance of Multiple Parallel Plate Capacitor, Energy stored in a Capacitor, Charging & Discharging of Capacitor & Time constant.	**04**
3	**Magnetic circuit :** Law of Magnetic Circuit, Series & parallel Magnetic Circuits and Calculation, Comparison of magnetic & Electric Circuit.	**04**
4	**Electromagnetic Induction :** Review of Faraday's Law, Lenz's Law, Self & Mutual Inductance, Inductance of coupled circuits, Rise and Decay of Current in Inductive circuit.	**05**
5	**AC Circuits:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (Series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections, measurement of power in 3-phase circuits.	**10**
6	**Transformer:** Magnetic materials, BH characteristics, working principle, construction, core and shell type transformer, step up and step down transformer.	**04**
7	**Induction motor:** Classification of A.C. motors, construction and working of three-phase motor, production of rotating field, Synchronous speed, Actual speed, Slip.	**04**

8	**Electrical Installations:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of wires and Cables, Types of Batteries, Important Characteristics for Batteries, Elementary calculations for energy consumption and power factor improvement.	**06**

Practical content	
Practicals, assignments and tutorials are based on above syllabus.	
Text Books	
1.	U.A. Patel, “Elements of Electrical & Electronics Engineering”, Atul Prakashan.
2.	B.L.Thereja,”Electrical Technology “, S. Chand Volume-I.
3.	B.L.Thereja,”Electrical Technology “, S. Chand Volume-II.
Reference Books	
1.	V.N. Mittal,” Basic Electrical Engineering”, Tata Mc Graw hill, New Delhi.
2.	V.K.Mehta,” Principles of Power Systems “, Pub. By Chand.
3.	D.P. Kothari and I.J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
4.	D.C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
5.	L.S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6.	V.D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.
ICT/MOOCS	
1.	http://www.nptel.ac.in/courses/108105053/(D.C. Circuits, Capacitor, Magnetic circuit Electromagnetic Induction, AC Circuits, Transformer, Induction motor)
2.	https://www.youtube.com/watch?v=9XOnqmnKYSg(Battrey and cells)

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	I	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2ES109	Subject Name	Basics of Web Technology

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	1	1	-	4	Theory	40	60	100
Hours	2	1	2	-	5	Practical	30	20	50

Pre-requisites:

No prerequisite is required.

Learning Outcome:

Upon completion of this course, students will acquire knowledge about:

- Be able to create simple web pages using HTML and CSS.
- Understand basics of internet programming.
- To have hands on experience for HTML using CSS, this will help them to create websites.

Theory syllabus

Unit	Content	Hrs
1.	**Introduction:** Introduction of Internet, Introduction of Static & Dynamic web pages, Web server & web pages, browser, browser plugin best practices for internet.	02
2.	**HTML Basic:** Introduction of HTML, Elements of HTML, HTML Basic Tags, HTML Formatting, HTML Entities, HTML Links, HTML Images, HTML Frames, HTML Tables, HTML Lists, HTML Forms, HTML Background, HTML Colors, Meta-tags and search engine.	06
3.	**Cascaded Style Sheet:** CSS Introduction, CSS Syntax, Setting Background Text, Font, Border, Margin, Padding, List, Dimension Classification, Positioning, Pseudo-class, Pseudo-element, CSS Media Types, External, Internal and Inline style sheet.	07
4.	**Introduction to HTML5 & CSS3:** Introduction to HTML5 and its tags, Introduction to CSS3 and its properties.	07
5.	**Introduction to Java script and Bootstrap**	04
6.	**Introduction to Web Design and Development Tool:** Design and Deployment of Website.	04

Practical content

- Experiments would be carried out based on syllabus which includes above topics.
- Programming Assignment Manual will be prepared and will be the reference for the questions, assignments, evaluation and the laboratory practices.

Text Books

1.	Learning Web Design by Jennifer Niederst Robbins, 3rd Edition, O'Reilly
2.	HTML 5 and CSS 3.0 to the Real World by Alexis Goldstein, Sitepoint publication.

Reference Books

1.	Teach yourself HTML in 24 hours, By Techmedia
2.	CSS Cook book By Christopher Schmitt, O'Reilly publication.
3.	Introduction to web Technology, By Uttam K. Roy
4.	Introduction to Internet and HTML scripting, By Bhaumik Shroff
5.	Web Applications : Concepts and Real World Design, Knuckles, Wiley-India
6.	Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel Pearson.

ICT References

1.	https://www.w3schools.com/html/html_basic.asp
2.	https://www.tutorialspoint.com//html5/html5_discussion.htm
3.	http://nptel.ac.in/courses/106105084/13
4.	https://getbootstrap.com/
5.	https://www.w3schools.com/html/html5_intro.asp

6.	https://www.w3schools.com/js/default.asp
7.	https://www.tutorialspoint.com//css/css_discussion.htm

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Programme	Bachelor of Technology					Branch/Spec	Computer Engineering / Information Technology		
Semester	I					Version	2.0.0.0		
Effective from Academic Year			2018-19			Effective for the batch Admitted in		July 2018	
Subject code	2ES110		Subject Name			IT Peripherals & Tools			
Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	0	0	2	0	2	Theory	00	00	00
Hours	0	0	4	0	4	Practical	30	20	50

Pre-requisites:

- No Prerequisite is required.

Learning Outcome:

- Understand concept and methodology of different parts of computer and their assembling.
- Know various operating systems installation, commands and scripting in OS and open source technologies.
- Familiar with basic concepts of batch file programming and its uses.
- Awareness of social networking and government e-services.
- Be able to understand the importance of open source technology.

Practical Content:

Unit	Content	Hrs
1.	**Introduction to Computer Hardware** Definition of computer, Computer hardware, software and firmware, history of computer, classification of computer, basic parts of digital computer	04
2.	**Display unit** Types of monitor: LCD, LED, OLED, Faults of monitor, Display card **Keyboard , Mouse and other Input devices** Types of keyboard: Wired and Wireless Wired: Din type, PS/2, USB, Wireless: Bluetooth, Infrared(IR), RF Types of mouse: Wired and Wireless Wired: Serial port, PS/2, USB, Wireless: Bluetooth, Infrared(IR), RF **Printer** General features of printer, Classification of printer, Impact printer: Dot matrix, ink jet printer, Laser Printer	04
3.	**Power supply & Storage Devices** SMPS: Working, output connectors, UPS, Stabilizer Types of Memory: Primary storage: Registers, Cache, RAM Other Storage Devices: Floppy, Hard Disk, CD, DVD, Flash **Motherboard** Types of motherboard, Functional block diagram of motherboard, CPU and supporting chips, introduction of CPU architectures, BIOS, CMOS setup, Faults of motherboard **Assembling the computer system** Study of configuration of computer system, introduction of computer assembling, Different types of cables, Assembling and Disassembling	06
4.	**Computer troubleshooting** Hardware troubleshooting and repairing, Software troubleshooting and dealing with various error messages.	08
5.	**Installation and using various Operating Systems** Different types of Operating System, Installation of OS on a single machine (Dual Boot) **DOS Commands** Internal Commands: CLS, DATE, VER, VOL, DIR, COPY CON, TYPE, MKDIR, CHDIR	08

	(CD), RMDIR, RENAME, DEL, MOVE, COPY, PROMPT, DOSKEY, PATH External Commands: ATTRIB, FORMAT, CHKDSK, SCANDISK, TREE, XCOPY. Use of commands with Wild Card Characters: **?** (Question Mark) and *****(Asterisk)	
6.	**LINUX Commands and scripting** Introduction to basics of Linux OS and its variants, what is shell?, Commands: clear, man, who, date, who am i, cal, echo, ls, mkdir, cd, cd.., rmdir, pwd, cat, rm, cp, mv, chmod, umask, grep, ps. Prepare scripts using control structures and loops for various actions to perform.	06
7.	**Professional Document writing using Word Processing Tool** Microsoft Word: Basic menu introduction, Page layout-Margin-Header Footer, Page break, Insert symbols and Equations, Mail Merge, Preparation of Index, Automatic Index generation, Two columns research paper format-Footnote-Cross reference. **Data Processing using Spread Sheet** Microsoft Excel: Cell Address, Row, Column, Header and Footer, Fill handle and drag-&-drop, Format cells, Conditional formatting, Formulas and Functions, Validation, Chart with various options, Filter, Sort. **Creating Dynamic and Informative Slide Show using Presentation Software** Microsoft PowerPoint: Slide layout, Slide design (Proper selection based on audience), Header and Footer in slides, Slide transition, Slide Master, Insert Picture-Smart Art, Insert animations to different objects, Hide Slide, Rehearse Timings, Record slide show. How to prepare professional presentation	08
8.	**Batch File Commands & Programming in Windows** Batch file commands: CLS, %1, ECHO, SET, CALL, :LABEL, EXIT, GOTO, IF, FOR, REM, etc. Create batch files for various purposes and execute it, study of AUTOEXEC.BAT file.	04
9.	**Social Networking & Google Applications** Use of twitter, Facebook, LinkedIn. Google search, Google drive services etc..	04
10.	**Government e-Services Awareness** Online Financial Transaction platforms, Apply for Passport online, Aadhar card Access, Apply for Driving license and many more.	02
11.	**Git and GitHub**	06
Reference Books		
1.	IBM - PC And Clones Govindarajulu, Tata McGraw Hill	
2.	The Complete PC Upgrade and Maintenance Guide, 16th Edition, Mark Minasi, Quentin Docter, Faithe Wempen, SYBEX publication	
ICT References		
1.	https://www.cybrary.it/course/comptia-aplus/	
2.	https://alison.com/course/abc-it	
3.	https://www.lynda.com/IT-and-Hardware-training-tutorials/5776-0.html	

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	I	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2HS102	Subject Name	Seminar

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	0	0	2	-	2	Theory	-	-	-
Hours	0	0	4	-	4	Practical	30	20	50

Pre-requisites:

Not applicable

Learning Outcome:

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

- Build their presentation skills on emerging topics of computer engineering and information technology.
- Give presentation to the large audience without any stage fear.

Theory syllabus

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Practical content

Unit	Content	Hrs
1	Students have to choose seminar topic from recent trends and technology and at the end of semester they have to give presentation	60

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	I / II	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2AC103	Subject Name	Environmental Studies and Disaster Management

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	00	00	00	00	00	Theory	00	00	00
Hours	02	00	00	00	02	Practical	00	00	00

Pre-requisites:

Environmental Studies and Disaster Management

Learning Outcome:

Upon completion of this course, students will acquire knowledge about

- Understand the natural environment and its relationships with human activities.
- Characterize and analyze human impacts on the environment.
- Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.

Capacity to integrate knowledge and to analyse, evaluate and manage the different public health aspects of disaster events at a local and global levels.

Theory syllabus

Unit	Content	Hrs
1.	**Introduction to Environment:** Definition, Components of Environment, Relationship between different components, Man-Environment relationship, Impact of Technology on the environment, Environmental Degradation, Sustainable Development, Environmental Education.	05
2.	**Ecology & Ecosystems:** Introduction: Ecology- Objectives and Classification, Concepts of an ecosystem- structure & function of ecosystem, Components of ecosystem- Producers, Consumers, Decomposers, Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem: (a) Forest ecosystem (b) Grassland ecosystem , (3) Desert ecosystem, (4) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	06
3.	**Environmental Pollution:** **Air Pollution:** Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like SPM, SO_2, NO_X. **Noise Pollution:** Introduction, Sound and Noise measurements, Sources of Noise Pollution, Ambient noise levels, Effects of noise pollution, Noise pollution control measures. **Water Pollution:** Introduction – Water Quality Standards, Sources of Water Pollution, Classification of water pollutants, Effects of water pollutants **Current Environmental Global Issues:** Global Warming and Green Houses Effect, Acid Rain, Depletion of Ozone Layer.	06
4.	**Energy Resources:** Renewable Resources, Nonrenewable Resources, Indian Scenario, Destruction versus Conservation.	03
5.	**Renewable Resources, Nonrenewable Resources, Indian Scenario, Destruction versus Conservation.** Introduction, Types of Natural Disasters, Accidental Disasters, Impact of Disasters on Trade and International Trade.	04
6.	**Types of Disaster** Introduction, Earthquakes, Tornadoes, Floods, Tsunami, Volcanoes, , Forest Fires, Severe,	06

	Landslides, Epidemics and Insect Infestations, Types of Technological Hazards, Social Disasters, Components of Disaster Management, Government's Role in Disaster Management through Control of Information, Actors in Disaster Management.
Practical content	

Text Books	
1.	Basics of Environmental Studies by Dr. N. S. Varandani, Books India Publications.
2.	Disaster Management by MukeshDhunna, Vayu Education of India, Delhi Publication
Reference Books	
1.	Environmental Studies by R. Rajagopalan, Oxford University Press Publication.
2.	Environmental Science by Richard T Wright & Bernard J Nebel, Prentice Hall India Publication.
3	Environmental Science by Daniel B Botkin& Edward A Keller, Wiley Publications.
Reference ICT/MOOCs	
1.	http://www.nptelvideos.com/civil_engineering/environmental_air_pollution_video_lectures.php
2.	https://www.geo.lu.lv/fileadmin/user_upload/lu_portal/projekti/gzzf/Vides_zinatne_kursi/2014/Eng_1000/15.LECTURE-Natural_disasters__Compatibility_Mode_.pdf
3.	https://www.slideshare.net/PIRATERHINO/disaster-management-ppt
4.	http://nptel.ac.in/courses/105104099/
5.	https://www.iare.ac.in/sites/default/files/lecture_notes/dm%20notes.pdf

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	II	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2BS102	Subject Name	Mathematics-II

Teaching scheme (Per week)	Lecture(DT)		Practical(Lab.)		Total	Examination scheme (Marks)	CE	SEE	Total
	L	TU	P	TW					
Credit	03	01	--	--	04	Theory	40	60	100
Hours	03	01	--	--	04	Practical	--	--	--

Pre-requisites:

Basic knowledge of Matrix operations and Vectors

Learning Outcome:

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

- Understand mathematical basic preliminaries.
- Express physical phenomenon in mathematical formulation.
- Apply Matrix algebra in formal representation of various computing constructs.
- Recognize the importance of vector space & linear transformation for analysis in engineering problems.

Theory syllabus

Unit	Content	Hrs
1.	**Matrix Algebra:** Review of algebra of matrices & elementary transformations Rank of a matrix, inverse of a matrix by Gauss-Jordan method, normal form of a matrix, Solution of system of algebraic simultaneous equations, Linear dependent and Linear independent vectors. Eigen values and Eigen vectors, Eigen values and Eigen vectors of : Symmetric, Skew symmetric, Hermitian, Skew Hermitian, Unitary and Normal matrix, Algebraic and Geometric multiplicity, Diagonalization ,Spectral theorem for real symmetric matrices, Application of Quadratic forms.	**22**
2.	**Vector Space :** Vectors in R^n and its properties ,Dot product ,Norm and Distance properties in R^n, Pythagorean theorem in R^n , Definition and Examples of vector spaces, Vector subspace, Linear Independence and dependence, Linear span of set of vectors, Basis of subspaces, Extension to basis.	**10**
3.	**Linear Transformation :** Definition and basic properties, Types of linear transformation (Rotation, reflection, expansion, contraction, shear, projection), Matrix of linear transformations, Change of basis and similarity, Rank nullity theorem	**09**
4.	**Infinite Series :** Definition, Comparison test, Cauchy's integral test, ratio test, root test, Leibniz's rule for alternating series, power series, range of convergence, uniform convergence.	**05**
	TOTAL	46

Practical content

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
2. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

Reference Books

1. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

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Programme	Bachelor of Technology	Branch/Spec	ALL
Semester	I / II	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2BS103	Subject Name	Physics

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	--	1	--	3	Theory	40	60	100
Hours	2	--	2	--	4	Practical	30	20	50

Pre-requisites: --

Learning Outcome:

After successful completion of course, students will be able to:

- understand necessary parameters of different materials in different domains.
- demonstrate the behavior of material in different fields based on their properties.
- enrich their experimental knowledge.
- enhance practical capability and skills for modules using different materials and selection of material for system designs.

Theory syllabus

Unit	Content	Hrs
1.	**Thermal Physics** Introduction, thermometry, resistance thermometer, thermoelectric conduction, convection, radiation, thermal conductivity of material.	**3**
2.	**Optics** Introduction, different theories based on the properties of light, reflection, refraction, classification of fibers, absorption, dispersion, Lasers and LED, its operation and applications.	**8**
3.	**Acoustics** Introduction, parameters associated with sound wave, doppler effect, ultrasonic and its applications	**4**
4.	**Magnetics** Magnetic moment, Magnetic dipole, Magnetic Filed strength, Magnetic flux density, Intensity of magnetization, Magnetic dipole moment, Magnetic field Intensity, magnetic permeability, magnetic susceptibility, Bohr magnetron, classification of magnetic materials, , hysteresis, Skin effect, application of magnetic materials.	**4**
5.	**Semiconductor Physics** Conductors, Insulator, semiconductors, silicon crystals, intrinsic semiconductor, doping, type of semiconductor, biasing, breakdown, energy level and hill, barrier potential.	**6**
6.	**Modern Physics** Introduction to nucleus, application of plasma physics, superconductive materials Nanomaterials, Bio-materials, X-rays.	**5**

Practical content

Practicals are based on above contents.

Text Books	
1	“Engineering Physics” by V Rajendran (Tata McGraw Hill Education).
2	“Modern Engineering Physics” by Vasudeva (S. Chand Publication).
3	“Electronic Principles” by A. P. Malvino (Tata McGraw Hill Education).
Reference Books	
1	“Engineering Physics” John Wiley & Sons.
2	“Engineering Physics” by Naidu (Pearson Education India Publication).
3	“A Text Book of Engineering Physics” by M. N. Avadhunuly, P.G. Kshirsagar (S. Chand Publication).
4	Moocs : 1. http://nptel.ac.in/courses/122107035/1 2. http://nptel.ac.in/courses/122107035/8

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Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	I / II	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2HS101	Subject Name	Communication Skills

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	02	00	01	00	03	Theory	40	60	100
Hours	02	00	02	00	04	Practical	30	20	050

Pre-requisites:

Basic acquaintance with English Language and English Grammar

Learning Outcome:

On successful completion of the course, the students will be able to:

- understand the basics of communication and its significance in the career as engineer.
- comprehend and express any idea/thought in an effective manner using the four basic communication skills: Listening, Reading, Speaking, Writing (LSRW).
- make effective presentation, face job interview and participate in group communication fruitfully.
- handle various professional communication situations more impressively and effectively.

Theory syllabus

Unit	Content	Hrs
1.	**Basics of Communication** Definition, Principles, Process, Functions, Methods and Barriers to communication with remedies	04
2.	**Vocabulary and Verbal Ability** Parts of Speech, Verb Forms, Collocations, Words often Confused, One Word Substitutes, Word Analogies, Para jumbles, Verbal Ability for competitive exams, Practice Exercises for Vocabulary and Verbal Ability	04
3.	**Receptive Language Skills: Listening & Reading** **Listening Skill:** Significance of listening comprehension for engineers, definition, process and pre-requisites of effective listening, hearing vs listening, modes of listening, traits of a sharp listener, Practice of Listening Comprehension **Reading Skill**: Significance of reading comprehension for engineers, definition, types and purposes of reading, useful strategies for effective reading comprehension, Practice of Reading Comprehension	06
4.	**Productive Language Skill - I: Speaking** **Presentation Skills:** Significance of presentation skills for engineers, definition and components, brainstorming and steps to prepare effective presentation, Boredom factors and its avoidance, Practice of Oral Presentation **Group Discussion and Debate:** Definition and significance of group discussion, pre-requisites, objectives and characteristics of group discussion, group discussion in organization and group discussion as a part of selection process, Practice of Group Discussion **Job Interviews:** Definition, significance, purpose and types of interviews, types of job interview, stages of job interview, process of job interview, success and failure factors in job interview, Practice through Mock Interview	08
5.	**Productive Language Skill - II: Writing** Informal vs. formal writing, significance of written communication ability for success in professional career, features of effective written communication (7 Cs), features that make	08

	writing effective (appearance and language) **Formal Writing:** **(A) Official and Business Letters:** significance, characteristics, layout, letter to various authorities, making inquiry, inviting quotation, lodging complaint, offering adjustment, sales promotion, Practice of preparing drafts of different types of letters **(B) Advertisement and Press Release:** significance, types, lay-out, Practice of preparing various drafts of advertisements and press-release **(C) Resume:** description, layout, dos and don'ts, Practice of Resume writing **(D) Notice and e-mail:** Significance, Layout, Practice of drafting Notice and e-mails	
	Total Hours	**30**
Practical content		
The Praticals will be in the form of Tutorials which will be designed with explanation and practice exercises.		
Text Books		
1.	Meenaksi Raman & Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford University Press	
Reference Books		
1.	M Ashraf Rizvi, Effective Technical Communication, Tata McGraw-Hill Education	
2.	V. K. Jain & Omprakash Biyani, Business Communication, S. Chand & Company	
3.	Raymond Murphy, Essential English Grammar: A Self-study Reference and Practice Book for Elementary Students of English with Answer, Cambridge University Press	
4.	AndreaJ. Rutherford, Basic Communication Skills for Technology, Pearson Education Asia	
5.	Cambridge 1 to 12, Cambridge University Press	

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Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	I / II	Version	2.0.0.0
Effective from Academic Year	2018-2019	Effective for the batch Admitted in	July 2018
Subject code	2ES102	Subject Name	Workshop Manufacturing Practice

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	0	0	2	0	2	Theory	0	0	0
Hours	0	0	4	0	4	Practical	30	20	50

Pre-requisites:

-

Learning Outcome:

On successful completion of the subject, students should be able to

- To acquire measuring skills.
- To acquire practical skills in the trades.
- To provides the knowledge of job materials in various shops.
- To provides the knowledge of core technical subjects for making and working of any type of project.
- Students will be able to analyze the material on the basis of their properties and thus assigning different weight age to their use for technical purposes.
- Understand modern manufacturing operations, including their capabilities, limitations, and how to design economically.
- Gain insight into how designers influence manufacturing schedule and cost, and cost of different components.
- Learn how to analyze products and be able to improve their manufacturability and make the cost effectively.
- The students will be able to assess the working conditions of any machining process and thus calculating the actual forces involved.
- Students are expected to learn the physical recognition of different electrical & Electronics
  Components like Resistances, Inductances, Capacitances, diodes, transistors and their ratings.
- Students are expected to connect electric circuits, and be able to use electric instruments to
  perform experiments
- Students are expected to be able to check ratings of commonly used house hold electrical Appliances.
- Students are expected to be able to understand the different wiring schemes used around them likein their homes, shops, college, etc.
- Students are expected to recognize the importance of safety while dealing with electrical Equipments.
- Students are expected to be able to identify and solve the small problems occurring in their householddevices like fan, iron, washing machine, electric kettle, mixer, etc.

▪ Students are expected to be able to calculate their energy bill and apply some energy conservationto reduce it.		
Theory syllabus		
Unit	**Content**	**Hrs**
Topics (A) Mechanical		
1	**Instruction and Demonstration:** Instruction should be given for each of following shops which include importance of the shop in engineering, new materials available, use of each tool / equipment, methods of processing any special machines, power required etc.	**02**
2	**Carpentry Shop:** Study of tools & operations and carpentry joints, Simple exercise using jack plane, Simple exercise on woodworking lathe.	**04**
3	**Fitting Shop**: Study of tools & operations, Simple exercises involving fitting work, Make perfect male-female joint, Simple exercises involving drilling/tapping/dieing.	**04**
4	**Smithy Shop:** Study of tools & operations, Simple exercises base on smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.	**04**
5	**Plumbing Shop:** Study of Tools and Operations, Simple exercises of piping.	**04**
6	**Welding Shop**: Study of tools & operations of Gas welding & Arc welding, Simple butt and Lap welded joints, Oxy-acetylene flame cutting.	**02**
7	**Sheet-metal Shop**: Study of tools & operations, making sheet metal component using 'soldering'. Ex: Funnel, tool-box, tray, electric panel box etc.	**04**
8	**Machine Shop:** Study of machine tools and operations, Demonstrations of basic machine tools like Lathe, Shaper, drilling machine with basic operations etc.	**02**
9	**Foundry Shop:** Study of tools & operations like Pattern making, Mould making with the use of a core. Various Casting processes	**04**
Topics (B) Electrical		
10	**Identification of electrical and electronics components:** Resistors, Capacitors, Inductors, Diodes, Transistors.	**04**
11	**Domestic and Industrial Electrical wiring:** Wiring of different lamp control, Staircase circuits, Cleat wiring and conduit wiring, Working of fluorescent tube light, Compact Fluorescent Light, Electronic Ballast, Connection of table fan and ceiling fan with regulators.	**06**
12	**Operation of Protective & Safety devices:** Fuse, MCB, ELCB, Relay	**04**
13	**Troubleshooting of domestic devices:** Dismantling, Repairing, Assembling and testing of domestic appliance like electric iron, Room heater, Electric toaster, Water heater, Electric kettle, Electric oven, Ceiling fan, Table Fan, Regulators, Alarm bell.	**04**
14	**Electrical Energy meter:** 1-Φ & 3-Φ Energy meter, Measurement & Calculation of Electrical Energy, Calibration of Energy Meter	**04**
15	**Motor:** Demo model of Motor Principle, Assembly & Disassembly of different motors, Basic Troubleshooting of different motors, Voltage, Current, Power & Speed measurement	**02**

	of various motors	
16	**Earthing:** Measurement of Earth resistance, Earthing methods, Domestic Earthing.	**04**
17	**Batteries & Cells:** Types of Cells, Charging & Discharging Phenomena of Batteries, Applications of various batteries	**02**

Practical content	
Practicals, assignments and tutorials are based on above syllabus.	
Text Books	
1.	Work shop technology by Hajra Chaudhary
2.	Elements of Mechanical Engineering by Hajra Chaudhary
Reference Books	
1.	Elements of Mechanical Engineering by Mathur & Mehta.
2.	Work shop technology by Chapmen 5. Electronics principle by A. Malvino
3.	S. L. Uppal , " Electrical wiring, estimating and costing ", Khanna Publication
4.	K. B. Bhatia, " Fundamentals of Maintenance of Electrical Equipments", Khanna Publication
5.	Dr N. K. Jain, " A Text Book of Practicals in Electrical Engineering ", Dhanpat Rai Publishing Company
ICT/MOOCs references	
1	https://www.youtube.com/watch?v=A9m_3onoVV8 (Instruction and Demonstration)
2	https://www.youtube.com/watch?v=uBeBilcSioo (Carpentry Shop)
3	https://www.youtube.com/watch?v=KgQyuCrOKoU (Fitting shop)
4	https://www.youtube.com/watch?v=c-FN4M77qyA (Smithy shop)
5	https://www.youtube.com/watch?v=STWhYHhfYNo (Plumbing Shop)
6	https://www.youtube.com/watch?v=GweENcDLvIE (Welding Shop)
7	https://www.youtube.com/watch?v=BVev9ZYL8-k (Sheet-metal Shop)
8	https://www.youtube.com/watch?v=xMPYLUoGqLY (Machine shop)
9	https://www.youtube.com/watch?v=HzBK98PP1sc (Foundry Shop)
10	https://www.youtube.com/watch?v=6Maq5IyHSuc(Identification of electrical and electronics components)
11	https://www.youtube.com/watch?v=6UTOTgbJ_8E(Identification of electrical and electronics components)
12	https://www.youtube.com/watch?v=hKtedrJKyQs(Domestic and Industrial Electrical wiring)
13	https://www.youtube.com/watch?v=OSwgfdU9q_0(Operation of Protective & Safety devices) https://www.youtube.com/watch?v=otVl5U_bbM0(Operation of Protective & Safety devices)
14	https://www.youtube.com/watch?v=gaRyNiPn26o(Troubleshooting of domestic devices**)**
15	https://www.youtube.com/watch?v=BRJ9azr61OA(Electrical Energy meter)
16	https://www.youtube.com/watch?v=zLW_7TPf310(Earthing)
17	https://www.youtube.com/watch?v=zJL13I1RVXU(Batteries & Cells)
18	https://www.youtube.com/watch?v=EfgDShcgKvM(Batteries & Cells)

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	II	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2ES104	Subject Name	Programming for Problem Solving

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	0	2	0	4	Theory	40	60	100
Hours	2	0	4	0	6	Practical	30	20	50

Pre-requisites:

Basic knowledge of Computer

Learning Outcome:

Upon completion of this course, students will acquire knowledge about:

- Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.
- Demonstrate an understanding of computer programming language concepts.
- Able to develop C programs on Linux and Windows platform.
- Able to define data types and use them in simple data processing.
- Choose the right data representation formats based on the requirements of the problem.
- Able to design and develop Computer programs, analyze, and interprets the concept of operators, branching and loops and their usage.
- Able to define the concept of array, structures, union, pointer, and file management
- Develop confidence for self-education and ability for life-long learning needed for Computer language.
- Able to write the program on a computer, edits, compile, debug, correct, recompile and run it.

Theory syllabus

Unit	Content	Hrs
1.	**Introduction to Programming.** Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). **Idea of Algorithm**: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.	04
2.	Arithmetic expressions and precedence Conditional Branching and Loops Writing and evaluation of conditionals and consequent branching Iteration and loops	06
3.	**Arrays** Arrays (1-D, 2-D), Character arrays and Strings	03
4.	**Basic Algorithms** Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)	03
5.	**Function** :Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference	03
6.	**Recursion:** Recursion, as a different way of solving problems. Example programs, such as	02

	Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.	
7.	**Structure** : Structures, Defining structures and Array of Structures	02
8.	**Pointers:** Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list.	05
9.	**File handling**	02

Practical content

Experiments/Practical/Simulations would be carried out based on syllabus which includes above topics.

- Programming Assignment Manual will be prepared and will be the reference for the questions, assignments, evaluation and the laboratory practices.

Text Books

1.	Programming in ANSI C by E Balagurusami –Tata MacGraw-Hill.

Reference Books

1.	Let's C, by YashvantKanetkar-BPB Publication
2.	Programming in C by Ashok Kamthane- Pearson Publication.
3.	The C Programming Language by Brian W. Kernighan / Dennis Ritchie
4.	Computer Programming in C by V Rajaraman, PHI.
5.	C Programming Language by Brian Kernighan and Dennis M. Ritchiz
6.	Outline of Programming with C by Byron Gottfried, Schaum's , McGraw-Hill

ICT References

1.	nptel.ac.in/courses/106104128
2.	http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/Free online lectures (PowerPoint) from MIT.

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FACULTY OF ENGINEERING& TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec	Computer Engineering/Information Technology
Semester	II	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2ES111	Subject Name	IT Workshop

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	0	0	2	0	2	Theory	00	00	00
Hours	0	0	4	0	4	Practical	30	20	50

Pre-requisites:

- Basic concepts of HTML

Learning Outcome:

Upon completion of this course, students will acquire knowledge about:

- Able to develop dynamic and interactive web applications.
- AngularJS which is used to develop complex web applications.
- Model-View-Controller (MVC) design pattern.

Unit	Content	Hrs
1.	**OOPs Concept:** Class, Object, Constructor, Message Passing, Inheritance, Polymorphism	02
2.	**JavaScript Basic:** JS Introduction, JS Output, JS Statements, JS Syntax, JS Comments, JS Variables, JS Operators, JS Data Types	04
3.	**JavaScript Controls:** JS Conditions: If , Else If & Switch, JS Loop: For, For In, While & Do While, JS Break, JS Type Conversion, JS Errors: Try, Catch & Throw	06
4.	**JavaScript Functions:** Function Definitions, Function Parameters, Function Invocation, Function Call, Function Closures	04
5.	**JavaScript Objects:** JS Object: Methods & Properties, JS Array, JS String, JS Date, JS Math, JS Number, JS Boolean, JS Random	08
6.	**JavaScript Browser BOM:** JS Window, JS Screen, JS Location, JS History, JS Navigator, JS Popup Alert, JS Timing, JS Cookies	06
7.	**JavaScript HTML DOM:** DOM Introduction, DOM Methods, DOM Document, DOM Elements, DOM HTML, DOM CSS, DOM Animations, DOM Events, DOM Event Listener, DOM Navigation, DOM Nodes, DOM Collections, DOM Node Lists	08
8.	**JavaScript Validation:** JS Regular Expression, JS form validation, JS email validation	02
9.	**JS AJAX:** AJAX Introduction, AJAX XMLHttp, AJAX Request, AJ AX Response, AJAX XML File, AJAX Applications, AJAX Examples	02
10.	**AngularJS:** AngularJS Introduction, AngularJS MVC, AngularJS First App, AngularJS Data Binding, AngularJS Expressions, AngularJS Directives, AngularJS Controllers, AngularJS Modules, AngularJS Scopes, AngularJS Dependency, AngularJS Filters, AngularJS Tables, AngularJS Select, AngularJS DOM, AngularJS Forms, AngularJS Validation, AngularJS AJAX, AngularJS Animation	14
11.	**Mini Project**	04

Practical content

- Experiments would be carried out based on syllabus which includes above topics.
- Programming Assignment Manual will be prepared and will be the reference for the questions, assignments, evaluation and the laboratory practices.

Text Books	
1	Beginning JavaScript – 4th Edition by Paul Wilton, Jeremy McPeak, Wrox Publication
2	Beginning AngularJS 1st Edition,Kindle Edition by Andrew Grant
Reference Books	
1	JavaScript for Absolute Beginners by Terry McNavage. Apress publication
2	AngularJS by Brad Green, Shyam Seshadri, O'REILLY
ICT References	
1	http://nptel.ac.in/courses/106105084/25
2	https://www.w3schools.com/js/default.asp
3	https://www.tutorialspoint.com//javascript_online_training/index.asp

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	I / II	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2AC101	Subject Name	Creative & Critical Thinking

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	00	00	00	00	00	Theory	00	00	00
Hours	02	00	00	00	02	Practical	00	00	00

Pre-requisites:

Learning Outcome:

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

- enhance their creative and innovative thinking skills
- Familiar with processes and methods of creative problem solving: observation, definition, representation, ideation, evaluation and decision making
- take better decisions
- evaluate facts in an argument
- Learning the Art of Questioning
- be better thinkers,

Theory syllabus

Unit	Content	Hrs
1.	Introduction to Creativity and Innovation, Differentiation between creative and critical thinking	**05**
2.	Thinking styles and common mistakes in thinking	**07**
3.	Thinking about information and emotions, truth and knowledge	**05**
4.	Evaluating arguments by asking the right questions about issues, conclusions, reasons, assumptions, evidence, etc.	
5.	Techniques for improving Creativity : Brainstorming, Lateral Thinking, List of Mental Associations, Random Combinations, Matrix of Ideas, Use of Manipulative verbs, Tree of Possibilities, Abstraction, Transformation, Use of mind stimulation: games, brain-twisters and puzzles	**07**
6.	Creativity in problem solving: Problem Definition, Understanding, Representing, Pattern Breaking, Thinking differently, Changing your point of view, Watching for paradigm shift, Challenging conventional wisdom, Lateral thinking, etc.	**06**
	TOTAL	**30**

Practical content

Text Books

1.	
2.	

Reference Books

1.	Asking the right Questions by M. Neil Browne & Stuart M. Keeley, Pearson, Prentice Hall
2.	Teach Yourself to Think by Edward de Bono, Penguin
3.	Lateral Thinking by Edward de Bono, Penguin
4.	Six Thinking Hats by Edward de Bono, Penguin
5.	Selected videos showcasing cases and arguments

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	I / II	Version	2.0.0.0
Effective from Academic Year	2018-19	Effective for the batch Admitted in	July 2018
Subject code	2AC102	Subject Name	Ethics & Values

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	00	00	00	00	00	Theory	00	00	00
Hours	02	00	00	00	02	Practical	00	00	00

Pre-requisites:

Learning Outcome:

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

- Be aware and understand importance of Engineering Ethics and Human Social Values
- Understand social responsibilities of an engineer
- Appreciate ethical dilemma while discharging duties in professional/industrial life.

Theory syllabus

Unit	Content	Hrs
1.	**Human Values:** Morals, Values and Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character = Continuous Happiness and Prosperity- A look at basic Human Aspirations, Understanding and living in harmony at various levels	**06**
2.	**Engineering Ethics:** Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories. Valuing Time – Co-operation – Commitment –	**06**
3.	**Engineering as Social Experimentation:** Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study	**06**
4.	**Safety, Responsibilities and Right:** Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island and Chernobyl case studies, Collegiality and Loyalty - respect for Authority – collective Bargaining - confidentiality - Conflicts of Interest – Professional rights - Employee Rights.	**06**
5.	**Global Issues:** Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership	**06**
	TOTAL	**30**

Practical content

Text Books

1.	
2.	

Reference Books

1.	A Textbook on Professional Ethics and Human Values by Naagarazan, R.S, New Age Pub.
2.	Ethics in Engineering by Mike Martin and Roland Schinzinger, McGraw-Hill, New York
3.	Engineering Ethics by Govindarajan M, Natarajan S, Senthil Kumar V. S, Prentice Hall

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FACULTY OF ENGINEERING & TECHNOLOGY

TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	III		
Effective from Academic Year	2019-20	Effective for the batch Admitted in	July 2018

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
2BS3102	Discrete Mathematics & Probability	3	1	4	0	0	0	3	1	4	0	0	0	40	60	100	0	0	0
2CEIT301	Digital Electronics	3	0	3	1	0	1	3	0	3	2	0	2	40	60	100	30	20	50
2CEIT302	Object Oriented Programming	3	0	3	2	0	2	3	0	3	4	0	4	40	60	100	30	20	50
2CEIT303	Database Management System	3	0	3	1	0	1	3	0	3	2	0	2	40	60	100	30	20	50
2CEIT304	Data Structures	3	0	3	2	0	2	3	0	3	4	0	4	40	60	100	30	20	50
	Audit Course	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0
Total		**15**	**1**	**16**	**6**	**0**	**6**	**17**	**1**	**18**	**12**	**0**	**12**	**200**	**300**	**500**	**120**	**80**	**200**

Audit Course:

- The online courses based on MOOCS are to be considered as an Audit Course.
- To be decided by University

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	IV		
Effective from Academic Year	2019-20	Effective for the batch Admitted in	July 2018

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
2BS4101	Mathematics for Computer Engineering & Information Technology	3	1	4	0	0	0	3	1	4	0	0	0	40	60	100	0	0	0
2CEIT401	Operating Systems	3	0	3	1	0	1	3	0	3	2	0	2	40	60	100	30	20	50
2CEIT402	Design and Analysis of Algorithms	3	0	3	1	0	1	3	0	3	2	0	2	40	60	100	30	20	50
2CEIT403	Application Development Tools	2	0	2	2	0	2	2	0	2	4	0	4	40	60	100	30	20	50
2CEIT404	Programming with Python	3	0	3	1	0	1	3	0	3	2	0	2	40	60	100	30	20	50
2CEIT405	NoSQL Database Systems	0	0	0	1	0	1	0	0	0	2	0	2	0	0	0	30	20	50
	Audit Course	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0
Total		**14**	**1**	**15**	**6**	**0**	**6**	**16**	**1**	**17**	**12**	**0**	**12**	**200**	**300**	**500**	**150**	**100**	**250**

Audit Course:

- The online courses based on MOOCS are to be considered as an Audit Course.
- To be decided by University

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engg. & Information Technology
Semester	III	Version	2.0.0.0
Effective from Academic Year	2019-2020	Effective for the batch Admitted in	July 2018
Subject code	2BS3102	Subject Name	Discrete Mathematics & Probability

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	1	0	0	4	Theory	40	60	100
Hours	3	1	0	0	4	Practical	0	0	0

Pre-requisites:

-

Learning Outcome:

On successful completion of the subject, students should be able to

- Express physical phenomenon in Group theory and Graph theory.
- Solve Correlation & Regression.
- Use basic knowledge of Probability distributions and their applications in Computer Engineering & Information Technology to cater various problems

Theory syllabus

Unit	Content	Hrs
1	**Algebraic Structures and Morphism** Algebraic structures with one Binary Operation , Semi Groups, Monoids , Groups, Congruence Relation & Quotient Structures ,Abelian Group, Cyclic Group, Subgroup, Permutation Groups, Coset Decomposition Of Groups, Normal Subgroups, Lagrange's Theorem , Algebraic Structures with two Binary operation, Rings , Integral Domain and Fields & their examples.	**10**
2	**Graphs and Trees** Basic Concept of Graph and their properties ,Degree, , Path, Cycle, Subgraphs, Isomorphism, , Reachability and Connectedness, Matrix Representation Of Graphs, Eulerian & Hamiltonian Walks, Graph Colouring, Colouring Maps, Colouring Vertices, Colouring Edges, Trees, Routed trees and Sorting, Weighted trees and Prefixes codes.	**10**
3	**Fuzzy Sets** Basic Definitions of Fuzzy sets, Basic Operations On Fuzzy Sets, Image and Inverse Images, I-V Fuzzy Sets, Fuzzy Relations.	**03**
4	**Correlation** Definition of Correlation, Types of Correlation, Scatter Diagram Method, Karl Person's Correlation Coefficients, Correlation Coefficients for Bivariate frequency distribution, Probable error for Correlation Coefficients, Rank Correlation Co-efficient.	**07**
5	**Regression** Definition of Regression, Regression lines, Regression Coefficients, Properties of regression Coefficients, Fitting of regression lines and estimation for Bivariate frequency distribution.	**06**
6	**Probability Distributions** **Binomial Distribution :** Introduction, Probability mass function of Binomial distribution, Mean and Variance of Binomial distribution, Properties of Binomial Distribution, Uses of Binomial	**09**

	Distribution. **Poisson Distribution :** Introduction, Probability mass function of Poisson distribution, Mean and Variance of Poisson distribution, Properties of Poisson Distribution, Applications of Poisson Distribution. **Normal Distribution :** Introduction, Probability density function of Normal distribution, Properties of Normal distribution, Importance of Normal Distribution.	

Assignments and tutorials are based on the above syllabus.	
Text Books	
1.	Discrete Mathematical Structures With Application To Computer Science By Tremblay, J.P. & Manohar ,Mcgraw Hill - New DelhiTextbook of engineering mathematics By A.B.Mathur and V.P.Jaggi.
2.	Discrete Mathematics and Its Applications By Rosen,Kenneth L.Mcgraw Hill - New Delhi
3	Fuzzy Sets and Fuzzy Logic. Theory and Applications By Georgr J. Klir/Bo Yuan
4	Fundamental of Applied Statistics By S.C. Gupta & V.K. Kapoor , Sultan Chand Publication
Reference Books	
1.	Discrete Mathematical Structures For Computer Science By Kolman, B& Busby R.C,Prentice Hall Of India Pvt Ltd.,New Delhi
2.	Applied Discrete Structures For Computer Science By Alan Doerr & Kenneth , Galgotia Pub. Pvt.Ltd. New Delhi
3.	An introduction to Probability theory and its Application By W Feller,Vol.1 3rd Ed. Wiley,1968 .
4.	Probability, Statistics and Random Process By T Veerarajan, TMH
ICT/MOOCS	
1.	https://nptel.ac.in/courses/111105035/32
2.	https://nptel.ac.in/courses/111105035/1
3.	https://nptel.ac.in/courses/102101056/11
4.	https://nptel.ac.in/courses/111105041/8

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	III	Version	2.0.0.0
Effective from Academic Year	2019-20	Effective for the batch Admitted in	July-2018
Subject code	2CEIT301	Subject Name	Digital Electronics

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

None

Learning Outcome:

Upon successful completion of the course, the student should be able to:

- Learn various number systems and their conversion used in digital components.
- Introduce significant evolution in digital electronics.
- Understand basic digital components for circuit design.
- Design basic electronics circuit for various applications and their analysis.

Theory syllabus

Unit	Content	Hrs
1.	**Binary Systems:** Digital Computer & Systems, Binary Numbers, Number Base conversions, Different Number systems & their relations, Complements, Binary codes, Binary storage & registers.	06
2.	**Digital Integrated Circuits:** RTL, DTL circuits, I2L Logic, TTL, ECL, MOS & CMOS circuits & their characteristics, source current & sink current.	05
3.	**Boolean Algebra & Logic Gates:** Basic definitions, Axiomatic definition of Boolean Algebra, Basic Theorems & Properties, Boolean functions, Canonical & Standard forms, Logic operations, Digital Logic gates & Logic families.	05
4.	**Simplification of Boolean Functions:** Map method, Two, Three, Four, Five & Six variable maps, Products of Sum & Sum of Products simplification, NAND, NOR & Other two level Implementations, Don't care conditions, Tabulation method.	07
5.	**Combinational Logic:** Design Procedure, Address, Subtractors, Code Conversion, Analysis Procedure, Multilevel NAND & NOR circuits, Exclusive-OR & Equivalence functions.	06
6.	**Combinational Logic with MSI & LSI:** Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, ROMs, PLAs, Introduction of PLDs, CPLDs and FPGA.	07
7.	**Sequential Logic:** Latch, Flip Flops, difference between latch and flip flop, Triggering of Flip flops, Analysis of clocked sequential circuits, State reduction & assignment, Flip Flop Excitation tables, Design of	07

	Sequential circuits, Design of counters, Design using state equations.	
8.	**Registers and Counters:** Registers, Shift registers, Ripple Counters, Synchronous Counters, Memory.	03
Practical Content		
Experiments/Practical's/Simulations would be carried out based on syllabus		
Text Books		
1	Digital Logic and Computer Design By Morris Mano	
Reference Books		
1	Digital Electronics Circuits & Systems By V. K. Puri	
2	Digital Fundamentals By Floyd	
3	Digital Electronic By Y R. P. Jain	
ICT / MOOCs		
1	https://nptel.ac.in/courses/117106086/	
2	https://swayam.gov.in/course/1392-digital-circuits-and-systems	

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	III	Version	2.0.0.0
Effective from Academic Year	2019-20	Effective for the batch Admitted in	July-2018
Subject code	2CEIT302	Subject Name	Object Oriented Programming

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	2	-	5	Theory	40	60	100
Hours	3	0	4	-	7	Practical	30	20	50

Pre-requisites:

Course on programming for problem solving.

Learning Outcome:

After successful completion of this course, student will be able to:

- Understand and describe the basic principles and constructs of object-oriented programming
- Understand the significance of object oriented tools and technologies for modular development
- Design, develop, execute, debug and validate programs in object oriented programming environment

Theory syllabus

Unit	Content	Hrs
1.	**Introduction:** • Object Oriented Programming Concepts (Class, Object, Encapsulation, Inheritance, Polymorphism, Abstraction, Message Passing) • Features of Java Language, Types of Java Programs, Java Architecture(JDK, JRE and JVM)	3
2.	**Literals, Data Types, Variables, Operators and Control Statements:** • Literals, Data Types (Integer, Float, Char, Boolean), Variables • Operators, Operator Precedence • if else Statement, switch Statement • while, do while, for and enhanced for loop • break, continue, comma Statement • Implicit and Explicit Type Conversion	1
3.	**The Structure of a Java Program:** • Structure of a Java Program, Comments • Expressions and Statements • Block Statements and Scope	2
4.	**Arrays and Strings:** • One-Dimensional Array, Multi-Dimensional Array • String Class and methods, StringBuffer Class and methods	4
5.	**Classes and Objects:** • Defining a Class, the new Operator, Objects, the dot operator, Method Declaration and	6

	Calling, Instance Variable, Local Variables • Constructors, Types of constructors, Constructor overloading, this keyword, Method Overloading, Passing Objects as Parameters, Inner Class • Garbage collection, finalize method	
6.	**Inheritance and Polymorphism:** • Creating Subclasses, Method Overriding, Dynamic Method Dispatch, super Keyword, final keyword, Final Variables • Static Class, Methods, Block and Variables	7
7.	**Abstraction:** • Abstract Class and method • Interfaces (Defining Interface, Implementing an Interface)	3
8.	**Encapsulation:** • Package, Access Modifiers, Encapsulation	3
9.	**Exceptions:** • Type of Exceptions, Catching Exceptions (Nested try Blocks, Hierarchy Of Multiple Catch Blocks) • Throwing Exceptions • Creating Your Own Exceptions • Broadcasting that a Method Throws Exception, finally Block, Checked and Unchecked Exceptions	4
10.	**Applets:** • Applet Basics, Methods of Building an Applet • Displaying Text in Status Bar, Embedding Applet Information • The HTML Applet Tag, Reading Parameters into Applets, Colors in Applet, Getting Documentbase and Codebase • Interfaces in Applet, Multimedia in Applet (Playing Audio Clips, Images in Applet, Applet Showing Other HTML Pages)	3
11.	**Event Handling:** • Delegation Event Model, Events • Event Listeners, Registering Listeners with Source, Adapter Classes	2
12.	**Multithreaded Programming:** • Introduction, Creating Threads, Extending Thread Class, Runnable Interface • Stopping and blocking a thread, Life cycle of thread, Thread Methods • Thread Exception, Thread Priority, Synchronizations	4
13.	**Input and Output Classes:** • I/O Streams, The File Class, Byte Stream (InputStream, OutputStream), Disk File Handling (FileInputStream, FileOutputStream) • Memory Handling (ByteArrayInputStream, ByteArrayOutputStream) • Filtered Byte Streams (BufferedInputStream, BufferedOutputStream, DataInputStream, DataOutputStream), SequenceInputStream, ObjectOutputStream, ObjectInputStream, Random Access File • Character Stream(CharArrayReader, CharArrayWriter, InputStreamReader, Output StreamWriter, FileWriter, FileReader, BufferedReader, BufferedWriter)	3
Practical Content		

Implement object-oriented concepts in practical sessions.		
Text Books		
1	Java - The Complete Reference By Herbet Shield, Tata Mc-Graw Hill Publication	
Reference Books		
1	Programming with Java – A primer by E. Balagurasamy, Tata Mc-Graw Hill Publication.	
2	Programming in Java2 by Dr. K. Somasundaram, Jaico Books	
ICT / MOOCs		
1	https://swayam.gov.in/courses/5418-jan-2019-programming-in-java	
2	https://nptel.ac.in/courses/106105191/	

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	III	Version	2.0.0.0
Effective from Academic Year	2019-20	Effective for the batch Admitted in	July-2018
Subject code	2CEIT303	Subject Name	Database Management System

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

- Knowledge about Data Structure and Algorithm
- Computer Programming

Learning Outcome:

After successful completion of this course, student will be able to:

- understand preliminaries of database management system concepts and its applications.
- conceptualize and formalize relation amongst various entities of the database.
- understand and design optimal way of storage and retrieval, in correlation with relational model through appropriate indexing and normalization.
- create optimal query using structured query language.
- understand advanced DBMS concepts like transaction processing, concurrency control and recovery.

Theory syllabus

Unit	Content	Hrs
1	**Elementary concepts of DBMS:** Purpose of database, Data independence, Relational Systems and others, Architecture for Database System and data independence, database administrator, Client / Server architecture, the relational model, views, DDL, DML, DCL.	5
2	**Data model:** Various models Elements of the E/R Model-Design Principles, E/R diagrams, The Modeling of Constraints-Weak Entity Sets, E/R diagrams, Generalization-Specialization-Aggregation.	5
3	**The relational data model & algebra:** Keys, Basics of the Relational Model-From E/R Diagrams to Relational Designs, Relational Operations-Extended Operators of Relational Algebra-Constraints on Relations.	7
4	**Database design:** Introduction, Basic definitions, Trivial and nontrivial dependencies, Closure of a set of dependencies, Closure of a set of attributes, Introduction to normalization, Non loss decomposition and functional dependencies, Dependency preservation, first, second and third forms, Boyce / Codd normal form, higher normal forms multivalued dependencies and fourth normal form, join dependencies and fifth normal form.	7
5	**Data storage and querying:** RAID, Query Processing & Query Optimization: Overview, measures of query cost.	3
6	**Transaction processing:** Transactions, ACID Property, transaction atomicity and durability, Schedules & Types, Serializability, Conflict-Serializability, View-Serializability, Testing Serializability.	7
7	**Recovery:** Types of failures, Transaction recovery, system recovery, media recovery, two phases commit, Checkpoints, log based recovery.	5
8	**Concurrency:** Enforcing Serializability by Locks-Locking Systems with Several Lock Modes-Concurrency Control by Timestamps, two phase locking protocol, Multiple Granularity.	6

Practical content	
	Above concepts are to be implemented using SQL and PL/SQL and at least 10 experiments are to be ried out.
Text Books	
1	Database System Concepts by Silberschatz, Korth, Sudarshan
Reference Books	
1	An introduction to Database Systems, C J Date, Addition-Wesley
2	Database System using Oracle by Nilesh shah, PHI
3	Fundamentals of Database Systems, Ramez Elmasri & Shamkant B. Navathe, Addison-Wesley
4	Practical Book: SQL, PL/SQL by Ivan Bayross
ICT / MOOCs	
1	https://nptel.ac.in/courses/106104135/
2	https://nptel.ac.in/courses/106106093/

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	III	Version	2.0.0.0
Effective from Academic Year	2019-20	Effective for the batch Admitted in	July 2018
Subject code	2CEIT304	Subject Name	Data Structures

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	2	0	5	Theory	40	60	100
Hours	3	0	4	0	7	Practical	30	20	50

Pre-requisites:

Course on Programming for Problem Solving.

Learning Outcome:

Upon successful completion of the course, the student should be able to:

- Apply appropriate constructs of C language, coding standards for application development
- Recognize the need of various data structures
- Analyse various structures and their applicability
- Identify the appropriate data structure and algorithm design method for the given application
- Design and implement various techniques for searching, sorting and recurrence

Theory syllabus

Unit	Content	Hrs
1.	**Introduction to data structure**: Basic concepts C languages: Arrays, Functions, Strings, Structures and Pointers. Importance and applications of data structures, types of data structures, Algorithms and algorithmic notations	04
2.	**Stack:** Definition & Concepts, Operations on Stacks (Push, Pop, Peep, Change -Algorithm & Implementation), Applications of Stack, polish expressions, reverse polish expression and conversions, Recursion, Tower of Hanoi problem	06
3.	**Queue:** The queue and its sequential representation, Simple Queue, Circular Queue, Double ended Queue, Priority Queue, applications of queue	04
4.	**Linked List:** Sequential Allocation method Vs linked Allocation method, Dynamic Data structure Vs Static Data structure, Pointers and Linked Allocation, Singly Linked List Storage Structures & Basic Operations, Circular Linked List & Basic Operations, Doubly Linked List & Basic Operations, Applications of Linked List	08
5.	**Tree:** Definitions and concepts, Terminology, Binary trees, Binary tree representations, Binary tree traversals, Binary Search Tree, insertion and deletion in BST, Threaded binary trees, Applications of tree	08
6.	**Graph:** Definition and concepts, Graph Representation, Graph Terminology, Graph Traversals – Depth First Search and Breadth First Search	06
7.	**Sorting and Searching:** Elementary sorts: Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort, Heap Sort, Radix sort, Sequential Search, Binary search, Best case and worst case behaviour	07
8.	**Hashing:** The symbol table, Hashing Functions, Collision-Resolution Techniques	02

Practical content

Experiments/simulation based on the syllabus.

Text Books

1.	An Introduction to Data Structures with Application, By Jean-Paul Tremblay ,Paul G. Sorenson (second Edition)

Reference Books

1.	Data Structures using C & C++ -By Ten Baum Publisher – Prentice-Hall International.
2.	Fundamentals of Computer Algorithms by Horowitz, Sahni, Galgotia Pub. 2001 ed.
3.	Fundamentals of Data Structures in C++-By Sartaj Sahani.

ICT / MOOC	
1.	https://nptel.ac.in/courses/106102064/
2.	https://nptel.ac.in/courses/106103069/

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engg. & Information Technology
Semester	IV	Version	2.0.0.0
Effective from Academic Year	2019-2020	Effective for the batch Admitted in	July 2018
Subject code	2BS4101	Subject Name	Mathematics for Computer Engineering & Information Technology

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	1	0	0	4	Theory	40	60	100
Hours	3	1	0	0	4	Practical	0	0	0

Pre-requisites:

-

Learning Outcome:

On successful completion of the subject, students should be able to

- Express physical phenomenon in Fourier Series & Laplace Transforms.
- Solve Complex integrations.
- Use basic knowledge of Numerical techniques and their applications in CE & IT to cater various problems

Theory syllabus

Unit	Content	Hrs
1	**Laplace Transforms** Definition, Laplace transform of elementary functions. Formulas of Laplace transform, Inverse Laplace transforms. Laplace transform of derivatives, Laplace transform of integration. Multiplication by t^n, Division by t, Convolution theorem, Unit step and Heaviside's unit function, Dirac-delta function. Periodic functions, Solution of ordinary linear differential equations, simultaneous equation with constant co-efficient applied to electrical circuits	**10**
2	**Fourier Series** Definition of periodic function, Euler's formula, Functions having points of discontinuity, Change of intervals, Odd and Even functions, Expansion of odd or even periodic functions, Half range sine and cosine series, Elements of harmonic analysis.	**08**
3	**Fourier Transforms** Definition, Fourier integral, Fourier sine and cosine integration, complex form of Fourier integral, Fourier sine transform, Fourier cosine transform, Inverse Fourier transforms.	**05**
4	**Theory of Complex Variables** Analytic functions, Cauchy-Riemann equation, Line integral, Cauchy's theorem and Cauchy's integral formula, Simple form of conformal transformation with application of the solution of two-dimensional problems.	**07**
5	**Numerical Methods** Roots of algebraic equations, Solution of linear simultaneous equations, Numerical differentiation and Numerical integration, Numerical methods to solve first order, first degree ordinary differential equations.	**10**

6	**Finite Differences And Difference Equations** Finite differences interpolation, Newton's and LaGrange's formula, Difference equation with constants co-efficient, Solution of ordinary and partial differential equations with boundary conditions by finite difference method.	**05**

Assignments and tutorials are based on the above syllabus.	
Text Books	
1.	Higher engineering mathematics. By B.S.Grewal.
2.	Advanced engineering mathematics By Erwin Kreyzing
3	Computer Oriented Statistical and Numerical Methods By E.Balagurusamy,TMH
Reference Books	
1.	Dr. K. R. Kachot, "Higher Engineering Mathematics", Vol.2, Mahajan Publication.
2.	Engineering mathematics. By Srivastava.
3.	Textbook of engineering mathematics By A.B.Mathur and V.P.Jaggi.
4.	Introductory Methods in Numerical Analysis By S.S.Sastry
ICT/MOOCS	
1.	https://nptel.ac.in/courses/111105035/27
2.	https://nptel.ac.in/courses/111105035/22
3.	https://nptel.ac.in/courses/111105035/30
4.	https://nptel.ac.in/courses/111105035/11
5	https://nptel.ac.in/courses/111105035/14
6	https://nptel.ac.in/courses/122102009/2 https://nptel.ac.in/courses/111107062/
7	https://nptel.ac.in/courses/111107062/
8	https://nptel.ac.in/courses/111107062/ https://nptel.ac.in/courses/111107062/18
9	https://nptel.ac.in/courses/111107062/28 https://nptel.ac.in/courses/122102009/34
10	https://nptel.ac.in/courses/111107062/30

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	IV	Version	2.0.0.0
Effective from Academic Year	2019-20	Effective for the batch Admitted in	
Subject code	2CEIT401	Subject Name	Operating Systems

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Course on Data Structure, Programming for Problem Solving.

Learning Outcome:

Upon successful completion of the course, the student should be able to:

- Give the fundamental knowledge of how operating system works, manages the applications that are running.
- Give fundamental principles of operating system design and its components
- Understand process management, memory management including virtual memory, protection and security management.

Theory syllabus

Unit	Content	Hrs
1.	**Introduction:** What is an OS? Evolution of OS, Services of OS, Types of OS, Different view of OS, Basics of memory and architecture.	**3**
2.	**Process Management:** Process abstraction, Process management, Various types of schedulers and it's role, System calls, Threads, Types of Threads, Multi-threading Models, Process Scheduling, Process Scheduling Algorithms.	**6**
3.	**Inter process Communication:** Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution ,The Producer Consumer Problem, Semaphores, Event Counters, Monitors ,Message Passing and Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.	**8**
4.	**Deadlock:** Deadlock Problem, Deadlock Characterization, Deadlock Detection, Deadlock recovery, Deadlock avoidance: Banker's algorithm for single & multiple resources , Deadlock Prevention.	**5**
5.	**Memory Management:** Paging: Principle Of Operation, Page Allocation, H/W Support For Paging , Multiprogramming With Fixed partitions ,Segmentation ,Swapping , Virtual Memory: Concept, Performance Of Demand Paging, Page Replacement Algorithms, Thrashing, Locality.	**12**
6.	**Input Output Management:** I/O Devices, Device Controllers, Direct Memory Access , Principles Of Input/outputs, Interrupt Handler, Device Driver, Device Independent ,I/O Software Disks: RAID levels, Disks Arm Scheduling Algorithm ,Error Handling	**3**
7.	**File Systems:** File Naming, File Structure, File Types, File Access, File Attributes, File Operations, Memory Mapped Files , Directories: Hierarchical Directory System, Pathnames, Directory Operations ,File System Implementation, Contiguous Allocation, Linked List Allocation, Linked List Using Index, Inodes, Implementing Directories In C, MS-DOS, and UNIX. Shared Files , Disk Space Management , File System Reliability , File System Performance.	**4**

8.	Recent trends in Operating system design and their applicability to HPC.	**4**
Practical content		
Experiments/Practical's would be carried out based on syllabus		
Text Books		
1.	Operating System Concepts By Avi Silberschatz, Peter Baer Galvin, Greg Gagne, Ninth Edition, Wiley	
Reference Books		
1.	Modern Operating Systems By Andrew S. Tanenbaum, Third Edition PHI	
2.	Operating Systems Internals and Design Principles , William Stallings , Seventh Edition, Prentice Hall	
3.	Operating Systems, D.M.Dhamdhare, TMH	
4.	Unix System Concepts & Applications, Sumitabha Das, TMH	
5.	Unix Shell Programming, YashwantKanitkar By BPB Publications	
ICT / MOOCs		
1.	https://nptel.ac.in/courses/106106144/	
2.	https://onlinecourses.nptel.ac.in/noc17_cs29/	

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Programme	Bachelor of Technology				Branch/Spec.	Computer Engineering / Information Technology			
Semester	IV				Version	2.0.0.0			
Effective from Academic Year	2019-20				Effective for the batch Admitted in	July 2018			
Subject code	2CEIT402	Subject Name			Design and Analysis of Algorithms				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Course on Data Structures

Learning Outcome:

After successful completion of this course, student will be able to:

- Decide best algorithm out of various alternatives.
- Analyse the performance of the algorithms for the best, average and worst case.
- Find out the time and space requirements for various algorithms and represent it using various mathematical notations.
- Understand and derive the recurrence relationship for algorithms.
- Develop various algorithms for the same problem using different design paradigms.
- Understand the different classes of the problems.

Theory syllabus

Unit	Content	Hrs
1	**Introduction:** Definition and characteristics of an algorithm, problems & instances, best, average and worst case analysis, need to look for efficiency	03
2	**Analysis of Algorithms:** Performance analysis (time & space complexity), Growth of functions, asymptotic notations (Big-oh, Omega and Theta),Sorting Algorithms and analysis (Bubble sort, Selection sort, Insertion sort), Sorting in linear time: Radix sort and Counting sort	08
3	**Solving Recurrences:** Iteration method, homogeneous recurrences, inhomogeneous recurrences, change of variable, recurrence trees, master method & master theorem	10
4	**Divide and Conquer:** Characteristics, the general template, applications: binary search, merge sort, quick sort, randomized quick sort, counting inversions, min-max problem	06
5	**Graph Algorithms:** Depth-first search, breadth-first search, topological ordering & sorting, backtracking, applications of backtracking, knapsack problem, branch & bound, application: the assignment problem	04
6	**Greedy Algorithms:** General characteristics of greedy algorithms and examples, applications: making change problem, Kruskal's and Prim's algorithms, shortest path problem, knapsack problem, scheduling problem	06
7	**Dynamic Programming:** General characteristics and examples, principle of optimality, applications: binomial coefficients, making change, knapsack problem, chained matrix multiplication	05

8	**Computational Complexity:** Introduction, information-theoretic arguments: complexity and sorting, complexity and algorithmic, introduction to NP completeness, the classes P and NP, polynomial reductions, NP complete problems	03
Practical content		
Experiments/Practicals/Simulations would be carried out based on syllabus		
Text Books		
1	Introduction to Algorithms by Cormen, Leiserson, Rivest, Prentice Hall of India	
Reference Books		
1	Fundamentals of Algorithms by Brassard & Bratley, Prentice Hall of India	
2	Ellis Horowitz, SartajSahni, Fundamentals of computer algorithms, Computer Science Press	
ICT / MOOCs		
1	https://onlinecourses.nptel.ac.in/noc18_cs20/	
2	https://nptel.ac.in/courses/106101060/	
3	https://nptel.ac.in/courses/106106131/	

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	IV	Version	2.0.0.0
Effective from Academic Year	2019-20	Effective for the batch Admitted in	July 2018
Subject code	2CEIT403	Subject Name	Application Development Tools

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	0	2	-	4	Theory	40	60	100
Hours	2	0	4	-	6	Practical	30	20	50

Pre-requisites:

Basic knowledge of any programming language and object oriented concepts

Learning Outcome:

The main objectives for offering the course are:

- Explain the architecture of .NET Framework.
- Explain features of C# using Console Application.
- Develop Windows based application using Microsoft Visual Studio.
- Develop ADO.net based database driven .NET application
- Develop simple web application.

Theory syllabus

Unit	Content	Hrs
1.	Introduction To .Net Framework: The Common Language Runtime, Compilation in .NET (MSIL and JIT), CTS, CLS, Cross language Integration, Garbage Collection, Assemblies, Name spaces, Versioning and deployment, Framework class Library	3
2.	C# Basics using Console Application: Variables and Constants, Data Types, Scope of variables, Formatting Data, Handling Exceptions, Conditions, Loops, Arrays, StringBuilder, Functions	5
3.	Windows Forms and Controls: Creating Windows Forms, Windows Forms Properties and Events, Controls (Properties and Events of Controls): Button, Label, TextBox, NumericUpDown, CheckBox, RadioButton, DateTimePicker, GroupBox,ListBox, ListView, ComboBox, TabControl, PictureBox, ProgressBar, ToolTips, RichTextbox, Timer,DatagridView	7
4.	Working With ADO.NET: Introduction to ADO.NET, ADO.NET Architecture, Understanding SqlConnection, SqlCommands, SqlDataReaders, DataSet and DataAdapter	3
5.	Working with ASP.NET: Introduction to three-tier Client Server systems, Web Application basic, Introduction to ASP.NET, ASP.Net page life cycle, Working with various ASP.NET Server Controls, Creating consistent looking website, ASP.Net with ADO.NET, ASP.NET - Managing State, Introduction to user control, Validating user input, Introduction to ASP.NET AJAX, ASP.NET Security, Introduction to LINQ	10
6.	ASP.NET MVC Introduction	2

Practical Content

Experiments/Practical's/Simulations would be carried out based on syllabus

Text Books

1	Professional C# and .NET by Wrox Publication

Reference Books

1	Beginning Visual C# Programming. by Wrox publication

2	Beginning ASP.NET 4.5.1 in c# and VB by Imar Spaanjaars,Wrox publication
3	Dino Esposito, Programming Microsoft ASP.NET
4	Matthew Macdonald and Robert Standefer, ASP.NET Complete Reference, TMH
ICT / MOOCs	
1	Students can enroll various NPTEL or other MOOCs for the related course contents.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	IV	Version	2.0.0.0
Effective from Academic Year	2019-20	Effective for the batch Admitted in	July 2018
Subject code	2CEIT404	Subject Name	Programming with Python

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Course on Basics of Web Technoloy

Learning Outcome:

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

- Develop proficiency in creating applications using the Python Programming Language.
- Be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
- Be able to do testing and debugging of code written in Python.
- Be able to create GUI applications in Python.
- Be able to develop web applications with database.

Theory syllabus

Unit	Content	Hrs
1	**Introduction:** Why Python? Python Concepts, Dynamic vs. Static Types, Procedural vs. Object-Oriented Programming, Comparing Programming Languages: C,C++,JAVA, C#, Python, Python Interpreter	03
2	**Programming with Python:** Launching Python programs, Types and Operators, Python Syntax, Indentation, Multiple Line Spanning, Python Object Types, Python Numbers, Strings and string operations, Regular expressions, Exception Handling	05
3	**Dictionaries, List and Tuples:** Concept of dictionary, list and tuple: accessing, updating, deletion and basic operations of dictionary, list and tuple, Applications of dictionary, list and tuple	03
4	**File handling:** Files, File Operations, Files and Streams, Creating a File, Reading From a File, Iterating Through Files, Writing file, Maintain students record using file handling	03
5	**Object oriented programming with python:** Learning Python classes and objects, Built-In Class Attributes and Class Methods	03
6	**GUI Programming in Python using Tkinter:** Tkinter Introduction, Working with widgets: button, labels, text boxes, Checkbutton, etc.	04
7	**Working with Databases:** Working With a Databases, Using SQL to Query a Database, Python and SQLite and MYSQL, Creating Database, Pulling Data from a DB	07
8	**Python with CGI script** CGI architecture, CGI Environment Variable, Get and POST Methods, CGI script with different HTML controls	05
9	**Networking and Multithreaded Programming** Sockets, Threads and Processes, Chat Application, Sending Email using smtplib	06
10	**Web application using Django Framework** Django Framework: Introduction, Installation, Apps Life Cycle, Admin Interface, Creating Views,	06

	URL mapping, Template System, Models, Web application using Django framework	
Practical content		
Practicals would be carried out based on syllabus		
Text Books		
1	Learning program to Python by Cody Jackson 2nd edition	
Reference Books		
1	Beginning Python by James Payne, Wrox Publication	
2	Beginning Python by Magnus Lie Hetland, Apress Publication	
3	Django: Web Development with Python, by Samuel Dauzon, Aidas Bendoraitis, Arun Ravindran, packt	
Web Resources		
1	https://www.tutorialspoint.com/python/	
2	https://tutorial.djangogirls.org/en/	
ICT / MOOCs		
1	https://nptel.ac.in/courses/106106145/	
2	https://nptel.ac.in/courses/106106182/	

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	IV	Version	2.0.0.0
Effective from Academic Year	2019-20	Effective for the batch Admitted in	July 2018
Subject code	2CEIT405	Subject Name	NoSQL Database Systems

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	0	0	1	-	1	Theory	-	-	-
Hours	0	0	2	-	2	Practical	30	20	50

Pre-requisites:

Course on Database Management System

Learning Outcome:

Upon successful completion of the course, the student should be able to:

- Understand the functionalities of NoSQL-DB as a document database
- Identify the benefits of NoSQL-DB
- Explain the different use cases of NoSQL-DB
- Explain how to create and manage different types of indexes in NoSQL-DB for query execution
- Explain how the replication and sharding features in NoSQL-DB help in scaling read and write operations
- Explain the process of developing Java and Node JS applications using NoSQL-DB

Theory syllabus

Unit	Content	Hrs

Practical content

Sr.	Content	Hrs
1.	Introduction to NoSQL-DB and its Installation on Windows & Linux. Key-value store, Document store, Graph, Object database, Tabular, Tuple store, Triple/quad store (RDF) database, Hosted, Multivalue databases, Multimodel database.	4
2.	Description of NoSQL-DB Shell, create database and show database and apply some queries to get specified output. (AND in NoSQL-DB, OR in NoSQL-DB, Limit Records and Sort Records.)	2
3.	Commands for NoSQL DB and To study operations in NoSQL-DB – Insert, Query, Update, Delete (CRUD Operations) and Projection and apply some queries to get specified output.	2
4.	Indexing and Aggregation in NoSQL-DB. (Indexing, Advanced Indexing, Aggregation and Map Reduce)	2
5.	Replication and Sharding in NoSQL-DB	2
6.	Developing Java and Node JS Application with NoSQL-DB	2
7.	Administration of in NoSQL-DB Cluster Operations	2
8.	Project with NoSQL-DB	

Text Books

1	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence , Author: Sadalage, P. & Fowler, Publication: Pearson Education

Reference Books

1	Name: Redmond, E. &Wilson, Author: Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition: 1st Edition.

ICT / MOOCs

1	https://nptel.ac.in/courses/106104135/45
2	https://nptel.ac.in/courses/106104135/46
3	https://nptel.ac.in/courses/106104135/47

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FACULTY OF ENGINEERING & TECHNOLOGY

TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	V		
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
2CEIT501	Computer Architecture & Organization	3	0	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT502	Software Engineering	3	0	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT503	Computer Networks	4	0	4	1	-	1	4	0	4	2	-	2	40	60	100	30	20	50
2CEIT504	Capstone Project-I	-	-	-	1	-	1	0	0	0	2	-	2	-	-	-	30	20	50
2CEIT5PE*	Elective-I	3	0	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT5PE*	Elective-II	3	0	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2HS5101	Aptitude Skill Building-I	0	0	0	1	-	1	0	0	0	2	-	2	-	-	-	30	20	50
	Total	16	0	16	7	-	7	16	0	16	14	0	14	200	300	500	210	140	350
		23						30						850					

NOTE: * indicates any number from the following set of subjects in given order

Elective-I	**Elective-II**
2CEIT5PE1 : Advanced Java	2CEIT5PE5[#] : Mobile Application Development
2CEIT5PE2 : Computer Graphics & Visualization	2CEIT5PE6 : Human Computer Interaction
2CEIT5PE3 : Quantum Computing	2CEIT5PE7[#] : Innovation & Entrepreneurship
2CEIT5PE4 : Software Packages	2CEIT5PE8 : Advanced programming with .NET

NOTE[#]: The teaching and examination scheme for the following subjects differ from the general electives, however, total credits are same and teaching hours would be 31.

2CEIT5PE5[#]	Mobile Application Development	2	0	2	2	0	2	2	0	2	4	0	4	40	60	100	30	20	50
2CEIT5PE7[#]	Innovation & Entrepreneurship	2	1	3	1	0	1	2	1	3	2	0	2	40	60	100	30	20	50

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT501	Subject Name	Computer Architecture & Organization

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Digital Electronics

Objectives of the course:

1. To understand the structure, function and characteristics of computer systems.
2. To understand the design of the various functional units and components of computer.
3. To understand the basic concepts of pipeline and vector processing.
4. To understand the memory hierarchy.
5. To learn the assembly language programming.

Theory syllabus

Unit	Content	Hrs
1	**Overview of Register Transfer and Micro Operations:** Register Transfer Language, Register Transfer, Bus & Memory Transfer, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.	05
2	**Basic Computer Organization and Design:** Instruction Codes, Computer Registers, Computer Instructions, Timing & Control, Instruction Cycle, Memory-Reference Instructions, Input-Output & Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Unit.	05
3	**Micro Programmed Control:** Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.	03
4	**Central Processing Unit:** Introduction, General Register Organization, Stack Organization, Instruction Format, Addressing Modes, Data Transfer & Manipulation, Program Control, Reduced Instruction Set Computer (RISC).	05
5	**Pipeline and Vector Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processor.	04
6	**Input – Output Organization:** Input-Output Interface, Asynchronous Data Transfer, Modes Of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPUIOP Communication, Serial Communication.	04
7	**Memory Organization:** Memory Sub System, Memory Hierarchy, Main Memory, Auxiliary Memory, Flash Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.	05
8	**Microprocessor Architecture:** 8085 Architecture, Instruction Set, Instruction Types & Formats, Instruction Execution,	14

	Instruction Cycles, Different Types of Machine Cycles & Timing Diagram, 16-Bit Microprocessors, 8086 Architecture, Registers, Memory Segmentation & Addressing, 32-Bit/64-Bit Microprocessor Families.	

Practical content	
Experiments/Practical/Simulations would be carried out based on syllabus	
Text Books	
1	Computer System Architecture: By M. MorrisMano, Pearson Publication
2	Microprocessors and Interfacing: By D.V.Hall, Tata McGrawHill.
Reference Books	
1	Structured Computer Organization: By Tanenbaum, PHI Publication
2	Computer Organization and Architecture: By Stallings, Pearson Publication
3	The Intel Microprocessors: By B.B. Brey, Pearson Education.
ICT/MOOCs Reference	
1	https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
2	https://nptel.ac.in/courses/106/105/106105163/

Course Outcomes:

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

1. Understand the organization of a Computer system.
2. Apply the knowledge of combinational and sequential logical circuits to design computer architecture.
3. Understand the input / output and Memory related concepts.
4. Apply the concepts of architecture of a processor and machine level programming.
5. Apply the digital principles in modelling and designing of computer based systems.
6. Write assembly language programming for computing and engineering practice.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT502	Subject Name	Software Engineering

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Concepts of Object oriented programming and algorithms

Objectives of the course:

1. Able to gain knowledge of different software development lifecycle models and able to apply it
2. Acquire knowledge of different analysis models and build according to software needs
3. Gain the understanding of different approaches of requirement gathering, analysis, and documentation
4. Get to know different coding and testing standards and methods to be used in industry for software projects

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Software and Software Engineering:** FAQ about Software Engineering, Software characteristics, The Changing Nature of Software, Software Myths	03
2	**Process Models (Software Development Life Cycle):** What is Software Process? , What is Software Development Life Cycle (SDLC)? Prescriptive models, The water fall model (classical life cycle model), Incremental Process model, Evolutionary process model, The unified process	04
3	**Building the Analysis Model:** Requirement Analysis, Analysis Modelling Approaches, Data Modelling Concepts, Object Oriented Analysis, Scenario Based Modelling, Class Based Modelling, Creating a Behavioural Model, Flow Oriented Modelling, Entity Relationship Diagram (E-R diagram)	04
4	**Requirements Analysis and Specification or Requirement Engineering:** Requirement Engineering, Requirement Elicitation, Requirement Analysis, Requirement Documentation (SRS), Requirement Gathering and Analysis, Software Requirement Engineering	05
5	**Software Project Management:** Introduction, Responsibility of Software Project Manager, Project Planning Activities, Project planning, SPMP Document, Metrics for Project Size Estimation, Project Estimation Techniques, Scheduling	06
6	**Coding and Testing:** Coding Standards & Guidelines, Coding Review, What is Testing, Error- Faults-Failures, Test cases, Test suites, Verification versus Validation, Design of Test Cases, Alpha and Beta Testing, Testing in Small and Large Scale, Black Box Testing, White Box Testing (Structural Testing), Integration testing, System Testing	06
7	**Software Design**: Design Framework, Conceptual Design & Technical Design, Quality Attributes (FURPS) (Hewlett–Packard), Modularity, Strategy of Design, Function Oriented Design, Object Oriented Design Approach(OOD)	05
8	**Unified Modelling Language (UML):** Overview of object oriented concepts, Advantage of OOD, Unified modelling language(UML),	05

	UML diagrams, Use Case Diagram, Class Diagram, Sequence, collaboration Diagram, Activity Diagram, State chart Diagram	
9	**Function oriented software design:** Overview of SA/SD methodology Structured analysis, Data flow diagrams (DFDs), Structure design	03
10	**Advanced Topics in Software Engineering** Component-Based Software Engineering, Client/Server Software Engineering, Web Engineering, Reengineering, Computer-Aided Software Engineering, Software Process Improvement, Emerging Trends in software Engineering.	04

Practical content	
Experiments/Practical/Simulations would be carried out based on syllabus	
Text Books	
1	Software Engineering a practitioner's approach by Roger S. Pressman
Reference Books	
1	Software Engineering by Sommerville
2	Fundamentals of Software Engineering by Rajib Mall
3	Fundamentals of Software Engineering by K. K. Agrawal
4	Object–Oriented Modelling and Design with UML by Rumbaugh, Blaha
ICT/MOOCs Reference	
1	https://swayam.gov.in/nd2_cec20_cs07/preview

Course Outcomes:

After Successful completion of this course, student will be able to

1. Design the application of different SDLC models for different types of projects.
2. Develop and understand the application of different requirement models require for the any software
3. Gather, understand, analyse and document the software requirements
4. Manage the software project development by staffing, scheduling and estimation techniques
5. Implement and use certain coding and testing standards for their software projects
6. Understand the advance and emerging trends of software engineering

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Programme	Bachelor of Technology				Branch/Spec.	Computer Engineering/Information Technology			
Semester	V				Version	2.0.0.0			
Effective from Academic Year		2020-21			Effective for the batch Admitted in				July 2018
Subject code	2CEIT503		Subject Name		ComputerNetworks				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture (DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	4	0	1	-	5	Theory	40	60	100
Hours	4	0	2	-	6	Practical	30	20	50

Pre-requisites:

Operating System

Objectives of the course:

1. Build an Understanding of Modern Network Architectures From Design and Performance Perspective.
2. Able to Understand Fundamental Concepts of Communication Networks Like Network Devices, topologies, Types of Network, Addressing Mechanism, Routing.
3. To Make Students Familiar with Services and Functionalities Offered at Each Layer of the Network Protocol Stack.
4. Learn Various Protocols at Data Link Layer, Network Layer, Transport Layer & Application Layer of Network.
5. To Familiarize with The Basic Taxonomy & Terminology of The Computer Networking with the Concept of Layered Approach.

Theory syllabus

Unit	Content	Hrs
1	**Overview:** Basics of Computer Networks, Network Hardware, Network Software, Uses of Computer Networks, Types of Network, Network Topology , Examples of Network and Protocols, Reference Models: OSI, TCP/IP	08
2	**Physical Layer:** Data, Signals, Analog and Digital Transmission, Transmission Media and Impairments, Multiplexing, Transmission in ISDN, Broad Band ISDN	08
3	**Data Link Layer:** Design Issues: Services Provided to Network Layer, Framing, Error Detection and Correction, Flow Control, Data Link Control and Protocols, Medium Access, Multiple Access Protocols: ALOHA, CSMA/CD, CSMA/CA, Channelization, Ethernet 802.3, Token Ring 802.5, Circuit Switching & Packet Switching, Switching Networks, Wireless LAN	14
4	**Network Layer:** Design Issues, Introduction to Routing, Virtual Circuits, Connectionless Internetworking, Fragmentation, Internet Protocol, IP Addressing Scheme, Sunetworking, Ipv6, ARP, RARP, Routing Algorithms, Congestion Control Mechanisms, QOS	10
5	**TransportLayer:** Process to Process Delivery, Client-Server Paradigm, Addressing, Multiplexing and DeMultiplexing, Establishing a Connection, Releasing a Connection, UDP, TCP: Service Model, Connection Management, Silly Window Syndrome, Performance Issues, Congestion Control	10
6	**Application Layer:** Introduction to Application Layer Protocols: DNS, SMTP, FTP, HTTP, SNMP, WWW, Socket Programming	06
7	**Overview of Advance Concepts of Networking:**	04

	Infrastructure-less Networks : Wireless Adhoc Network, Sensor Network, IoT, Edge Computing and Other Recent Trends in Networking	

Practical content	
Experiments/Practical/Simulations would be carried out based on syllabus	
Text Books	
1	Data Communication &Networking by Behrouz A.Forouzan, Tata McGrawHill.
2	Computer Networks by Andrew S. Tanenbaum, PrenticeHall India.
Reference Books	
1	Computer Networks: A Top Down Approach by Behrouz A. Forouzan. Tata McGrawHill
2	Data & Computer Communications by William Stallings. PrenticeHallIndia.
3	Introduction to Wireless and Mobile System by D. P. Agrawal and Q.-A. Zeng, Cengage Learning
ICT/MOOCs Reference	
1	https://nptel.ac.in/courses/106/105/106105183/
2	https://nptel.ac.in/courses/106/106/106106091/

Course Outcomes:

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

1. Analyse the functionality of layered network architecture.
2. Categorize the different types of network topologies, network devices and their functions within a network.
3. Recognize the significance of different networking protocols, algorithms and design issues for layered model.
4. Use network simulator tool(s) to examine key networking algorithms.
5. Use the knowledge of network protocols and its performance in design and configuration of computer networks.

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT504	Subject Name	Capstone Project – I

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	0	0	1	-	1	Theory	-	-	-
Hours	0	0	2	-	2	Practical	30	20	50

Pre-requisites:

Understanding of programming, databases, and algorithms.

Objectives of the course:

1. To motivate the students to work in emerging / latest technologies
2. To help the student to develop ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories
3. To provide enough experience to the students to carry out the larger project in the sixth semester.

Theory syllabus

Practical Content

	Guidelines	Hrs
	Students are supposed to find out a suitable project and prepare a detailed plan in fifth semester so that it can be executed smoothly in sixth semester. The students then will work on the identified problem through a rigorous process of understanding and analysing the problem, conducting a literature survey, deriving, discussing (monitored by guide) and designing the project proposal with the following subtitles: • Rationale (one page) • Introduction • Literature survey • Problem definition • Proposed methodology of solving identified problem • In-case some prototype has to be fabricated then its tentative design and procedure for making it should be part of the proposal. • Resources and consumables required. • Action plan (Sequential list of activities with probable dates of completion)	30

Text Books

Reference Books

ICT/MOOCs Reference

1	https://www.coursera.org/specializations/product-management
2	https://www.udacity.com/course/software-development-process--ud805

Course Outcomes:

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

1. Write the problem/task specification in existing system.
2. Select, collect and use the required information/knowledge to solve the problem.
3. Logically choose relevant possible solution(s).
4. Assess the impact of project on society.
5. Prepare project proposal with action plan and time duration scientifically before beginning the project.
6. Communicate effectively and confidently as a member and leader of team.

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FACULTY OF ENGINEERING& TECHNOLOGY

Programme	Bachelor of Technology				Branch/Spec.	Computer Engineering/Information Technology			
Semester	V				Version	2.0.0.0			
Effective from Academic Year		2020-21			Effective for the batch Admitted in				July 2018
Subject code	2CEIT5PE1		Subject Name		Advanced Java				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture (DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Object Oriented Programming

Objectives of the course:

1. Acquire knowledge on the advanced concepts and practices in a field of Java EE to develop enterprise level applications.
2. Develop data driven applications to manage data and processes over the network using JDBC and database framework.
3. Develop GUI applications, multi-tier web applications and enterprise applications using Java EE technologies.
4. Develop Java applications using web MVC framework.

Theory Syllabus

Unit	Content	Hrs
1	**Introduction to Java EE Platform and Architecture:** Java EE Platform, Enterprise Application and Architecture, Java EE Containers and Components, Java EE Technologies, Java EE Application Deployment	03
2	**JavaDatabase Connectivity(JDBC):** Introduction, JDBC Architecture: API and Drivers, Types of JDBC Statements,Types of Result sets, Batch Processing, Transactions, JDBC Exception Types, Metadata	07
3	**SwingProgramming:** Introduction, Limitations of AWT, Swing Components and Containers, Look and Feel for Swing Components, MVC Architecture	04
4	**Servlet:** Introduction, Servlet API and Interface, Generic Servlet, HTTP Servlet, Servlet Lifecycle, Servlet Container, Servlet Request, Servlet Collaboration, Servlet Context, Session Management	07
5	**JSP:** Introduction, Advantages of JSP, Working and Lifecycle of JSP, Directives, Scripting elements, Action Elements, Implicit Objects, Java Beans, Various scope in JSP, JSTL	07
6	**Java Mail:** Overview, Mail protocols, Java Mail API, Java Mail Exception, Sending and Receiving Mail	02
7	**Hibernate:** Introduction to JPA, Entities, Entity Relationships,JPA - ORM Components,Entity Manager, Introduction to Hibernate, Hibernate Architecture, Hibernate Mapping Types, Hibernate Configuration, Hibernate Sessions, Persistent Class & Mapping Files, Hibernate O/R Mapping,Hibernate Annotations, Hibernate Query Language	06
8	**Java Web Frameworks- Spring MVC:** Overview of spring, Spring architecture, Aspect – oriented spring, managing database,	06

	Managing transaction	
9	**Java Server Faces:** Introduction to JSF, JSF request processing life cycle, JSF Facelets Tag, JSF Convertor Tag, JSF Validation Tag, JSF Event handling and database access	03
Practical Content		
Experiments/Practical/Simulations would be carried out based on syllabus.		
Text Books		
1	J2EE Unleashed by Joseph J. Bambara, BPB publications	
2	Java Server Programming Java EE5 Black Book, Dreamtech Press	
Reference Books		
1	Professional Java Server Programming Volume I and II, Wrox Publication	
2	The complete Reference J2EE by Jim Keogh,Mcgraw Hill Education Pvt. Ltd	
3	Head first Servlets and JSPs,byBryan Basham, Kathy Sierra, Bert Bates,O'Rilley Media	
4	Professional Java Server Programming: J2EE by Allamaraju, Shroff Publication	
ICT/MOOCs Reference		
1	https://www.udemy.com/spring-hibernate-tutorial/	
2	https://www.udemy.com/jsp-servlet-free-course/	
Course Outcomes:		

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

1. Develop event driven programs using graphical user interface components.
2. Develop database driven java programs using JDBC.
3. Develop web applications using Servlets, Java Server Pages and JDBC.
4. Develop web applications using Hibernate framework.
5. Develop web applications using Spring MVC framework.

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT5PE2	Subject Name	Computer Graphics & Visualization

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Knowledge of C Programming language, Basic Linear Algebra, Basic data structures and algorithms

Objectives of the course:

1. Understand about fundamentals of Graphics to enable them to design animated scenes for virtual object creations.
2. Understand the 2D & 3D graphics and their transformations.
3. Understand illumination and color models.
4. Understand clipping techniques.

Theory Syllabus

Unit	Content	Hrs
1	**Introduction:** History of Computer Graphics, Applications, Animation, Rendering, Relation to Computer Vision and Image Processing	02
2	**Introduction To Opengl:** Opengl Architecture, Primitives and Attributes, Simple Modeling and Rendering of Two- and Three-Dimensional Geometric Objects, Indexed and RGB Color Models, Frame Buffer, Double Buffering, GLUT, Interaction, Events and Callbacks, Picking.	04
3	**Raster Graphics & Clipping:** Point, Line, Circle and Ellipse as Primitives, Fill Area Primitives, Windowing, Line Clipping (Cohen and Sutherland, Cyrus-Beck), Polygon Clipping, 3d Clipping, Introduction to Anti-Aliasing Technique	05
4	**2D & 3D Geometric Transformations:** Basic Transformation, Matrix Representations and Homogenous Coordinates, Composite Transformations, Affine Transformations, Matrix Stacks and Model View Matrix In Opengl.	04
5	**2D & 3D Viewing:** Viewing Pipeline and Co-Ordinate System, Viewing Transformations, Classical 3D Viewing, Parallel and Perspective Projective Transformations	02
6	**3D Object Representation and Visualization:** Curves and Surfaces: Cubic Splines, Bezier Curves, B-Splines, Tensor Product Surfaces, Surface of Revolution Sweep Surfaces, Fractal Curves and Surfaces, Hidden Line/Surface Removal Methods, Visibility- Z-Buffer, BSP Trees, Open-GL Culling, Hidden-Surface Algorithms, Visualization, Interpolation, Modelling Techniques, Trees, Scene Graphs, Wireframe, Surface and Solid Modelling, Surface Area and Volume Estimation For 3D Tessellation	09
7	**Lighting & Shading:** Light Sources, Basic Illumination Models: Ambient Light, Diffuse Reflection, Specular Reflection	08

	and Phong Model, Intensity Attenuation, Color Models, Transparency and Shadows, Gouraud and Phong Shading for Polygons, Programmable Shaders: Opengl Shading Language, Fragment Shaders, Cub and Bump Maps	
8	**Discrete Techniques:** Texture Mapping, Compositing, Textures in Opengl; Ray Tracing- Recursive Ray Tracer, Ray-Sphere Intersection	05
9	**Introduction of CUDA Programming:** Different Generations of Gpus, GPU Architecture Overview, CUDA Programming Model, Memory Models, CUDA Hardware Interface on The GPU, CUDA Programming Examples	03
10	**Introduction of Animation:** Principles of Animation, Overview of Various Animation Techniques, Storyboards for Animation, Key-Frame System, Tweening and Morphing	03

Practical Content	
Experiments/Practical/Simulations would be carried out based on syllabus	
Text Books	
1	"Mathematics for 3D Game Programming and Computer Graphics" by Eric Lengyel, Course Technology PTR Cengage Learning.
2	Donald Hearn and Pauline Baker, Computer Graphics with OpenGL, Prentice Hall
Reference Books	
1	Peter Shirley and Steve Marschner, Computer Graphics, A. K. Peters.
2	F. S. Hill Jr. and S. M. Kelley, Computer Graphics using OpenGL, Prentice Hall.
3	"Geometric Modeling and Mesh Generation from Scanned Images by Jessica Zhang", Taylor and Francis Group.
4	"Curves and Surfaces For CAGD" by Gerald Farin, Morgan Kauffman Publishers.
5	"Polygon Mesh Processing" by Botsch, Kobbelt, Pauly, Alliez and Levy, A K Peters Ltd
6	Tomas Akenine-Mller and Eric Haines Naty Hoffman, Real-Time Rendering, A.K. Peters.
7	NVidia CUDA Repository, URL: http://developer.nvidia.com/category/zone/cudazone
8	Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education
9	"Geometric Modeling and Mesh Generation from Scanned Images by Jessica Zhang", Taylor and Francis Group.
10	M. de Berg, M. Van Kreveld, M. Overmars, and O. Schwarzkopf, Computational Geometry: Algorithms and Applications, Springer.
ICT/MOOCs Reference	
1	https://nptel.ac.in/courses/106106090/

Course Outcomes:

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

1. Implement the concept of 2D and 3D transformations, projection and viewing.
2. Gain detailed knowledge of the graphics pipeline.
3. Implement the concept of shading and texture mapping algorithms.
4. Get broad knowledge of 3D modelling and rendering techniques.
5. Understand, design and implement scene graphs for games.
6. Develop practical skills in graphics programming.

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT5PE3	Subject Name	Quantum Computing

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Data Structure and Algorithm, Programming concepts

Objectives of the course:

1. To learn and understand the concept of Quantum Computing.
2. To learn and understand the concept of Qubits System.
3. To learn and understand the architecture of Quantum Computing.
4. Understanding of Quantum Logic gates and circuits.
5. Demonstrate the quantum computing algorithm by simulating it on a classical computer, and state some of the practical challenges in building a quantum computer.
6. Distinguish problems of different computational complexity and explain why certain problems are rendered tractable by quantum computation with reference to the relevant concepts in quantum theory.

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Quantum Computing:** Motivation for Studying Quantum Computing, Major Players in The Industry (IBM, Microsoft, Rigetti, D-Wave Etc.), Origin Of Quantum Computing, Overview of Major Concepts in Quantum Computing - Qubits and Multi-Qubits States, Bra-Ket Notation, Bloch Sphere Representation, Quantum Superposition, Quantum Entanglement	06
2	**Math Foundation for Quantum Computing:** Matrix Algebra: Basis Vectors and Orthogonality, Inner Product and Hilbert Spaces, Matrices and Tensors, Unitary Operators and Projectors, Dirac Notation, Eigen Values and Eigen Vectors.	09
3	**Building Blocks for Quantum Program:** Architecture of Quantum Computing Platform, Details of Q-Bit System of Information Representation: Block Sphere, Multi-Qubits States, Quantum Superposition of Qubits (Valid and Invalid Superposition), Quantum Entanglement, Useful States From Quantum Algorithmic Perceptive E.G. Bell State, Operation on Qubits: Measuring and Transforming Using Gates, Quantum Logic Gates and Circuit: Pauli, Hadamard, Phase Shift, Controlled Gates, Ising, Deutsch, Swap etc, Programming Model for A Quantum Computing Program, Steps Performed on Classical Computer, Steps Performed on Quantum Computer, Moving Data Between Bits and Qubits.	08
4	**Quantum Algorithms:** Basic Techniques Exploited by Quantum Algorithms: Amplitude Amplification, Quantum Fourier Transform, Phase Kick-Back, Quantum Phase Estimation, Quantum Walks, Major	22

	Algorithms: Shor's Algorithm, Grover's Algorithm, Deutsch's Algorithm, Deutsch -Jozsa Algorithm, Oss Toolkits For Implementing Quantum Program: Ibm Quantum Experience, Microsoft Q, Rigetti Pyquil (Qpu/Qvm).	

Practical Content	
Experiments/Practicals/Simulations would be carried out based on syllabus	
Text Books	
1	Quantum Computation and Quantum Information, M A Nielsen and I L Chuang.
2	An Introduction to Quantum Computing, P Kaye, R Laflamme and M Mosca.
Reference Books	
1	Pittenger A. O., An Introduction to Quantum Computing Algorithms
2	David McMahon, "Quantum Computing Explained", Wiley
ICT/MOOCs Reference	
1	https://nptel.ac.in/courses/115101092/
2	https://nptel.ac.in/courses/104104082/

Course Outcomes:

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

1. Use the principles of quantum computing
2. Classify the problems that can be expected to be solved well by quantum computers.
3. Understand the basic quantum algorithms.
4. Understand the differences between classical and quantum computing.

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT5PE4	Subject Name	Software Packages

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic concepts of HTML, CSS and JavaScript and OOPS

Objectives of the course:

1. Understand how to write asynchronous code using different techniques.
2. Learn how to install, update and uninstall node packages using npm.
3. Learn how to work with events and stream for better non-blocking i/o.
4. Understanding of database connectivity with node.js application.
5. Conceptualize the lifecycle of a component in react.
6. Manage state and events in react applications.

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Node.js:** Advantages of Node.js, Traditional Web Server Model, Node.js Process Model	04
2	**Node.js Modules:** Functions, Buffer, Module, Module Types, Core Modules, Local Modules	06
3	**Node Package Manager:** What is NPM, Installing Packages Locally, Adding Dependency in Package json, Installing Packages Globally, Updating Packages	07
4	**Events:** EventEmitter Class, Returning Event Emitter, Inhering Events	05
5	**Database Connectivity:** Connect Database with Node.js Application, Configuring Node.js Application, Working with Select Command, Updating Records, Deleting Records	07
6	**Introduction to React and Component:** React Syntax, React Component Properties, Setting Properties, Component Lifecycle, Updating Components	07
7	**React State:** Creating State, Events In React, hanging State, Changing State From Another Component	04
8	**React Forms:** Creating a Form With State, Controlled Components and OnChange, Uncontrolled Components & Refs, Form Submit Action to Context	05

Practical content

Experiments/Practicals/Simulations would be carried out based on syllabus

Text Books	
1	Practical Node.js: Building Real-World Scalable Web Apps by AzatMardan
2	The Road to learn React by Robin Wieruch
Reference Books	
1	Learning React: Functional Web Development with React and Redux by Alex Banks, Eve Porcello
2	Smashing Node.js: JavaScript Everywhere by Guillermo Rauch.
ICT/MOOCs Reference	
1	https://reactjs.org/docs/getting-started.html
2	https://www.edureka.co/nodejs-certification-training
3	https://www.guru99.com/node-js-tutorial.html
4	https://nodejs.org/en/
5	https://reactjs.org/

Course Outcomes:

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

1. Understand the JavaScript and technical concepts behind Node.js.
2. Build simple command line programs or complex enterprise level web applications with equal ease.
3. Create and deploy dynamic front end applications using React.
4. Build powerful, fast, user-friendly and reactive web applications.

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT5PE5	Subject Name	Mobile Application Development

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	T U	P	TW					
Credit	2	0	2	-	4	Theory	40	60	100
Hours	2	0	4	-	6	Practical	30	20	50

Pre-requisites:

Object oriented programming

Objectives of the course:

1. Understand the basics of Android devices and Platform.
2. Acquire knowledge on basic building blocks of Android programming required for Application development.
3. Gain knowledge to user interfaces used in android applications.
4. Acquire knowledge on advanced application concepts like networking, Animations and Google Maps services etc.
5. Develop and publish Android applications in to Android Market.
6. Understand the knowledge of JSON and applications of JSON.

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Android:** History of Mobile Software Development, Open Handset Alliance, What is an Android, Difference between i-phone OS (apple) and Android OS, Define term HTML, XML and WML	02
2	**Setting Up Your Android Development Environment:** Configuring Your Development Environment, Difference between JVM and DVM, Android platform Architecture, Advantage of DVM over JVM, Android Emulator	02
3	**Understanding the Anatomy of an Android Application:** What is the meaning of an Anatomy? , Explain the activity with their states? , What are the methods used in android activity life cycle? , Explain the Android activity life cycle	03
4	**Defining your Application using the Android Manifest file:** Core files and Directories of the Android Application, What are the contents of the Android Manifest file? , How to edit the Android manifest file?, Registering Activities and Other in Application	02
5	**Managing Application Resources:** What Are Resources?, Storing Application Resources , Understanding the, Resource Directory Hierarchy, Resource Value Types, Setting Simple Resource Values Using Eclipse, Working with String, String Arrays, Boolean, Integer, Colours, Dimensions, Drawables, Images resources etc…, Working with Layouts, Using Layout Resources Programmatically	03
6	**Exploring User Interface Screen Elements:** Introducing the Android View, Android Control, Android Layout, Displaying Text to Users with Text View, Configuring Layout and Sizing, Using Buttons, Check Boxes, Radio Groups,	03

	spinner, Progress Bar	
7	**Designing User Interfaces with Layouts:** Creating User Interfaces in Android, Creating Layouts Using XML Resources and Programmatically, ScrollView, GridView, ListView, Spinner	02
8	**Drawing and Working with Animation:** Design Working with Canvases and Paints, Drawing Ovals and Circles, Frame by frame & tween animation	03
9	**Explore Data Storage Techniques:** Working with Shared Preferences, What is SQLite, features of SQLite, store data in SQLite	03
10	**Explore Google Map:** Feature of Google map, version of Google map APIs, integration of google map in android application	02
11	**Working with other components:** Use of TimePicker & DatePicker, Different Dialogboxs, Option menu & context menu, Send/read SMS, JSON & Application with JSON	03
12	**iPhone OS:** Introduction to iPhone Architecture, AppDelegate, View controller, Interface Builder, Nib File, COCOA and MVC Framework, Overview of features of latest iOS	02

Practical content
Experiments/Practicals/Simulations would be carried out based on syllabus.

Text Books	
1	The Swift Programming Language By Apple Inc.
2.	Android Programming with Kotlin for Beginners by John Horton, Packt Publishing Limited.

Reference Books	
1	Android Wireless Application Development, by Shane Conder & Lauren Darcey. Pearson.
2	Head First Kotlin: A Brain - Friendly Guide by Dawn Griffiths and David Griffiths.
3	Head First Android Development: A Brain-Friendly Guide By Dawn Griffiths and David Griffiths.
4	Kotline in Action By Dmitry Jemerov, Svetlana Isakova.
5	Programming Kotlin By Stephen Samuel, Stefan Bocutiu.
6	iOS 11 Swift Programming Cookbook By Vandad Nahavadipoor.

ICT/MOOCs Reference	
1	https://www.mooc-list.com/tags/android-developmen
2	https://www.mooc-list.com/tags/ios-development
3	https://www.udacity.com/course/kotlin-for-android-developers--ud888
4	https://www.udemy.com/course/learn-kotlin-by-making-android-app/
5	https://developer.android.com/guide
6	https://developer.apple.com/documentation/

Course Outcomes:

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

1. Analyse business trends impacting Android Platform.
2. Be competent with the characterization and architecture of mobile applications.
3. Understand enterprise scale requirements of mobile applications.
4. Design and develop mobile applications using application development framework.
5. Understand how to handle and share android data.
6. Develop an android services and to publish android application for use.

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT5PE6	Subject Name	Human Computer Interaction

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic understanding of programming, analysis and design.

Objectives of the course:

1. Understand the important aspects of implementation of human-computer interfaces.
2. Understand the theoretical dimensions of human factors involved in the acceptance of computer interfaces.
3. Identify the various tools and techniques for interface analysis, design, and evaluation.
4. Identify the impact of usable interfaces in the acceptance and performance utilization of information systems
5. Identify the importance of working in teams and the role of each member within an interface development phase.

Theory Syllabus

Unit	Content	Hrs
1	**Foundations of HCI:** The Human: I/O channels, Memory, Reasoning and problem solving; The computer: Devices, Memory, processing and networks; Interaction: Models, frameworks, Ergonomics, styles, elements, interactivity and paradigms.	9
2	**Models & Theories:** Cognitive models, Socio-Organizational issues and stake holder requirements, Communication and collaboration models, Hypertext, Multimedia and WWW.	9
3	**Interactive Design & Software Process:** Interactive Design basics: process, scenarios, navigation, screen design, Iteration and prototyping. HCI in software process: software life cycle, usability engineering, prototyping in practice, design rationale. Interaction Styles: Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages. Design standards, guidelines, rules. Evaluation Techniques: Universal Design	10
4	**Mobile HCI and Web Interface Design:** Designing Web Interfaces: Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages and Process Flow. Mobile HCI: Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design and Tools.	10
5	**Virtual and Augmented Reality & Ubiquitous Computing:** Virtual reality: pros and cons, Augmented reality: pros and cons, ubiquitous computing and ambient intelligence, Wearable devices and the miniaturization of computing platforms, Uses and benefits of these technologies, Disadvantages and problems	7

Practical Content

Experiments/Practicals/Simulations would be carried out based on syllabus

Text Books

1	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, Pearson Education.
Reference Books	
1	Ben Shneiderman, “Designing the User Interface-Strategies for Effective Human Computer Interaction”, ISBN:9788131732557, Pearson Education.
2	Julie A. Jacko (Ed.), Human-Computer Interaction Handbook, CRC Press. ISBN 1-4398-2943-8.
3	Jonathan Lazar, Jinjuan Heidi Feng, & Harry Hochheiser Research Methods in Human-Computer Interaction, Wiley.
4	Usability Engineering: Scenario-Based Development of Human-Computer Interaction, by Rosson, M. and Carroll, J..
5	Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O‟Reilly.
6	Brian Fling, “Mobile Design and Development”, First Edition , O‟Reilly Media Inc..
ICT/MOOCs Reference	
1	https://www.coursera.org/courses?query=human%20computer%20interaction
2	https://www.udacity.com/course/human-computer-interaction--ud400
3	http://www.edx.org/course/human-computer-interaction-i-fundamentals-design-p
4	https://online.stanford.edu/programs/human-computer-interaction-graduate-certificate
Course Outcomes:	
After successful completion of this course, student will be able to 1. Understand foundations of Human Computer Interaction. 2. Identify the impact of HCI, formulate and solve user interface issues. 3. Develop software prototype for interfaces with necessary interactive design standards and guidelines. 4. Design web and mobile interfaces with design concepts such as inlays, overlays and virtual concepts and various design tools.	

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July-2018
Subject code	2CEIT5PE7	Subject Name	Innovation & Entrepreneurship

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	1	1	-	4	Theory	40	60	100
Hours	2	1	2	-	5	Practical	30	20	50

Pre-requisites:

The course does not have any Pre-requisites.

Objectives of the course:

1. Understanding different methods to assess the attractiveness of business opportunities.
2. Understanding what characterizes an attractive business opportunity and common pitfalls during the entrepreneurial process and Decision making.
3. Understanding the key risks and the most effective processes in bringing different types of products or services to market.
4. Developing an understanding of Crafting business models and Lean Start-ups methods and theories relevant for the field.
5. Understanding how to Organize Business and Entrepreneurial Finance.

Theory syllabus

Unit	Content	Hrs
1	**Introduction To Entrepreneurship:** Entrepreneurs; Entrepreneurial Personality and Intentions - Characteristics, Traits and Behavioural; Entrepreneurial Challenges	04
2	**Entrepreneurial Opportunities:** Opportunities - Discovery/ Creation, Pattern Identification and Recognition for Venture Creation: Prototype and Exemplar Model, Reverse Engineering	06
3	**Entrepreneurial Process And Decision Making:** Entrepreneurial Eco-System, Ideation, Development and Exploitation of Opportunities; Negotiation, Decision Making Process and Approaches**,** Effectuation and Causation	06
4	**Crafting Business Models And Lean Start-Ups:** Introduction to Business Models; Creating Value Propositions - Conventional Industry Logic, Value Innovation Logic; Customer Focused Innovation; Building and Analysing Business Models; Business Model Canvas, Introduction to Lean Start-Ups, Business Pitching	08
5	**Organizing Business And Entrepreneurial Finance:** Forms of Business Organizations; Organizational Structures; Evolution of Organisation, Sources and Selection of Venture Finance Options and its Managerial Implications. Policy Initiatives and Focus; Role of Institutions in Promoting Entrepreneurship	06

Practical content

Experiments/Practical/Simulations/Case studies would be carried out based on syllabus

Text Books

1	Ries, Eric, The lean Start-up: How constant innovation creates radically successful businesses, Penguin Books Limited.
2	Blank, Steve, The Startup Owner's Manual: The Step by Step Guide for Building a Great Company, K&S Ranch.

Reference Books

1	T. H. Byers, R. C. Dorf, A. Nelson, Technology Ventures: From Idea to Enterprise, McGraw Hill.
2	Osterwalder, Alex and Pigneur, Yves, Business Model Generation.
3	Kachru, Upendra, India Land of a Billion Entrepreneurs, Pearson

ICT/MOOCs Reference	
1	https://swayam.gov.in/nd1_noc19_mg55/preview
2	https://online.stanford.edu/courses/xmse100-introduction-innovation-and-entrepreneurship
3	https://www.coursera.org/learn/open-innovation-entrepreneurship

Course Outcomes:

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

1. Explain the fundamentals behind the entrepreneurial personality and their intentions
2. Discover/create and evaluate opportunities.
3. Identify various stakeholders for the idea and develop value proposition for the same.
4. Describe various Business Models and design a business model canvas.
5. Select suitable finance and revenue models for start-up venture.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT5PE8	Subject Name	Advanced Programming with .NET

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	T U	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Students should know about Javascript, HTML, Basics of Dot net framework, Basics of ASP.NET, Visual Studio, Object oriented programming

Objectives of the course:

1. This course helps to build and practice programming skills
2. The course also focuses on delivering knowledge and hands-on experience about building web applications using the MVC model of ASP.NET
3. This course cumulatively gives great exposure to the learners about Razor views & signalR, AJAX, JQuery, Web services in detail
4. Develop and publish Desktop applications
5. Able to work on Azure cloud
6. Learn about the basic concepts of Avalonia Framework, Xamarin

Theory syllabus

Unit	Content	Hrs
1	**Introduction of .NET Core:** Understanding .NET Core, .NET Core Features, .NET Core Framework Architecture, .NET Core 3.0 vs .NET 4.5 Framework, .NET Core Supports, Advantages of .NET Core, .NET App Model, .NET CLI	03
2	**ASP.NET Core:** ASP .NET Core Project structure, Configuration, Creating & Injecting Service, MVC: MVC Architecture, MVC Middleware, Model, View, Controller, Action Methods, ASP.NET MVC Framework, Life Cycle of ASP.MVC Request, MVC State Management, Simple MVC based Web Application, Integration with Modern UI Frameworks, MVC Validation, Data Annotations, Security, Routing in MVC, Web API, CRUD using Web API, Authentication and Authorization: Role Based Authorization, JWT Token	12
3	**Razor Views & SignalR:** Razor View Engine, Types of Views, Razor Syntax Fundamentals, Razor Statements, Loops, Enum Support, Layout view Razor (Master Pages), Working with Sections, Working with Partial Views, SignalR with chat application	05
4	**Entity Framework Core:** Object Relational Mapping (ORM), Entity Framework, Database Modeling, CRUD Operations, Database Migration, Repository Design Pattern, Unit of Work Design Pattern, Dependency Injection	05
5	**AJAX & JQuery :**	03

	ASP.NET Ajax Introduction, Architecture , Using AJAX.NET Controls ,Accordion, Calendar ,Cascading Dropdown, Collapsible Panel , Filtered Textbox ,NumericUpDown, Modal Popup , Popup Control , ASP.NET Ajax Server Controls , ASP.NET Ajax Server Data, ASP.NET Ajax Client-side Library, ASP.NET Ajax Control Toolkit	
6	**Web Services:** The Motivation for XML Web Services, Creating an XML Web Service, Designing XML Web Services, Web Service Consumers, Discovering Web Services Using UDDI, Web Service using RESTful, Web Service SOAP, Developing Secure WebService	05
7	**Dot Net Core Desktop Application:** Application Architecture, Application Life Cycle, Navigation, Designing XAML UI, MVVM architecture, Data Binding, Entity Framework	05
8	**Introduction to Azure Cloud:** Cloud, WebAPI using Azure Cloud, Azure services, Microsoft Azure Storage, Azure Virtual Network, Azure Virtual Machines	04
9	**Advanced Topics:** Avalonia Framework, Xamarin	03

Practical content	
Experiments/Practicals/Simulations would be carried out based on syllabus	
Text Books	
1	Pro ASP.NET MVC 5 (Expert's Voice in ASP.Net), by Adam Freeman
2	C# 8.0 and .NET Core 3.0 – Modern Cross-Platform Development: Build applications with C#, .NET Core, Entity Framework Core, ASP.NET Core, and ML.NET using Visual Studio Code, by Mark J. Price
Reference Books	
1	Learn ASP.NET Core 3: Develop modern web applications with ASP.NET Core 3, Visual Studio 2019, and Azure, by Kenneth Yamikani Fukizi, Jason De Oliveira, Michel Bruchet
2	Pro Entity Framework Core 2 for ASP.NET Core MVC by Adam Freeman
3	Pro ASP.NET Web API: HTTP Web Services in ASP.NET (Expert's Voice in .NET) by Tugberk Ugurlu, Alexander Zeitler, Ali Kheyrollahi
4	Xamarin Mobile Application Development: Cross-Platform C# and Xamarin.Forms Fundamentals, by Dan Hermes
5	Azure for Architects: Implementing cloud design, DevOps, IoT, and serverless solutions on your public cloud 1st Edition, by Ritesh Modi
6	Real-Time Web Application Development: With ASP.NET Core, SignalR, Docker, and Azure, by Rami Vemula
7	Mastering Visual Studio 2019, Kunal Chowdhury
8	Learn WPF MVVM: XAML, C# and the MVVM pattern, by Arnaud Weil
9	Ryan Benedetti and Ronan Cranley, Head First jQuery, O'Reilly Media
ICT/MOOCs Reference	
1	https://www.edx.org/course/mvc-application-design-using-net-core-20
2	https://www.udemy.com/course/complete-aspnet-core-31-and-entity-framework-development/
3	https://www.dotnettricks.com/training/masters-program/aspnet-core
4	https://avaloniaui.net/docs/

Course Outcomes:

After successful completion of this course, student will be able to:

1. Understand architecture of .NET Core, MVC web based Application.
2. Implement real time applications using signalR.
3. Use advanced concepts related to Web Services and desktop application in project development.
4. Build interactive web based UI using AJAX & jQuery.
5. Build interactive UI for desktop application.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	V	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2HS5101	Subject Name	Aptitude Skill Building-I

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	-	-	1	-	1	Theory	-	-	-
Hours	-	-	2	-	2	Practical	30	20	50

Pre-requisites:

Basic engineering mathematics and English

Objectives of the course:

1. Build a strong base in the fundamental mathematical concepts
2. Grasp the approaches and strategies to solve problems with speed and accuracy.
3. Gain appropriate skill to succeed and preliminary selection process for recruitment.
4. Collectively solve problems in teams and groups.
5. Enhance lexical skills through systematic application of concepts and careful analysis of style, usage, syntax, semantics and logic.

Syllabus

Unit	Content	Hrs
1	**Quantitative Ability I:** Height and Distance and Time Problems like Trains, Boats etc., Algebra, Inequalities and Absolute Values, Functions-Formulas, Sequences, Fractions and Decimals	06
2	**Quantitative Ability II :** Percent, Divisibility and Primes, Exponents and Roots, Word Problems, Two Variables Problems, Rates and Work, Ratios, Averages, Allegations and Mixtures, Pipes and Cistern	06
3	**Verbal Reasoning:** Vocabulary, Text Completions and Verbal Reasoning, Reading Comprehension, Logical Sequence of Words, Blood Relation Test, Venn Diagrams	06
4	**Logical Reasoning:** Number Series, Letter and Symbol Series, Artificial Language, Matching Definitions, Logical Problems, Logical Games & Puzzles	06
5	**Presentation Skill:** Preparing A Presentation, Organising The Presentation Material, Writing your Presentation, Working with Visual Aids, Presenting Data, Managing The Event, Dealing with Questions	06

Text Books

1.	Aggrawal R.S., “Quantitative Aptitude for Competitive Examinations”, S Chand
2.	Sharma Arun, “How to Prepare for Verbal Ability and Reading Comprehension for CAT”, McGraw Hill Education (India) Private Limited

Reference Books

1.	GuhaAbhijit, “Quantitative Aptitude for Competitive Examination”, McGraw Hill Education India Private Limited
2.	Aggrawal R.S., “A Modern Approach to Logical Reasoning”,S Chand
3.	Kumar Ajay, Kumar Anand, “General Aptitude Theory and Practice”, Pathfinder Publication
4.	GKP, “GATE Engineering & Mathematics General Apptitude 2016”, G.K. PUB
5.	Lewis Norman, “Word Power Made Easy”, Goyal
6.	Anderson Marilyn, “Critical Thinking, Academic Writing and Presentation Skills: Mg University Edition”, Pearson Education

Course Outcomes:

After successful completion of this course, student have

1. An ability to apply knowledge of mathematics, science and engineering.
2. An ability to function on multidisciplinary teams.
3. Recognition of the need for, and ability to engage in life-long learning.
4. An ability to identify, formulate and solve engineering problems.
5. An ability to communicate effectively.

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TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VI		
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
2CEIT601	Theory of Computation	3	0	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT602	Artificial Intelligence	3	0	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT603	Cloud Computing	3	0	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT604	User Experience Design	0	0	0	1	-	1	0	0	0	2	-	2	-	-	-	30	20	50
2CEIT605	Capstone Project-II	-	-	-	1	-	1	0	0	0	2	-	2	-	-	-	30	20	50
2CEIT6PE*	Elective-III	3	0	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT6PE*	Elective-IV	3	0	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2HS6101	Aptitude Skill Building–II	-	-	-	1	-	1	0	0	0	2	-	2	-	-	-	30	20	50
	Total	15	0	15	8	0	8	15	0	15	16	0	16	200	300	500	240	160	400
		23						31						900					

NOTE: * indicates any number from the following set of subjects in given order

Elective-III	**Elective-IV**
2CEIT6PE1 : Web Technology	2CEIT6PE6 : Robotics
2CEIT6PE2 : Software Validation & Testing	2CEIT6PE7 : Ethical Hacking
2CEIT6PE3 : Cryptography and Network Security	2CEIT6PE8# : IT Infrastructure & Management
2CEIT6PE4 : Data Sciences and Machine Learning	2CEIT6PE9 : Internet of Things
2CEIT6PE5 : Game Design & Development	

NOTE: # The teaching and examination scheme for the following subjects differ from the general electives; however, total credits are same.

2CEIT6PE8#	IT Infrastructure & Management	3	1	4	0	0	0	3	1	4	0	0	0	40	60	100	-	-	-

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT601	Subject Name	Theory of Computation

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic Understanding of Mathematics

Objectives of the course:

1. Explain the models of computation, including formal languages, grammars and automata, and their connections.
2. Identify limitations of some computational models and possible methods of proving them.
3. Have an overview of how the theoretical study in this course is applicable to engineering application like designing the compilers.
4. Course should provide a formal connection between algorithmic problem solving and the theory of automata and develop them into a mathematical view.

Theory syllabus

Unit	Content	Hrs
1	**Review of Mathematical Background:** Sets, Functions, Type of Functions, Logic, Logical Connectives, Quantifiers, Proofs, Relations, Equivalence Relation	02
2	**Regular Languages And Finite Automata:** Regular Expressions, Regular Languages, Memory Required to Recognize A Language, Finite Automata, Distinguishable Strings, Union, Intersection and Complement of Regular Languages, Construction of Mealy and Moore Machine, Conversion From Mealy to Moore Machine and Vice Versa	11
3	**Nondeterminism And Kleen'sTheorem:** Non-Deterministic Finite Automata, Non Deterministic Finite Automata With ^ Transitions, Kleen's Theorem	05
4	**Regular And Non Regular Language:** Minimization of Finite Automata, Non-Regular and Regular Languages, Pumping Lemma, Decision Problems and Decision Algorithms, Regular Languages in Relation to Programming Languages	07
5	**Context-Free Languages And Push-Down Automata:** Context-Free Languages, Regular Grammars, Derivation Tree and Ambiguity, An Unambiguous CFG , Simplified and Normal Forms, Chomsky Normal Form	07
6	**Pushdown Automata And CFL:** Push -Down Automata, Definition and Examples, Deterministic PDA, Types of Acceptances and Their Equivalence, Equivalence of CFG and PDA, Introduction to Parsing, Top-Down and Bottom Up Parsing, Non-CFL and CFL, Pumping Lemma for CFL, Intersection and Complement of CFL	06

7	**Turing Machine:** Models of Computation, Tm Definition, Combining Tms, Computing A Function With Tms. Variations on Turing Machines, Doubly Infinite and More Than One Tapes, Non-Deterministic and Universal Tm, The Halting Problem, Acceptability and Decidability.	07

Practical content
Perform various lex programs using all metacharacters.

Text Books	
1	Introduction to Languages and Theory of Computation: By John C. Martin

Reference Books	
1	Computation: Finite and Infinite: By Marvin L. Minsky, Prentice-Hall.
2	Introduction to formal languages: By G. E. Reevsz, Mc-graw hill.
3	Formal language theory: By M. H. Harrison

ICT/MOOCs Reference	
1	https://nptel.ac.in/courses/106106049/
2	https://nptel.ac.in/courses/111103016/
3	https://nptel.ac.in/courses/106/105/106105196/
4	https://nptel.ac.in/courses/106/104/106104028/

Course Outcomes:

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

1. Demonstrate advanced knowledge of formal computation and its relationship to formal languages.
2. Distinguish different computing languages and classify their respective types.
3. Recognize and comprehend formal reasoning about languages.
4. Show a competent understanding of the basic concepts of complexity theory.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT602	Subject Name	Artificial Intelligence

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basics of programming language, Algorithms & Data Structures.

Objectives of the course:

1. Gain a historical perspective of AI and its foundations.
2. Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
3. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Experience AI development tools such as an 'AI language', expert system shell.
5. Experiment with a machine learning model for simulation and analysis.
6. Explore the current scope, potential, limitations, and implications of intelligent systems

Theory syllabus

Unit	Content	Hrs
1	**Introduction:** Concept of AI, history, current status, Pattern Recognition, Deep Learning, Robotics, Vision Learning, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.	04
2	**Search Algorithms:** Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Playing- MiniMax, Alpha-Beta Cut-off	07
3	**Knowledge Representation:** Building a Knowledge Base, Logic based representations, Propositional Logic (PL), First Order Logic (FOL), Resolution and Reasoning in FOL, Inference Engine, Rule Based Expert System	03
4	**Probabilistic Reasoning:** Fuzzy Logic, Probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.	05
5	**Markov Decision process:** MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs	09
6	**Deep Learning: Basics of Neural Network:** Biological Neural Network, Neural Network Representation, Neural Networks as a Paradigm for Parallel Processing, The Perceptron, Training a Perceptron, Learning Boolean Functions, Multilayer Perceptron	05
7	**Genetic Algorithm:** Traditional Methods of Optimization, Genetic Operators, Binary Coded Genetic Algorithm, Real Coded Genetic Algorithm	04

8	**Reinforcement Learning:** Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.	08

Practical content	
Experiments/Practical/Simulations would be carried out based on syllabus	
Text Books	
1	Artificial Intelligence, By Rich E. & Kevin Knight, Tata McGraw Hill.
2	Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall
Reference Books	
1	Genetic Algorithms in Search, Optimization, and Machine Learning, D. E. Goldberg, Addison-Wesley.
2	Neural Networks: A Comprehensive Foundation, S. Haykin, PHI
3	Machine Learning, By Tom M. Mitchell, Tata McGraw-Hill.
4	Trivedi, M.C., "A Classical Approach to Artifical Intelligence", Khanna Publishing House, Delhi
5	Saroj Kaushik, "Artificial Intelligence", Cengage Learning India.
6	David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press.
7	Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India
8	Marsland, Stephen. Machine learning: an algorithmic perspective. Chapman and Hall/CRC.
9	Raschka, Sebastian. Python machine learning. Packt Publishing Ltd.
ICT/MOOCs Reference	
1	https://nptel.ac.in/courses/106105079/
2	https://nptel.ac.in/courses/106105077
3	https://nptel.ac.in/courses/106106126
4	https://nptel.ac.in/courses/106106140/
5	https://nptel.ac.in/courses/106/106/106106202/
6	https://ai.berkeley%2Cedu/project_overview.html

Course Outcomes:

Upon completion of this course, students will be able to:

1. Build intelligent agents for search and games.
2. Solve AI problems through programming with Python.
3. Learning optimization and inference algorithms for model learning.
4. Design and develop programs for an agent to learn and act in a structured environment.

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology				Branch/Spec.	Computer Engineering/Information Technology			
Semester	VI				Version	2.0.0.0			
Effective from Academic Year	2020-21				Effective for the batch Admitted in	July 2018			
Subject code	2CEIT603		Subject Name		Cloud Computing				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Computer Network

Objectives of the course:

1. Understand the basics of hardware, software concepts and architecture of cloud computing.
2. Acquire knowledge on the service models with reference to Cloud Computing.
3. Gain knowledge of Virtualization Technologies.
4. Design and deploy Cloud Infrastructure for various applications.
5. Understand the concept of cloud security and how to manage and maintain it.

Theory syllabus

Unit	Content	Hrs
1	**Introduction:** Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing, Layers and Types of Clouds, Cloud Infrastructure Management, Challenges and Applications. Cloud Services: Introduction to Cloud Services IaaS, PaaS and SaaS	07
2	**Cloud enabling Technologies:** Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish Subscribe Model – Basics of Virtualization – Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System VM, Process VM, VM provisioning process, VM Migration techniques, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V	07
3	**Cloud Architecture, Services and Storage**: Layered Cloud Architecture Design– Public, Private and Hybrid Clouds – laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3, Cloud balancing architecture	08
4	**MapReduce Programming models and File Systems:** Introduction to MapReduce: MapReduce Programming Model, MapReduce Impacts, Google File System – Hadoop File System - Hadoop Framework	06
5	**Management and Monitoring:** Service quality metrics and SLAs (service level agreements), SLA Guidelines, cloud usage monitor, SLA Management, Introduction to Monitoring, Needs for monitoring, Cloud monitoring tools, Resource Allocation and Pricing in Cloud	04
6	**Security and Privacy:** Cloud security mechanism, cloud security threats, Infrastructure Security, Data Security and Storage, Identity and Access Management (IAM), Case study example, Privacy	05
7	**Cloud Middleware:** OpenStack, OpenNebula, Windows Azure, CloudSim, EyeOs, Aneka, Google App Engine, Amazon EC2	08

Practical content	
Experiments/Practicals/Simulations would be carried out based on syllabus	
Text Books	
1	Rajkumar Buyya, James Broberg, Andrzej M Goscinski, Cloud Computing: Principles and Paradigms, Wiley publication
Reference Books	
1	Toby Velte, Anthony Velte, Cloud Computing: A Practical Approach, McGraw-Hill Osborne Media.
2	Thomas Erl, Z Mahmood and Ricardo Puttini, Cloud computing concepts, technology and architecture, Prentice Hall
ICT/MOOCs Reference	
1	http://nptel.ac.in/courses/106105167/
2	http://nptel.ac.in/courses/106106129/28
3	https://www.coursera.org/learn/cloud-computing

Course Outcomes:

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

1. Understand the hardware, software concepts and architecture of cloud computing.
2. Understand the Service Model with reference to Cloud Computing.
3. Appreciate the role of Virtualization Technologies.
4. Design and deploy Cloud Infrastructure.
5. Understand cloud security issues and solutions.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT604	Subject Name	User Experience Design

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	0	0	1	-	1	Theory	-	-	-
Hours	0	0	2	-	2	Practical	30	20	50

Pre-requisites:

Knowledge of scripting/programming languages: HTML, CSS, JS, Angular JS

Objectives of the course:

1. Achieve a deep understanding throughout a project life-cycle of design.
2. Understand the principles of UI/UX Design.
3. Learn the basics of human-computer interaction and the psychology behind user decision making.
4. Learn the importance of a user centred design process and the benefit of incorporating UX activities at all the stages of a project.

Theory syllabus

Practical content

Unit	Content	Hrs
1	**Introduction of UI/UX:** Introduction of User Interface, Design Principles-Learn Ability, Visibility, Error Prevention, Efficiency and Graphic Design, Examples Of Good User Interface, Analysis of UI	02
2	**UI Widgets & Input Devices:** Input & Output Controls and Widgets- Graphical User Interface Elements	04
3	**Organizational Structures and Web Site Critiques [Web2.0 & Web3.0]** Flow and Layout of User Interface, Web Site Critiques: Image Size, Content Order, Horizontal Alignment, Long Title, Large and Full Screen Background, Fonts, View Modes, Browser and Colors	04
4	**Ux Design Techniques:** Design Techniques Such as Scenarios, Personas, Storyboards, Wire-Framing, Screen Design and Layouts	04
5	**Build User Interface:** Prototyping Tools with Low-Fidelity and High-Fidelity, Wizard of Oz, Input Models, Output Models, Model-View-Controller, Layout, Constraints and Toolkits	04
6	**Adaptive and Responsive Page Design:** Understanding The Designing Language of Desktop, Web and Mobile	04
7	**Non-GUI Design:** Auditory Interfaces and Gesture Interfaces	02
8	**Ux Evaluation Process:** Heuristic Evaluation, Predictive Evaluation and User Interface Design Testing	02
9	**Ux Improvement Process:** Understand Result of Testing	02
10	**Ux Delivery Process:** Communication with Implementation	02

Text Books

1	UX for Beginners by Joel Marsh
2	User Experience Design: A Practical Introduction By Gavin Allanwood and Peter Beare
Reference Books	
1	Buxton, B., Sketching User Experiences. Sketching User Experiences. San Francisco: Morgan Kaufmann
2	Greenberg, S., Carpendale, S., Marquart, N., and Buxton, B, Sketching User Experiences: The Workbook. San Francisco: Morgan
3	Designing for Small Screens: Mobile Phones, Smart Phones, PDAs, Pocket PCs, Navigation Systems, MP3 Players, Game Consoles, by Studio 7.5, Zwick and Schmitz, ISBN-10 # 2940373078
ICT/MOOCs Reference	
1	https://www.coursera.org/courses?query=ux%20design
2	https://www.edx.org/learn/user-experience-ux
3	https://www.udemy.com/courses/design/user-experience/

Course Outcomes:

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

1. Understand the definition and principles of UI/UX Design in order to design with intention.
2. Describe the issues and challenges to achieving a human centred design process, especially with regard to user experience design.
3. Use, adapt and extend design standards, guidelines, and patterns focusing on user experience.
4. Create storyboards, video scenarios, and experience prototypes for a small system, plan and perform a real world deployment study of a user experience.
5. Discover the industry-standard tools and specific project deliverables in UI/UX.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT605	Subject Name	Capstone Project – II

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	0	0	1	-	1	Theory	-	-	-
Hours	0	0	2	-	2	Practical	30	20	50

Pre-requisites:

Understanding of Tools & Technology

Objectives of the course:

1. Application of knowledge and techniques learnt in theoretical classes for developing the s/w for real problems or inventing new things related to original concept.
2. Gives an insight into the working of the real organizations/companies.
3. Gaining deeper understanding in specific functional areas.
4. Helps in exploring career opportunities in their areas of interest.

Theory syllabus

NA

Practical content

	Guidelines	Hrs
	Students are supposed to continue Capstone Project – I, and/or the implementation of the project under the guidance of the faculty member and submit the project report along with source code at the end of the semester.	30

Text Books

	NA

Reference Books

	NA

ICT/MOOCs Reference

1	https://www.coursera.org/specializations/product-management
2	https://www.udacity.com/course/software-development-process--ud805

Course Outcomes:

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

1. Select, collect and use the required information/knowledge to solve the problem.
2. Logically choose relevant possible solution(s).
3. Assess the impact of project on society.
4. Communicate effectively and confidently as a member and leader of team.
5. Prepare the project report.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT6PE1	Subject Name	Web Technology

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basics of HTML, Java Script ,CSS

Objectives of the course:

1. To acquire knowledge and skills for creation of web site considering both client and server side programming.
2. To gain ability to develop responsive web applications.
3. To explore different web extensions and web services standards.
4. To create web application using tools and techniques used in industry.
5. To be familiarized with open source frameworks for web development.

Theory syllabus

Unit	Content	Hrs
1	**Web Fundamentals:** Introduction to World Wide Web, Web Application, Web Architecture, Web Server, Web Browser and Internet Protocol: HTTP, Message Format - Request Message & Response Message, HTTP Example, Case Study	4
2	**XHTML and XML:** Basics of XHTML, Standard XHTML Document Types, Conversion of HTML to XHTML, Introduction to XML, Simple XML and XML key components, DTD and Schemas, XML applications, Transforming XML using XSL and XSLT	6
3	**PHP: Flow control, building blocks, Functions, Array, Objects and Strings** Variables, Data Types, Operators and Expressions, Constants, Switching Flow, Loops, Get and Post Method, Introduction of Function, Calling Function, Defining a Function, Returning Values From User-Defined Functions, Variable scope, Saving state between function calls with the static Statement, Basics of Array, Built-In functions of Array, Creating an Object, Object inheritance, Working with Strings, Date and Time, Formatting Strings with PHP, Investigating Strings in PHP, Manipulating Strings with PHP, Built-In functions of String, Date and Time	6
4	**Working with Forms:** Creating a Simple Input Form, Accessing Form Input with User-Defined Arrays, Combining HTML and PHP Code on a Single Page, Using Hidden Fields to Save State, Redirecting the User, Sending Mail on form Submission, Form Validation, Form Required Fields, Validate E-mail and URL, File Handling ,Working with File Uploads and Filters	10
5	**PHP and MySQL:** MYSQL Database, MYSQL Connection, Create, Insert, Update and Delete Data From Database	6
6	**Working with Cookies, User Sessions and JSON:** Introducing Cookies, Set and Delete Cookies with PHP, Basics of PHP Session, Starting a Session, Working with Session Variables, Passing Session IDs in the Query String, Destroying Sessions, Login example, Basics of JSON, Built-In functions of JSON and Accessing the Decoded Values	4
7	**PHP with AJAX and XML:**	6

	AJAX Introduction, AJAX Benefits, Asynchronous Communication, Process: XMLHttpObject, Handler, Ready state, Sequence Execution Action, AJAX Advanced, AJAX Database, AJAX XML File, PHP and AJAX Examples	
8	**Working With API(Application Programming Interface)**	3
Practical content		
Experiments would be carried out based on syllabus which includes above topics.		
Text Books		
1	Profession PHP Programming by Wrox publication	
Reference Books		
1	HTML4 BIBLE By Brayn Omdex	
2	Web Technologies, Black Book, dreamtech Press	
3	PHP & MySQL development – Luke Welling – Pearson Education	
4	PHP6 and MySQL Bible –Steve Suehring, Tim Converse and Joyce Park – Wiley India Edition.	
5	Head First PHP& MySQL by Lynn Beighley, Michael Morrison, O'Reilly Media	
6	Julie C Meloni, "Sams Teach Yourself PHP, MySQL and Apache All in One" Pearson Education	
ICT/ MOOCs Reference		
1	https://www.coursera.org/courses?query=php	
2	https://www.edx.org/learn/web-development	
3	https://online.stanford.edu/courses	
Course Outcomes:		
After successful completion of this course, student will be able to 1. Understand the concepts of WWW including web protocols and web browser architecture. 2. Understand the general concepts of PHP scripting language for the development of web applications. 3. Build dynamic web site using server side PHP programming and Database connectivity. 4. Develop real world applications.		

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020,21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT6PE2	Subject Name	Software Validation & Testing

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	,	4	Theory	40	60	100
Hours	3	0	2	,	5	Practical	30	20	50

Prerequisites:

Software Engineering Basics

Objectives of the course:

1. To understand the basics of testing, test planning & design and test team organization.
2. To study the various types of test in the life cycle of the software product.
3. To build design concepts for system testing and execution.
4. To learn the software quality assurance, metrics, defect prevention techniques.
5. To learn the techniques for quality assurance and applying for applications.

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Testing:** What is Testing, Software Testing Principles, Role of Tester, Testing As A Process, Overview of Testing Maturity Model, Defects, Hypothesis and Tests	5
2	**Black Box Testing Strategies:** Black Box Testing Techniques, Random Testing, Equivalent Partitioning, Boundary Value Analysis (BVA), Equivalence Class Testing, State Transition Testing, Cause, Effect Graphing Based Testing, Error Guessing, Black Box TMM Maturity Goals	6
3	**White Box Testing Strategies:** White, Box Testing Techniques, Test Adequacy Criteria : Coverage and Control Flow Graphs, Basis Path Testing,, Loop Testing, Data Flow Testing, Mutation Testing Evaluating Adequacy :White Box and TMM Levels	6
4	**Unit Testing Strategies:** Unit Testing : Need, Functions, Plan :Design, Considerations : Test Harness, Integration Testing, Goals, Strategies, Design, Plan, System Testing	6
5	**Function Test Strategies:** Function Test, Performance Test, Stress Test, Configuration Test, Security Test : Recovery Test, Regression Testing, Alpha, Beta, Acceptance Test, Special Role Of Use Cases, Levels Of Testing and TMM	6
6	**Testing Policies:** Test Planning, Components, Attachments, Locating Test Items, Test Reports, Role Of Three Critical Groups, Building A Test Group, Structure, Technical Training, Career Paths, Certification, Integrating Testing Activities	5
7	**Software Quality:** Quality Concepts, Cost Estimation, Quality Control, Role Of Operational Profiles and Usage Models, Statistical Testing, Software Reliability :Measurements, Applying Reliability Models, Confidence Level, Usability Testing, Software Quality Control and Critical Views	6
8	**Test Automation:** Software Test Automation : Skills Requirement For Automation : Scope of Automation : Design and Architecture for Automation : Requirements for A Test Tool : Challenges in Automation : Test Metrics and Measurements : Project, Progress and Productivity Metrics	5

Practical content	
Experiments/Practical's/Simulations would be carried out based on syllabus Software Testing (Manual and Automated)	
Text Books	
1	Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing : Principles and Practices", Pearson Education.
2.	Ron Patton, "Software Testing", Sams Publishing, Pearson Education.
Reference Books	
1	Naresh Chauhan, Software Testing Principles and Practices, Oxford University Press.
2	C. J. Paul, Software testing: A craftsmen's approach, CRC Press, CRC Press.
3	G. J. Myers, The art of software testing, Wiley Interscience New York.
4	Software Testing And Quality Assurance, Theory and Practice, Kshirasagar Nak Priyadarshi Tripathy, John Wiley & Sons Inc.
ICT/MOOCs Reference	
1	https://swayam.gov.in/nd1_noc19_cs71/preview
2	https://www.edx.org/course/software-testing-fundamentals
Course Outcomes:	
After successful completion of this course, student will be able to 1. Understand the role of tester 2. Apply mathematical logic for testing 3. Choose appropriate testing strategies 4. Communicate effectively with developers and other stakeholders 5. Check and verify the Quality standards	

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT6PE3	Subject Name	Cryptography and Network Security

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Concept of Computer Networks, Discrete Mathematics, and programming

Objectives of the course:

1. To introduce fundamental concepts of symmetric and asymmetric cipher models.
2. To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity
3. To introduce network security and web security protocols.

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Cryptography and Network Security:** Basic Terminology , Need of Security, Principles of Security, Types of Attacks, Techniques for security goals implementation, OSI Security Architecture, Possible Cryptanalysis Attacks	05
2	**Traditional Symmetric Key Cryptography:** Symmetric key and Asymmetric key cryptography, Substitution Techniques, Transposition Techniques, Key range and Key Size, Symmetric key and Key Distribution Problem, Diffie-Hellman Key Exchange/Key Agreement Algorithm, Man in the Middle Attack	06
3	**Modern Symmetric Key Cryptography Techniques:** Stream Cipher, Block Cipher, Product Cipher, Claude Shannon's concept of Confusion & Diffusion, Algorithm types and modes, Two classes of product ciphers (Feistel Ciphers and Non-Feistel Ciphers), Data Encryption Standards (DES), Advanced Encryption Standards (AES)	10
4	**Asymmetric key Cryptography:** Difference between Symmetric key and Asymmetric key cryptosystems, RSA Algorithm, Security of RSA	03
5	**Symmetric and Asymmetric Key both together:** Digital Envelope, Digital Signature, Digital Signature Schemes, Message Digest (MD), SHA, Message Authentication	04
6	**Network Security:** Kerberos, Key Management, PKI, Security at the Network Layer – IPSec, Security at the Transport Layer – SSL, Security at the Application Layer- PGP and S/MIME, Firewall, Network Vulnerabilities	09
7	**Mathematics for Cryptography**	08

Practical content

Experiments/ Practicals /Simulations would be carried out based on syllabus

Text Books

1	'Cryptography and Network Security' by Behrouz A Forouzan, Debdeep Mukhopadhyay

Reference Books

1	'Cryptography and Network Security' by Atul Kahate
2	'Cryptography and Network Security' by William stallings

3	‘Cryptography and Network Security’ by Prakash C. Gupta
4	‘Network Security and Cryptography’ by Bernard Menezes
ICT/MOOCs Reference	
1	https://nptel.ac.in/courses/106/105/106105031/
2	https://www.coursera.org/learn/crypto

Course Outcomes:

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

1. Understand the concepts related to the Cryptography and Information security.
2. Appreciate Importance of Network Security and Challenges in Network Security.
3. Deduce the mechanisms to be employed while trying to satisfy any of the security services
4. Apply the concept of security services and mechanisms from the application developers and network administrator’s perspective.
5. Find the importance of Security tools
6. Implement Security services in an organization
7. Apply security principles to system design
8. Conduct research in Network Security.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT6PE4	Subject Name	Data Science and Machine Learning

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Concepts of Probability and Programming

Objectives of the course:

1. To get the knowledge of the mathematical foundations needed for data science
2. Ability to create programs to build data science applications

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Data Science:** Concept of Data Science, Traits of Big Data, Web Scraping, Analysis Vs. Reporting	04
2	**Introduction to Programming Tools for Data Science:** Toolkits Using Python (Matplotlib, NumPy, Scikit, NLTK), Visualizing Data (Bar Charts, Line Charts, Scatterplots), Working With Data (Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction)	07
3	**Mathematical Foundations:** Linear Algebra (Vectors, Matrices), Statistics (Describing a Single Set of Data, Correlation, Simpson's Paradox, Correlation and Causation), Probability (Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem), Hypothesis and Inference (Statistical Hypothesis Testing, Confidence Intervals, P-Hacking, Bayesian Inference)	12
4	**Machine Learning:** Overview of Machine Learning Concepts (Over Fitting and Train/Test Splits), Types of Machine Learning (Supervised, Unsupervised, Reinforcement Learning, Introduction to Bayes Theorem), Linear Regression (Model Assumptions, Regularization (Lasso, Ridge, Elastic Net)), Classification and Regression Algorithms (Naïve Bayes, K-Nearest Neighbours, Logistic Regression, Support Vector Machines (SVM), Decision Trees, and Random Forest, Classification Errors), Analysis of Time Series (Linear Systems Analysis, Nonlinear Dynamics, Rule Induction), Neural Networks Learning and Generalization, Overview of Deep Learning.	16
5	**Case Studies of Data Science Application:** Weather Forecasting, Stock Market Prediction, Object Recognition, Real Time Sentiment Analysis.	06

Practical content

Experiments/ Practicals /Simulations would be carried out based on syllabus

Text Book	
1	Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
Reference Books	
1	AurélienGéron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", O'Reilly Media
2	Jain V.K., “Data Science and Analytics”, Khanna Publishing House, Delhi
3	Jain V.K., “Big Data and Hadoop”, Khanna Publishing House, Delhi.
4	Jeeva Jose, “Machine Learning”, Khanna Publishing House, Delhi.
5	Chopra Rajiv, “Machine Learning”, Khanna Publishing House, Delhi.
6	Ian Goodfellow, YoshuaBengio and Aaron Courville, "Deep Learning", MIT Press
7	Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers
ICT/MOOCs Reference	
1	https://swayam.gov.in/nd1_noc19_cs60/preview
2	https://nptel.ac.in/courses/106106139/

Course Outcomes:

Upon completion of this course, students will be able to:

1. Demonstrate understanding of the mathematical foundations needed for data science.
2. Collect, explore, clean, munge and manipulate data.
3. Implement models such as k-nearest Neighbours, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering.
4. Build data science applications using Python based toolkits.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT6PE5	Subject Name	Game Design & Development

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Engineering Mathematics, Basics of Computer Graphics

Objectives of the course:

1. Understand to create 2D game, including the game play, character design and animation, multiple levels, the user interface, and game audio.
2. Understand the general outline of a 3D game, including game object kinetics and dynamics, and camera management in a three dimensional co-ordinate space

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Game Design and Development:** History, Video Games and Development, Programming Languages, Game Engines, Freeware and Commercial Game Engines, Platforms.	02
2	**3D Graphics for Game Programming:** Coordinate System, Vectors in 3D, Polygons, Graphics Fundamentals, 3D Viewing, 3D Transformations, Synthetic Camera, RGB Color Model, Textures, Texture Mapping, Lighting, Camera and Projections, Camera Lights, Culling and Clipping, 3D Modeling and Rendering, Ray Tracing, Shader Models & Programming, Parametric Curves and Surfaces, Subdivision Surfaces, 2D Vs 3D Programming, Animation Using Hierarchical Objects, Character Animation, Physics-based Simulation, Scene Graphs, Physics, Collision Detection	10
3	**Game Design:** Design Process, Storyboard, Story Telling, Narration, Game Play Rules, Game Balancing, Fair Game, Design Document, Game Coverage, Character development, Core mechanics, Principles of level design, Genres of Games	03
4	**Game Engine Design & Algorithm:** Game Engine Architecture, Unity Engine, Engine Support Systems, Resources And File Systems, Basics of rendering, Rendering Transformations, Rendering Pipeline, Renderers, Types of Rendering Primitives, Software Rendering, Hardware Rendering, Controller based animation, Spatial Sorting, Level of detail, standard objects, Collision and rigid body dynamics, Game Logic, AI, A* Path Finding Algorithm.	10
5	**Game Mechanics & Programming:** Game Loop, General Flow of Game Loop, Initialization and Shutdown of Game Modules, Input Interfaces like Keyboard & Mouse, Controllers for games, Game Data Structures, Implementation of Game Data Structure, Multi-Threaded Game, General Game Threads, Complexities, Game Event Management, Game Views, Managing Memory, Loading And Caching Game Data, Audio System Importance	10

6	**Game Development:** Developing 2D and 3D interactive games using Unity, User Interface Management in Unity, Terrain Modelling & Scene Management, Puzzle games, Character Motion, Single Player games, Multi-Player games.	10

Practical content	
Experiments/Practicals/Simulations would be carried out based on syllabus	
Text Books	
1	Roger E Pedersen, —Game Design Foundations, Wordware Publishing Inc.
2	Radha Shankarmani, Saurabh Jain and Gaurang Sinha, — Game Architecture and Programming, Wiley India Pvt Ltd.
Reference Books	
1	David H. Eberly, "3D Game Engine Design, A Practical Approach to Real-Time Computer Graphics" Morgan Kaufmann
2	JungHyun Han, "3D Graphics for Game Programming", Chapman and Hall/CRC
3	Jonathan S. Harbour, "Beginning Game Programming", Course Technology PTR
4	Dino Dini, "Essential 3D Game Programming", Morgan Kaufmann
5	Mike Mc Shaffrfy And David Graham, "Game Coding Complete", Cengage Learning, PTR
6	Advanced Game Development with Programmable Graphics Hardware, Alan Watt and Fabio Policarpo, A K Peters
7	3D Games: Volume 1: Real-Time Rendering and Software Technology, Alan Watt and Fabio Policarpo, Addison-Wesley
8	3D Games, Volume 2: Animation and Advanced Real-time Rendering, Alan Watt and Fabio Policarpo, Addison-Wesley
9	Alan S, Introduction to Game Programming with C++, BPB Publications
ICT/MOOCs Reference	
1	https://www.udemy.com/course/game-design-fundamentals/
2	https://www.udemy.com/course/unitycourse2/

Course Outcomes:

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

1. Develop storyboard of a video game idea, and develop a design document.
2. Implement the necessary algorithms, data structures, and optimization for successful video game development.
3. Apply effective engineering methodology for game development and testing.
4. Use Game programming platforms, frame works and engines.
5. Create interactive Games.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July-2018
Subject code	2CEIT6PE6	Subject Name	Robotics

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic engineering mathematics and programming

Objectives of the course:

1. Perform kinematic and dynamic analyses with simulation.
2. Design control laws for a robot.
3. Integrate mechanical and electrical hardware for a real prototype of robotic device.
4. Select a robotic system for given application.

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Robotics:** Types and components of a robot, Classification of robots, closed-loop and open-loop control systems, Kinematics systems; Definition of mechanisms and manipulators, Social issues and safety	04
2	**Robot Kinematics and Dynamics:** Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, DH parameters, Jacobian, Singularity, and Statics, Dynamic Modelling: Equations of motion: Euler-Lagrange formulation	07
3	**Sensors and Vision System:** Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc., Introduction to Cameras, Camera calibration, Geometry of Image formation, Euclidean/Similarity/Affine/Projective transformations, Vision applications in robotics	10
4	**Robot Control:** Basics of control: Transfer functions, Control laws: P, PD, PID, non-linear and advanced controls	12
5	**Robot Actuation Systems:** Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators	03
6	**Control Hardware and Interfacing:** Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications	09

Practical content

Experiments/Practicals/Simulations would be carried out based on syllabus

Text Books

1	Saha, S.K., “Introduction to Robotics, McGraw-Hill Higher Education, New Delhi.
2	Ghosal, A., “Robotics”, Oxford, New Delhi.

Reference Books

1	Niku Saeed B., “Introduction to Robotics: Analysis, Systems, Applications”, PHI, New Delhi.
2	Mittal R.K. and Nagrath I.J., “Robotics and Control”, Tata McGraw Hill.
3	Mukherjee S., “Robotics and Automation”, Khanna Publishing House, Delhi.

4	Craig, J.J., “Introduction to Robotics: Mechanics and Control”, Pearson, New Delhi.
5	Mark W. Spong, Seth Hutchinson, and M. Vidyasagar, “Robot Modelling and Control”, John Wiley and Sons Inc.
ICT/MOOCs Reference	
1	https://www.classcentral.com/course/swayam-robotics-14276

Course Learning Outcome:

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

1. Develop the student’s knowledge in various robot structures and their workspace.
2. Develop student’s skills in performing spatial transformations associated with rigid body motions.
3. Develop student’s skills in performing kinematics analysis of robot systems.
4. Gain knowledge of the singularity issues associated with the operation of robotic systems.
5. Gain knowledge and skills associated with robot control.
6. Demonstrate the self-learning capability of Industrial Automation.

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT6PE7	Subject Name	Ethical Hacking

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Programming and fundamentals of Computer networks

Objectives of the course:

1. Explore ethical hacking basics
2. Explore cryptography
3. Investigate reconnaissance: Information gathering for the ethical hacker
4. Explore scanning and enumeration
5. Explore hacking through the network: Sniffers and evasion
6. Explore low tech hacking techniques
7. Explore wireless network hacking
8. Perform penetration testing

Theory syllabus

Unit	Content	Hrs
1	**Introduction**: Introduction to Ethical Hacking and Essential Terminologies- Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit, Phases involved in hacking	2
2	**Footprinting & Reconnaissance:** Introduction to Footprinting, Footprinting methodology, Footprinting Tools, Footprinting Countermeasures, Footprinting Penetration Testing	3
3	**Scanning & Enumeration**: Introduction to scanning concepts, Scanning Tools, Understanding port scanning techniques, Scanning Pen testing, Enumeration concepts	5
4	**Vulnerability Assessment & System-Hacking**: Vulnerability Assessment Concepts, Stages of System Hacking, Penetration Testing	5
5	**Malwares Threats , Sniffing:** Sniffing Techniques, Sniffing Tools, Sniffing detection techniques and countermeasures	8
6	**Social Engineering:** Social Engineering Concepts, Various techniques of Social Engineering, Denial of Service: DoS/DDoS Concepts, Techniques of DoS/DDoS attacks	6
7	**Session Hijacking:** Understanding Session Hijacking, Phases involved in Session Hijacking, Types of Session Hijacking, and Session Hijacking Tools.	7
8	**SQL Injection & Hacking Wireless Networks:** Introduction to 802.11, Wireless hacking methodology, Wireless hacking tools	6
9	**Cryptography:** Understand different encryption algorithms, Cryptography tools, Understand the use of Cryptography over the Internet through PKI, Email encryption	3

Practical content

Experiments/Practicals/Simulations would be carried out based on syllabus	
Text Books	
1	CEH Certified Ethical Hacker Study Guide by Ric Messier
Reference Books	
1	Network Intrusion Alert:An Ethical Hacking Guide to Intrusion Detection by Ankit Fadia, Manu Zacharia, Thomson Course Technology PTR
2	Gray Hat Hacking: The Ethical Hacker's Handbook by Shon Harris
3	Ethical Hacking, Thomas Mathew
4	Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray, and George Kurtz, McGraw-Hill
ICT/MOOCs Reference	
1	https://swayam.gov.in/nd1_noc19_cs68/preview
2	https://nptel.ac.in/courses/106/105/106105217/

Course Outcomes:

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

1. Apply knowledge into an interactive environment where they are shown how to scan, test, hack and secure system / network.
2. Apply in-depth knowledge and practical experience with the current essential security systems.
3. Understand how perimeter defences work and then be led into scanning and attacking own networks, no real network is harmed.
4. Evaluate how intruders escalate privileges and what steps can be taken to secure a system.
5. Analyse malicious activities

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2CEIT6PE8	Subject Name	IT Infrastructure & Management

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	T U	P	TW					
Credit	3	1	0	-	4	Theory	40	60	100
Hours	3	1	0	-	4	Practical	-	-	-

Pre-requisites:

Nil

Objectives of the course:

1. Understand the design factors and challenges in IT Infrastructure Management.
2. Understand service delivery and associated processes.
3. Understand storage and security management related to IT Infrastructure.
4. Understand performance and tuning processes and associated case studies.
5. Understand the suitable combinations in information technology, business administration and electronic commerce.

Theory syllabus

Unit	Content	Hrs
1	**Introduction**: IT Infrastructure, Challenges in IT Infrastructure Management, Design Factors for IT Organizations, Design Factors for IT Infrastructures, Determining customer's Requirements, Identifying System Components to Manage, Identifying System Components to Manage, Exist Processes, Data, Applications, Tools and their Integration, IT Systems and Service Management Process, Information Systems Design Process , IT Infrastructure Library	09
2	**Service Delivery And Support Process:** Introduction, Service Level Management, Financial Management, Capacity Management, Configuration Management, Service Desk, Incident Management, Availability Management, Release Management	09
3	**Storage and Security Management:** Introduction, Backup and Storage, Archive & Retrieve, Space Management , Hierarchical space management, Database & Application Protection, Disaster Recovery, Bare Machine Recovery (BMR), Data Retention, Computer Security, Identity Management, Access Control System, Intrusion Detection	09
4	**Introduction on tuning process:** Performance and Tuning Process, Difference between Performance & Tuning processes & other Infrastructure processes, Definitions, Preferred characteristics, Performance and tuning applied to Major Resource Environments, Assessing an Infrastructure's performance and tuning process, Measuring and streamlining the P and T process, Performance tuning recommendations for Data and Event Management	09
5	**Case Studies**: Asset Network Corporation case, Business Process Outsourcing (BPO) Infrastructure	09

	Planning and Management, e-Commerce Business Infrastructure Planning and Management, Enron case, Tycocase, Worldcom case, Analyze an information infrastructure – SLO-2 case study	
Practical content		
NA		
Text Books		
1	Rich Schiesser, “IT Systems Management”, Pearson Education.	
2	P.Gupta, “ IT Infrastructure and Its Management”, Tata McGraw Hill.	
Reference Books		
1	SjaakLaan, “IT Infrastructure Architecture : Infrastructure Building Blocks and Concepts”, Lulu Press Inc.	
2	Leonard Jessup, Joseph Valacich,“Information System Today: Managing Digital World”, Prentice Hall.	
3	Hausman, Cook, “IT Architecture for Dummies”, Wiley Publishing, Hoboken, NJ www.wiley.com.	
4	Richard J. Reese, “IT Architecture in Action”, Xlibris Publishing.	
ICT/MOOCs		
1	https://www.coursera.org/learn/it-infrastructure-and-emerging-trends	
Course Outcomes:		

After successful completion of this course, student will be able to:

1. Describe the business value and processes of ICT services in an organization and apply that knowledge and skill with initiative to a workplace scenario.
2. Investigate, critically analyze and evaluate the impact of new and current ICT services to an organization.
3. Describe how effective IT Infrastructure & Management requires strategic planning with alignment from both the IT and business perspectives in an organization.
4. Demonstrate the technical and communications skills that contribute to the operation of ICT services in an organization.
5. Reflect critically on the role of an enterprise architect in an organization.
6. Synthesize the theoretical, technical and management issues that deliver ICT services to an organization.

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Programme	Bachelor of Technology				Branch/Spec.	Computer Engineering/ Information Technology		
Semester	VI				Version	2.0.0.0		
Effective from Academic Year		2020-21			Effective for the batch Admitted in			July 2018
Subject code	2CEIT6PE9		Subject Name		Internet of Things			
Teaching scheme					Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Fundamentals of computer networks and programming.

Objectives of the Course:

1. Explore the concepts of Internet of Things.
2. Design and program IoT devices.
3. Use of IoT protocols for communication.
4. Recognize the factors that contributed to the emergence of IoT.
5. Define the infrastructure for supporting IoT deployments.
6. Explore the different applications in IoT.
7. Explore the concepts of smart city development in IoT.
8. Design an IoT device to work with a Cloud Computing infrastructure.
9. Transfer IoT data to the cloud and in between cloud providers.

Theory syllabus

Unit	Content	Hrs
1	**Overview and Introduction:** Internet of Things (IoT) and Web of Things (WoT): What's WoT?, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet, of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Architecture Overview, Building an architecture, Application areas, Characteristics, Threats and security, design principles and needed capabilities, standard considerations, Machine to Machine and IoT Technology Fundamentals - Devices and gateways, Local and Wide Area Networking	07
2	**Electronics component, Sensor & actuator:** Introduction, Study of electronic components, study of different types of sensors like: temperature, humidity, flame, Metal Touch, smoke, gas, Accelerometer, Light, sound, pressure, water level, rain, ultra-sonic, IR, Line tracker, PIR. Study of different Actuators like: Relay, DC Motor, Servo Motor, Stepper Motor, Seven segment display, LCD display, OLED display	06
3	**Controller boards:** Arduino: Introduction, pin diagram, specification, methods for programming, Integration of Sensors and Actuators with Arduino. Raspberry Pi: Introduction, pin diagram, specification, methods for programming in python, Integration of Sensors and Actuators with Raspberry Pi	06
4	**Communication Protocols:** Introduction, Non-IP based WPAN –IEEE 802. 15. 1 Bluetooth, Bluetooth low energy (BLE 4.0), Beacon Technology, Bluetooth Mesh, Bluetooth Smart 5.0, IEEE 802.15.4 WPAN, Zigbee, Z-wave, Internet Protocol (IP) based WPAN and WLAN – 6LoPAN, WPAN with IP-thread	04

5	**IoT Protocols:** Introduction, Message Queuing Telemetry Transport (MQTT)- Publish-Subscribe Operation, Packet Structure, MQTT-SN, Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) –Session Layer-HTTP, Constrained Application Protocol (CoAP), Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP)	07
6	**Cloud Computing:** Cloud service models – Network as a Service (NaaS), Software as a Service (SaaS), Platform as a Service(PaaS), Internet as a Service (IaaS), Public, private and hybrid cloud, OpenStack cloud architecture, IoT with cloud	05
7	**Domain specific applications of IoT:** Home automation, Industry applications, Surveillance applications, Other IoT applications	05
8	**Case Study:** IoT for Healthcare domain, IoT for Smart City applications	03
9	**Open Problems & Research challenges**	02

Practical content	
Experiments/Practical/Simulations would be carried out based on syllabus	
Text Books	
1	From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence: By Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, Academic Press.
Reference Books	
1	Internet of Things (A Hands-On-Approach), by Vijay Madisetti and Arshdeep Bahga, VPT.
2	Getting started with the Internet of Things: by Cuno Pfister, O"Reilly Media.
3	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, by Francis daCosta, Apress Publications.
4	The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
ICT/MOOCs Reference	
1	https://nptel.ac.in/courses/106105166/
2	https://swayam.gov.in/nd1_noc19_cs65/

Course Outcomes:

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

1. Discuss the world of current technologies.
2. Describe the fundamentals of IoT.
3. Interpret models of distributed and cloud computing.
4. Examine prototypes for Internet of Things.
5. Understand business models for the Internet of Things.

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Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2018
Subject code	2HS6101	Subject Name	Aptitude skill building – II

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	-	-	1	-	1	Theory	-	-	-
Hours	-	-	2	-	2	Practical	30	20	50

Pre-requisites:

Basic engineering mathematics and English

Objectives of the course:

1. Build a strong base in basics of mathematical concepts
2. Grasp the approaches and strategies to solve problems with speed and accuracy.
3. Gain appropriate skill to succeed and preliminary selection process for recruitment.
4. Collectively solve problems in teams and groups.
5. Enhance lexical skills through systematic application of concepts and careful analysis of style, usage, syntax, semantics and logic.

Theory Syllabus

NA

Practical content

Unit	Content	Hrs
1	**Quantitative Ability I:** Averages, Weighted Averages, Median and Mode, Standard Deviation, Permutation and Combination, Probability	06
2	**Quantitative Ability II:** Simple Interest, Compound Interest, Profit and Loss and Discount, Area and Volume of Polygon, Cylinders and All Other Geometry, Coordinate and Mixed Geometry	06
3	**Verbal Reasoning:** Vocabulary, Sentence Equivalence, Logic Based Reading Comprehensive, Multiple Blank Text Completion	06
4	**Logical Reasoning:** Analyzing Arguments, Statement and Assumption, Course of Action, Statement and Conclusion, Theme Detection, Cause and Effect, Statement and Argument, Logical Deduction	08
5	**Data Interpretation:** Pie Charts, Line Charts, Table Charts, Bar Charts	04

Text Books

1.	Aggrawal R.S., “Quantitative Aptitude for Competitive Examinations”, S Chand
2.	Sharma Arun, “How to Prepare for Verbal Ability and Reading Comprehension for CAT”, McGraw Hill Education (India) Private Limited

Reference Books

1.	GuhaAbhijit, “Quantitative Aptitude for Competitive Examination”, McGraw Hill Education India Private Limited
2.	Aggrawal R.S., “A Modern Approach to Logical Reasoning”,S Chand
3.	Kumar Ajay, Kumar Anand, “General Aptitude Theory & Practice”, Pathfinder Publication
4.	GKP, “GATE Engineering & Mathematics General Apptitude 2016”, G.K. PUB
5.	Lewis Norman, “Word Power Made Easy”, Goyal
6.	Anderson Marilyn, “Critical Thinking, Academic Writing and Presentation Skills: Mg University Edition”, Pearson Education
7.	Grockit, “Grockit 1600+ Practice Questions for the GRE: Book + Online (Grockit Test Prep)”, Kaplan Publishing

ICT/MOOCs Reference	
	NA

Course Outcomes:

After successful completion of this course, student have

1. An ability to apply knowledge of mathematics, science and engineering.
2. An ability to function on multidisciplinary teams.
3. Recognition of the need for, and ability to engage in life-long learning.
4. An ability to identify, formulate and solve engineering problems.
5. An ability to communicate effectively.

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FACULTY OF ENGINEERING & TECHNOLOGY

TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VII		
Effective from Academic Year	2021-22	Effective for the batch Admitted in	July 2018

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
2CEIT701	Compiler Design	3	-	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT702	Big Data Analytics	3	-	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT703	Capstone Project-III	-	-	-	6	-	6	-	-	-	12	-	12	-	-	-	60	40	100
2CEIT78PE*	Elective-V	3	-	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT78PE*	Elective-VI	3	-	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT704	Soft Skills	-	-	-	1	-	1	0	0	0	2	-	2	-	-	-	30	20	50
Total		12	-	12	11	0	11	12	0	12	22	0	22	160	240	400	210	140	350

Elective-V / Elective-VII	**Elective-VI / Elective-VIII**
2CEIT78PE1 : Deep Learning	2CEIT78PE7 : Natural Language Processing
2CEIT78PE2 : Blockchain Technologies	2CEIT78PE8 : Forensics & Cyber Law
2CEIT78PE3 : Fundamentals of Image Processing	2CEIT78PE9 : Advanced Algorithms
2CEIT78PE4 : Mobile Computing	2CEIT78PE10 : Fog Computing
2CEIT78PE5 : Search Engine Optimization	2CEIT78PE11 : Fault Tolerant Systems
2CEIT78PE6 : Virtual Reality	2CEIT78PE12 : High Performance Computing
	## 2CEIT78PE13 : Computer Vision

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology				Branch/Spec.	Computer Engineering/Information Technology			
Semester	VII				Version	2.0.0.1			
Effective from Academic Year		2021-22			Effective for the batch Admitted in			July-2018	
Subject code	2CEIT701	Subject Name			Compiler Design				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Theory of Computations

Objectives of the course:

The objectives of this course are to provide you with an understanding of:

- Different stages in the process of compilation
- Identify different methods of lexical analysis
- Design top-down and bottom-up parsers
- Synthesized and inherited attributes
- Syntax directed translation schemes
- Algorithms to generate code for a target machine

Theory syllabus:

Unit	Content	Hrs
1.	**Introduction:** Introduction to translators- Assembler, Compiler, Interpreter, Difference between Compiler and Interpreter, Linker, Loader , one pass compiler, multi pass compiler, cross compiler , The components of Compiler, Stages of Compiler: Front end, Back end, Qualities of Good Compiler.	04
2.	**Lexical Analysis:** The Role of the Lexical Analyzer, Specification of Lexemes, Tokens and Patterns. Recognition of Tokens.	02
3.	**Syntax Analysis:** The Role of the Parser, Types of grammar, CFG, Leftmost derivation , Rightmost derivation, Parse Tree, Restriction on CFG, Ambiguous grammar, Top-Down Parsing, Issues of CFG, Recursive Descent Parser, Construction of Predictive Parsing Table , LL (1) Grammar, String Parsing using M-Table, Bottom-Up Parsing: Handle, Shift-reduce parser, LR parsers: LR (0), SLR (1), LALR (1), CLR (1), String parsing procedure using LR parser, R-R and S-R Conflicts.	17
4.	**Syntax-Directed Translation:** Syntax Directed Definitions, Construction of syntax tree, S-attributed and L-attributed SDDs with example.	04
5.	**Intermediate Code Generation:** Implementation of Three Address Code, Intermediate code for all constructs of programming languages (expressions, if-else, for , while, do….while, switch case, Array, Pointer etc.)	05
6.	**Run-time environment:** Procedure activation, Parameter passing, Value return, Memory allocation, and Scope.	05
7.	**Code generation and optimization:** Introduction to machine code generation and optimization, Simple machine code generation, Examples of machine-independent code optimizations.	06
8.	**Error Detection and Recovery:** Functions of the error handler, Classification of errors: Run time error & Compile time error: Lexical, Syntax & Semantic phase error.	02

Practical content:	
● Experiments/Practical/Simulations would be carried out based on syllabus	
Text Books:	
1.	Compilers: Principles, Techniques, and Tools , by A.V. Aho, Monica Lam, Ravi Sethi, and J.D. Ullman.
2.	Concept of Compiler Design, By Adesh K. Pandey.
Reference Books:	
1.	Compiler Design By O G Kakade, 4th Edition.
2.	K.C. Louden, Compiler Construction: Principles and Practice, Cengage Learning.
ICT/MOOCs Reference:	
1.	https://nptel.ac.in/courses/106/108/106108113/
2.	https://nptel.ac.in/courses/106/105/106105190/

Course Outcomes:

COs	Description
CO1	Develop the lexical Analyzer for specific grammar
CO2	Design top-down and bottom-up parsers for specific given grammar
CO3	Develop syntax directed translation schemes
CO4	Develop algorithms to generate code for a target machine

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	1	0	0	0	1	0	0	0
CO2	3	3	3	1	1	0	0	0	1	0	0	0
CO3	3	3	3	1	0	0	0	0	1	0	0	0
CO4	3	3	3	1	1	0	0	0	1	0	0	0

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Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VII	Version	2.0.0.1
Effective from Academic Year	2021-22	Effective for the batch Admitted in	July-2018
Subject code	2CEIT702	Subject Name	Big Data Analytics

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Programming Concept, Basic Mathematical Concept

Objectives of the course:

Objectives of this course are to:

- Identify and distinguish big data analytics applications
- Describe big data analytics tools
- Explain big data analytics techniques
- Present cases involving big data analytics in solving practical problems

Theory syllabus:

Unit	Content	Hrs
1.	**Introduction:** Distributed file system–Big Data and its importance, Vs of Big Data, Drivers for Big data, Big data applications.	05
2.	**Big Data Enabling Technologies:** Big Data – Apache Hadoop & Hadoop EcoSystem,Hadoop Distributed File system, YARN, Hadoop Mapreduce programming model.	08
3.	**Big Data Storage Platforms**:Large Scale Data Storage,CAP Theorem, Eventual Consistency, Consistency Trade-Os, ACID and BASE,Introduction to Zookeeper and Paxos,Introduction to Cassandra, Cassandra Internals,Introduction to HBase, HBase Internals.	08
4.	**Apache Spark and Kafka:** Data analysis with Spark,Introduction to Big Data Streaming Platforms ,Big Data Pipelines for Real-Time computing,Introduction to Spark Streaming,Kafka,Streaming Ecosystem,SparkSQL,Kafka Introduction.	10
5.	**Big Data Application:** Big data in Machine learning and Deep Learning, Graph processing, Apache Giraf and Spark GraphX.	08
6.	**Case Study**	06

Practical content:

- Experiments/ Practicals /Simulations would be carried out based on syllabus

Text Book:

1.	Big Data and Analytics by Seema Acharya,Subhashini Chellappan,Paperback(Latest Edition).

Reference Books:

1.	Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2011. Ron Bekkerman, Mikhail Bilenko and John Langford, Scaling up Machine Learning: Parallel and Distributed Approaches, Cambridge University Press, 2011.
2.	Tom White, Hadoop: The Definitive Guide, O'Reilly Media (Latest Edition).

3.	Bill Franks, Taming The Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Wiley(Latest Edition).
4.	Frank J. Ohlhorst, Big Data Analytics: Turning Big Data into Big Money, Wiley (Latest Edition).

ICT/MOOCs Reference:

1.	https://nptel.ac.in/courses/106/104/106104189/

Course Outcomes:

COs	Description
CO1	Approach Specific Problem of Analytics Industry
CO2	Develop research aptitude
CO3	Program the analytics task using various trending tools and technology
CO4	Frame the proper steps to solve the problems

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	0	0	0	0	1	0	1	0	1	1
CO2	1	1	0	0	0	0	1	0	0	0	0	1
CO3	3	2	1	2	2	0	2	0	2	0	2	2
CO4	2	2	0	2	1	0	2	0	2	0	2	2

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Programme	Bachelor of Technology				Branch/Spec.	Computer Engineering/Information Technology		
Semester	VII				Version	1.0.0.0		
Effective from Academic Year		2021-22			Effective for the batch Admitted in			July-2018
Subject code	2CEIT703		Subject Name		Capstone Project-III			
Teaching scheme					Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)	Total		CE	SEE	Total
	L	TU	P	TW				
Credit	-	-	6	-	6	Theory	-	-	-
Hours	-	-	12	-	12	Practical	60	40	100

Pre-requisites:

Understanding of latest Tools & Technology and Database Management System, critical & innovative thinking, Problem solving mindset

Objectives of the course:

The objectives of this course are to provide you:

- To identify the problem by applying acquired knowledge
- To analyze and categorize executable project modules after considering risks
- To choose efficient tools for designing project modules
- To combine all the modules through effective team work after efficient testing
- To elaborate the completed task and compile the project report

Practical content

Sr. No.	Content
1.	Problem Identification
2.	Defining Problem Statement
3.	Requirement gathering & Analysis
4.	Finding Technological Solutions / Idea Pitching
5.	Feasibility Study
6.	Prototype Design
7.	Implementation
8.	Testing
9.	Technical Report Writing

Course Outcome:

COs	Description
CO1	Identify the problem by applying acquired knowledge
CO2	Analyze and categorize executable project modules after considering risks
CO3	Choose efficient tools for designing project modules
CO4	Combine all the modules through effective team work after efficient testing
CO5	Develop professional etiquette to work in a diverse team.
CO6	Integration and application of knowledge and skills acquired
CO7	Bring novel ideas into innovation
CO8	Technical report writing. Elaborate the completed task and compile the project report.

Mapping of CO and PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	1	0	0	0	3	3	3	2
CO2	3	2	2	2	2	1	1	1	3	3	3	2
CO3	3	2	2	2	2	1	1	1	3	3	3	2

CO4	3	2	2	3	2	1	1	1	3	3	3	2	
CO5	3	2	3	3	2	0	0	0	3	3	3	2	
CO6	3	2	3	3	2	1	1	1	3	3	3	2	
CO7	3	2	3	3	3	1	1	1	3	3	3	2	
CO8	3	2	2	2	2	0	0	0	3	3	3	2	

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VII	Version	1.0.0.0
Effective from Academic Year	2021-22	Effective for the batch Admitted in	July 2018
Subject code	2CEIT78PE1	Subject Name	Deep Learning

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic Knowledge of Python programming and Machine Learning

Objectives of the course:

The objectives of this course are to provide an understanding of:

- Mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data
- Deep learning Techniques to various engineering and social applications

Theory syllabus

Unit	Content	Hrs
1.	**Introduction to Deep Neural Networks:** History of Deep Learning, Deep Learning Success Stories, McCulloch Pitts Neuron, Perceptron and Deep Neural Networks, Basics of Machine Learning: features, weights, loss function, cost function, Training Neural networks with Tensorflow, Types of NN- CNN, RNN, Feedforward, Common Tensorflow API's - KERAS, Estimator, Layers , Datasets, training set, validation sets, testing set, evaluation measures: accuracy, precision, recall, f-measure.	06
2.	**Tensorflow for CNN:** Basics of Tensors, Data Input and Preprocessing with Tensorflow, model building, Prediction with Tensorflow, Monitoring and evaluating models using Tensorboard.	06
3.	**Convolutional Neural Networks (CNNs) Architectures:** Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Learning Vectorial Representations Of Words.	08
4.	**CNNs for Recognition, Verification, Detection:** CNNs for Detection: Background of Object Detection, R-CNN, Fast R-CNN, Faster R-CNN, YOLO.	08
5.	**Model Improvement:** Overfitting vs underfitting, Bias vs Variance, hyper parameter tuning: random, coarse to fine; Regularization: L1, L2 regularization, Dropout, Early stopping, Data normalization, Augmentation; Convolutional Neural Networks: convolution, striding, padding, pooling, 1x1 convolution, famous CNN models; CNN Applications: Transfer Learning, Image classification, face detection, object detection.	12
6.	**Case-Study:** Object Detection in Images, Object Detection in Videos.	05

Practical content:

- Experiments/ Practicals /Simulations would be carried out based on syllabus

Text Book:	
1.	Atienza, R.. Advanced Deep Learning with TensorFlow 2 and Keras: Apply DL, GANs, VAEs, deep RL, unsupervised learning, object detection and segmentation, and more. Packt Publishing Ltd., 2020.
2.	Deep Learning in Computer Vision,Principles and Applications,MahmoudHassaballah, Ali Ismail Awad.
Reference Books:	
1.	Andy Krig Scott, Computer Vision Metrics: Survey, Taxonomy, and Analysis: Neuroscience, and Deep Learning: Springer: Berlin, Germany(Latest Edition).
2.	Dr.P.S.Jagadeesh Kumar, Prof. Thomas Binford, Dr.J. Ruby, J. Lepika: Modern Deep Learning and Advan Computer Vision, A Perspective Approach.
ICT/MOOCs Reference:	
1.	https://nptel.ac.in/courses/106/106/106106224/

Course Outcomes:

COs	Description
CO1	Identify the deep learning techniques
CO2	Implement Machine learning and deep learning
CO3	Train machine and solve problems associated with batch learning and online learning
CO4	Implement various ways of selecting suitable model parameters for different machine learning techniques
CO5	Integrate deep learning libraries and mathematical and statistical tools

Mapping of CO and PO:

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	0	0	1	0	1	0	1	0	0	2	0	1	0
CO2	3	1	2	3	3	0	3	0	3	0	1	2	0	3	2
CO3	3	2	1	2	3	0	2	0	2	0	1	2	0	3	2
CO4	3	2	3	3	3	0	3	0	2	0	1	2	0	3	2
CO5	3	2	3	2	3	0	2	0	3	0	2	2	3	3	2

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelors of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VII	Version	1.0.0.0
Effective from Academic Year	2021-22	Effective for the batch Admitted in	Juy-2018
Subject code	2CEIT78PE2	Subject Name	Blockchain Technologies

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Substantial programming experience

Objectives of the course:

The Course objectives are to:

- Understanding the concept of Blockchain networks and Cryptocurrencies
- Regulatory and policy considerations for designing applications based on Blockchain technology
- Understand how a company can reinvent itself or enter new markets using blockchain technologies
- Comprehend the use Blockchain in real world scenarios and applications

Theory syllabus:

Unit	Content	Hrs
1.	**Introduction to Blockchain:** History, Digital Money to Distributed Ledgers, Design Primitives, Protocols, Security, Consensus, Permissions, Privacy.	04
2.	**Blockchain Architecture, Design and Consensus:** Basic crypto primitives: Hash, Signature, Hashchain to Blockchain, Basic consensus mechanisms, Requirements for the consensus protocols, PoW and PoS, Scalability aspects of Blockchain consensus protocols, Merkle Tree.	10
3.	**Permissioned and Public Blockchains:** Design goals, Consensus protocols for Permissioned Blockchains, Hyperledger Fabric, Decomposing the consensus process, Hyperledger fabric components, Smart Contracts, Chain code design, Hybrid models (PoS and PoW).	10
4.	**Blockchain cryptography:** Different techniques for Blockchain cryptography, privacy and security of Blockchain, multi-sig concept, Cryptographic Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.	06
5.	**Recent trends and research issues in Blockchain:** Use-cases, Scalability, secure cryptographic protocols on Blockchain, multiparty communication, Uses of Blockchain in E-Governance, Security, Land Registration, Medical Information Systems, and others.	06
6.	**The "Evil Sides" of Blockchain and Legal Regulations for Blockchain:** Criminal Use of Payment Blockchains, The Role of Financial Regulations for Blockchain, Does Blockchain Need Legal Regulations? Global Digital Assets Regulatory Trends.	04
7.	**Blockchain Applications:** Decentralized Cryptocurrency, Distributed Cloud Storage, E-Voting, Insurance Claims, Cross-Border Payments, Asset Management, Smart Appliances.	05

Practical content:

- Naive Blockchain construction
- Memory Hard algorithm - Hashcash implementation
- Play with Go-ethereum
- Smart Contract using Solidity
- Build an Application using Blockchain

Text Books:	
1.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press.
Reference Books:	
1.	Wattenhofer, Roger, The science of the blockchain, CreateSpace Independent Publishing Platform.
2.	Bahga, Arshdeep, and Vijay Madisetti,. Blockchain Applications: A Hands-on Approach, VPT.
3.	Antonopoulos, Andreas M, Mastering Bitcoin: Programming the open blockchain, O'Reilly Media, Inc .
4.	Diedrich, Henning, Ethereum: Blockchains, digital assets, smart contracts, decentralized autonomous organizations, Wildfire Publishing (Sydney).
5.	Nakamoto, Satoshi, Bitcoin: A peer-to-peer electronic cash system, Research Paper.
ICT/MOOCs Reference:	
1.	https://www.coursera.org/specializations/blockchain
2.	https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/
3.	http://cs251crypto.stanford.edu/18au-cs251/

Course Outcomes:

COs	Description
CO1	Understand the structure of a Blockchain networks
CO2	Design and analyze the applications based on Blockchain technology
CO3	Understand how Blockchain systems (mainly Bitcoin and Ethereum) work
CO4	Design, build, and deploy smart contracts and distributed applications
CO5	Evaluate security, privacy, and efficiency of a given blockchain system.

Mapping of CO and PO:

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	1	3	3	1	1	2	0	-	1	2
CO2	2	3	3	3	3	2	3	2	1	-	1	2
CO3	3	3	1	3	3	1	1	3	1	-	1	2
CO4	2	2	3	3	3	3	3	2	3	-	3	2
CO5	1	1	2	3	3	2	3	3	1	-	2	2

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VII	Version	2.0.0.1
Effective from Academic Year	2021-22	Effective for the batch Admitted in	July 2018
Subject code	2CEIT78PE3	Subject Name	Fundamentals of Image Processing

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Background of computer programming and Algorithms

Objectives of the Course:

The Course objectives are:

- To describe and explain basic principles of image processing
- To understand and implement algorithms that perform basic image processing
- To understand and implement algorithms for advanced image analysis like image segmentation

Theory syllabus

Unit	Content	Hrs
1.	**Introduction:** Overview, Applications of image processing in different fields, Fundamental steps in digital image processing, Components of an image processing system	04
2.	**Digital Image Fundamentals:** Elements of visual perception, light and the electromagnetic spectrum, Image sensing and acquisition, Image formation and digitization concepts, Image sampling and quantization, Basic relationships between pixels, Linear and nonlinear operations	07
3.	**Image Enhancement in the Spatial Domain:** Basic gray level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, smoothing spatial filters, Sharpening spatial filters, Mixture of spatial enhancement methods	12
4.	**Introduction to Image Restoration:** Various noise models, Image restoration using spatial domain filtering	05
5.	**Morphological Image Processing:** Basic morphological operations, Structuring elements, dilation and erosion, Opening and closing, Hit-or-Miss transformation, Basic morphological algorithms: hole filling, connected components, thinning, thickening, Skeletons, pruning	06
6.	**Image Segmentation:** Detection of discontinuities, Point, line, and edge detection, thresholding, Edge linking, and boundary detection, Region based segmentation, Hough transform	06
7.	**Representation and Description:** Representation, Boundary descriptors, Regional descriptors	05

Practical content:

- Experiments/Practicals/Simulations would be carried out based on the syllabus

Text Books:

1.	Digital Image Processing By Rafael C. Gonzalez and Richard E. Woods, Pearson Education

Reference Books:	
1.	Digital Image processing By S. Sridhar, Oxford University Press.
2.	Fundamentals of Image Processing by Anil K. Jain, Prentice Hall.
3.	Digital Image Processing By Pratt W.K, John Wiley & Sons.
ICT/MOOCs Reference:	
1.	https://www.coursera.org/course/digital
2.	http://nptel.ac.in/courses/117105135
3.	https://www.mooc-list.com/course/sparse-representations-signal-and-image-processing-fundamentals-edx
4.	https://www.udemy.com/topic/image-processing/
5.	https://www.coursera.org/learn/image-processing

Course Outcomes:

COs	Description
CO1	Analyze general terminology of image processing and Understand the fundamental concepts of image processing
CO2	Examine various types of images, transformations, and spatial filtering
CO3	Evaluate the techniques for image enhancement and image restoration
CO4	Perform image segmentation and representation techniques

Mapping of CO and PO:

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	3	2	2	0	1	0	1	1	2	3
CO2	3	3	2	3	3	1	3	0	2	0	2	2
CO3	3	3	2	2	3	0	3	0	2	1	2	3
CO4	3	3	2	2	3	0	3	0	2	1	2	3

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology			Branch/Spec.	Computer Engineering/Information Technology		
Semester	VII			Version	2.0.0.1		
Effective from Academic Year		2021-22		Effective for the batch Admitted in			July-2018
Subject code	2CEIT78PE4	Subject Name		Mobile Computing			
Teaching scheme				Examination scheme (Marks)			
(Per week)	Lecture(DT)	Practical(Lab.)	Total		CE	SEE	Total
	L TU	P TW					
Credit	3 0	1 -	4	Theory	40	60	100
Hours	3 0	2 -	5	Practical	30	20	50

Pre-requisites:

Basic knowledge of Computer Networks

Objectives of the course:

Upon successful completion of the course, the student should be able to:

- Classify the fundamental concepts of Mobile Computing
- Learn and identify the basics of mobile communication system
- Understand and evaluate the various routing protocols for mobile computing networks
- Know the basis of transport and application layer protocols
- Understand the concepts of data descrimination and maintenance in Mobile Computing

Theory syllabus:

Unit	Content	Hrs
1.	**Introduction:** Introduction to Mobile Computing ,Applications of Mobile Computing, Challenges in mobile computing, Generations of Mobile Communication Technologies-[2G,3G,4G,5G],Multiplexing, Spread spectrum, MAC Protocols: TDMA, FDMA, CDMA.	06
2.	**Mobile Communication System:** Cellular Network , GSM Network : GSM Architecture, ,GPRS Network : Architecture,Comparison between GSM and GPRS.	04
3.	**Mobility Management:** Mobility: Handoff, Types of handoffs,Location management, HLR-VLR scheme, Hierarchical scheme, Predictive location management schemes, Mobile IP, cellular IP.	10
4.	**Ad hoc Network Routing Protocols:** Ad hoc network routing protocols, Destination sequenced distance vector algorithm, Cluster-based gateway switch routing, Global state routing, Dynamic source routing, Ad hoc on-demand routing, Location aided routing, Zonal routing algorithm, Multicast Routing- ODMRP.	12
5.	**Mobile Transport and Application Layer :** Mobile TCP, WAP, Architecture, WDP , WTLS ,WTP, WSP ,WAE ,WTA Architecture ,WML.	10
6.	**Data Dissemination and Management:** Challenges, Data dissemination, Mobile data replication, Mobile data caching, Mobile cache maintenance, mobile web caching, caching in ad hoc networks.	03

Practical content:

- Experiments/Practical/Simulations would be carried out based on syllabus

Text Books:

1.	Mobile Computing By Talukder and Yavagal, Tata McGraw Hill.
2.	Prasant Kumar Pattnaik, Rajib Mall, —Fundamentals of Mobile Computing, PHI Learning Pvt.Ltd, New Delhi – (latest edition).

Reference Books:	
1.	Mobile Communication By Jochen Schiller, Pearson.
2.	Wireless and Mobile Networks, Concepts and Protocols by Sunilkumar S. Manvi, Wiley Pub.
3.	Wireless Communications and Networks by William Stallings, PHI/Pearson Education.
4.	Mobile Communication Systems by Hazysztof Wesolowski, John Wiley and Sons Ltd.
5.	Mobile Cellular Telecommunications-Analog and Digital Systems by William.C.Y.Lee, TMH.
Recommended web Materials:	
1.	Principles of Mobile computing by Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober Springer, New York, (Latest Edition).
2.	C. E. Perkins, "Mobile networking through Mobile IP," in IEEE Internet Computing, vol. 2, no. 1, pp. 58-69, Jan.-Feb. 1998, doi: 10.1109/4236.656077.
3.	www.ietf.org – For drafts.
4.	www.ieee.org – For standards and technical research papers.
5.	https://www.cse.iitb.ac.in/~mythili/teaching/cs653_spring2014/index.html
Recommended Softwares:	
1.	OMNET++
2.	SUMO
3.	MATLAB
4.	NS2, NS3

Course Outcomes:

COs	Description
CO1	Develop a strong foundation in the fundamentals of mobile Networks
CO2	Explain the various models of mobile communication systems
CO3	Apply knowledge and explain functionality of Network and Transport Layer protocols of Mobile Network
CO4	Encourage Business Principles and present marketing scenarios in wireless networks.

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	0	2	1	3	2	0	0	1	1	2
CO2	3	3	0	2	3	2	2	0	0	1	2	2
CO3	3	3	3	2	2	2	2	0	0	1	1	2
CO4	0	0	0	2	3	1	1	0	0	2	2	2

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelors of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VII	Version	1.0.0.0
Effective from Academic Year	2021-22	Effective for the batch Admitted in	July 2018
Subject code	2CEIT78PE5	Subject Name	Search Engine Optimization

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic knowledge of web development, Concept of search engine, Knowledge of analytics

Objectives of the course:

The objectives of this course are:

- To provide understanding of SEO
- To student learn different types of page optimization techniques
- To know about SEO tools and techniques

Theory syllabus:

Unit	Content	Hrs
1.	**Basics for SEO:** What is Domain? Basic Knowledge of World Wide Web, Difference between Portal and Search Engines, What is SEO, Types of SEO Techniques, Black hat techniques, White Hat techniques, How Search Engine works.	06
2.	**SEO Research & Analysis:** Market Research, Keyword Research and Analysis, Keyword opportunity, Competitors Website Analysis, SWOT Analysis of Website, How to Choose Best Keywords, Tools available for Keyword Research.	06
3.	**Website Design SEO Guidelines:** Content Research, Content Guidelines, Content Optimization, Design & Layout, XML Sitemap / URL List Sitemap.	06
4.	**On-page Optimization:** The Page Title, Meta Descriptions & Meta Keywords, Headings, Bold Text, Domain Names & Suggestions, Canonical Tag, Meta Tags, Images and Alt Text, Internal Link Building, The Sitemap, Invisible Text, Server and Hosting Check, Robots Meta Tag, Doorway Pages, 301 Redirects, 404 Error, Duplicate content.	07
5.	**Off-page Optimization:** Page Rank, Link Popularity, Link Building in Detail, Directory Submission, Social Bookmark Submission, Blog Submission, Articles, Links Exchange, Reciprocal Linking, Posting to Forums, Submission to Search Engine, RSS Feeds Submissions, Press Release Submissions, Forum Link Building, Competitor Link Analysis.	07
6.	**Analytics:** Google Analytics, Installing Google Analytics, How to Study Google Analytics, Interpreting Bars & Figures, How Google Analytics can Help SEO, Advanced Reporting, Webmaster Central & Bing/Yahoo, Open Site Explorer, Website Analysis using various SEO Tools available.	07
7.	**SEO Tools and Reporting:** Keyword Density Analyzer Tools, Google Tools, Yahoo / Bing Tools, Rich Snippet Text Tools, Comparison Tools, Link Popularity Tools, Search Engines Tools, Site Tools, Miscellaneous Tools, Google analysis, Tracking and Reporting, Reports Submission, Securing Ranks.	06

Practical content:

- Experiments / Practical / Simulations would be carried out based on syllabus

Text Books:

1. Todd Perkins "Search Engine Optimization for Flash" March 2009, O'Reilly Media, Inc., ISBN: 9780596522520.

Reference Books:

1. Andrew B. King "Website Optimization" July 2008, O'Reilly Media, Inc. ISBN: 9780596515089.

ICT/MOOCs Reference:

1. https://onlinecourses.swayam2.ac.in/ugc19_hs26/preview

Course Outcomes:

COs	Description
CO1	Understand SEO & its terminologies
CO2	Explain different methods of SEO research & Analysis
CO3	Apply different page optimization techniques
CO4	Implement SEO tools & reporting

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	3	0	0	0	0	0	0	1
CO2	3	3	2	3	3	0	0	0	1	0	1	1
CO3	3	2	3	3	3	0	0	0	2	0	1	1
CO4	3	2	3	3	3	0	0	0	2	0	3	1

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology			Branch/Spec.	Computer Engineering & Information Technology
Semester	VII			Version	1.0.0.0
Effective from Academic Year	2021-22			Effective for the batch Admitted in	July-2018
Subject code	2CEIT78PE6	Subject Name		Virtual Reality	

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Objectives of the course:

The Course objectives are:

- To make students know the basic concept and framework of virtual reality.
- To teach students the principles and multidisciplinary features of virtual reality
- To teach students the technology for multimodal user interaction and perception in VR, in particular the visual, audial and haptic interface and behaviour
- To teach students the technology for managing large scale VR environment in real time

Theory syllabus:

Unit	Content	Hrs
1.	**Virtual reality and virtual environments:** The historical development of VR, scientific landmarks computer graphics, real-time computer graphics, virtual environments, requirements for VR, benefits of virtual reality. Hardware technologies for 3D user interfaces: visual displays, auditory displays, haptic displays, choosing output devices for 3D user interfaces.	09
2.	**3D user interface input hardware:** Input device characteristics, desktop input devices, tracking devices, 3d mice, special purpose input devices, direct human input, home - brewed input devices, choosing input devices for 3D interfaces. Software technologies: database - world space, world coordinate, world environment, objects - geometry, position / orientation, hierarchy, bounding volume, scripts and other attributes, VR environment - VR database, tessellated data, LODs, Cullers and Occluders, lights and cameras, scripts, interaction - simple, feedback, graphical user interface, control panel, 2D controls, hardware controls, room / stage / area descriptions, world authoring and playback, VR toolkits, available software in the market.	15
3.	**3D interaction techniques:** 3D manipulation tasks, manipulation techniques and input devices, interaction techniques for 3D manipulation, design guidelines – 3D travel tasks, travel techniques, design guidelines - theoretical foundations of wayfinding, user centered wayfinding support, environment centered wayfinding support, evaluating wayfinding aids, design guidelines - system control, classification, graphical menus, voice commands, Gestural commands, tools, multimodal system control techniques, design guidelines, case study: mixing system control methods, symbolic input tasks, symbolic input techniques,	09

	design guidelines, beyond text and number entry.	
4.	**Designing and developing 3D user interfaces:** Strategies for designing and developing guidelines and evaluation. Advances in 3D user interfaces: 3D user interfaces for the real world, AR interfaces as 3D data browsers, 3D augmented reality interfaces, augmented surfaces and tangible interfaces, agents in AR, transitional AR-VR interfaces - the future of 3D user interfaces, questions of 3D UI technology, 3d interaction techniques, 3d UI design and development, 3D UI evaluation and other issues.	08
5.	**Virtual reality applications:** Engineering, architecture, education, medicine, entertainment, science, training.	04

Practical content:

- Experiments/ Practicals /Simulations would be carried out based on syllabus

Text Book:

1.	Paul Mealy, Virtual & Augmented Reality for Dummies, John Wiley & Sons.

Reference Books:

1.	Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality Applications: Foundations of Effective Design", Morgan Kaufmann.
2.	Jan Erik Solem, Programming Computer Vision with Python, Shroff Publisher/O'Reilly Publisher.
3.	Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach".
4.	Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory Practice", Addison Wesley, USA.

ICT/MOOCs Reference:

1.	https://nptel.ac.in/courses/106/106/106106138/
2.	https://www.coursera.org/specializations/virtual-reality
3.	https://www.coursera.org/learn/xr-introduction

Course Outcomes:

COs	Description
CO1	Analyse the hardware and software requirements
CO2	Use the different interaction techniques
CO3	Design 3D interfaces

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	0	1	0	0	0	1	0	1	0
CO2	3	3	2	2	2	0	0	0	2	0	1	0
CO3	3	2	2	0	2	0	2	0	1	0	0	0

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology				Branch/Spec.	Computer Engineering / Information Technology			
Semester	VII				Version	1.0.0.0			
Effective from Academic Year	2021-22				Effective for the batch Admitted in	July 2018			
Subject code	2CEIT78PE7		Subject Name		Natural Language Processing				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic knowledge of python programming and machine learning statistics

Objectives of the course:

The Course objectives are:

- To introduce the fundamental concepts and techniques of Natural language Processing for analyzing words based on Morphology and CORPUS
- To examine the NLP models and interpret algorithms for classification of NLP sentences by using both the traditional, symbolic and the more recent statistical approach
- To get acquainted with the algorithmic description of the main language levels that includes morphology, syntax, semantics, and pragmatics for information retrieval and machine translation applications

Theory syllabus:

Unit	Content	Hrs
1.	**Introduction to NLP:** Introduction to various levels of natural language processing, Ambiguities and computational challenges in processing various natural languages, Introduction to Real life applications of NLP such as spell and grammar checkers, information extraction, question answering, and machine translation.	03
2.	**Text Processing:** Ambiguity in language, Segmentation, Stemming, Tokenization, Representation of word, Sentence, Word embedding, Word Senses, Linguistic Structure: Dependency Parsing.	09
3.	**Text Classification:** Word Window Classification, Neural Networks for text, N-gram Language Models, Perplexity, Hidden Markov Models, Viterbi algorithm, Recurrent Neural network, Vanishing Gradients and exploding gradients.	13
4.	**Language Modelling:** The role of language models, Estimating parameters and smoothing. Evaluating language models, LSTM (Long short term memory), GRU (Gated recurrent Unit), Part of speech tagging, BERT, XLnet, 1D-CNN for NLP, Sub-word Models, Contextual Representations, Transformers, Self-Attention for Generative Models.	10
5.	**Machine Translation:** Statically Machine Translation, Neural Machine Translation, Seq2Seq Modelling, Attention, Question Answering Bot, Natural Language Generation, Neural Machine Translation.	07
6	**NLP Project:** Perceptron Learning, SVM-Formulation, SVM-Interpretation & Analysis, SVMs for Linearly Non Separable data, SVM Kernels, SVM-Hinge Loss Formulation.	03

Practical content:

- Experiments/ Practicals /Simulations would be carried out based on syllabus

Text Book:

1.	Daniel Jurafsky and James H. Martin, Speech and Language processing an introduction to Natural Language Processing, Computational Linguis, Prentice Hall, (Latest Edition). ISBN 978-0131873216.

Reference Books:

1.	Steven Bird, Ewan Klein and Edward Lopper, Natural Language Processing with Python, O'Reilly, (Latest Edition). ISBN 978-0596516499.
2.	Siddiqui and Tiwari, Natural Language Processing and Information Retrieval, Oxford University Press, (Latest Edition). ISBN 978-0195692327.
3.	Nitin Indurkhya, Fred J. Damerau and Fred J. Damerau, Handbook of Natural Language Processing, Taylor and Francis, (Latest Edition). ISBN 978-1420085921.
4.	Allen J., Natural Language understanding, Pearson, (Latest Edition). ISBN 978-0805303346.

ICT/MOOCs Reference:

1.	https://nptel.ac.in/courses/106/105/106105158/
2.	https://nptel.ac.in/courses/106/106/106106211/

Course Outcomes:

COs	Description
CO1	To understand natural language processing and importance of word representation
CO2	Apply deep learning to solve natural language problems such as language modelling, machine translation, POS tagging, Seq2Seq generation
CO3	Solve NLP problem in Indian context (Indian languages)

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	2	0	0	0	0	0	0	0
CO2	3	2	3	2	2	0	1	0	1	0	1	1
CO3	3	1	3	3	3	0	2	0	1	0	0	1

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelors of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VII	Version	1.0.0.0
Effective from Academic Year	2021-22	Effective for the batch Admitted in	Juy-2018
Subject code	2CEIT78PE8	Subject Name	Forensics & Cyber Law

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic knowledge of system and mobile devices, Social Networking platforms, Types of web application functionality

Objectives of the course:

The objectives of this course are:

- To extend the students' knowledge of Cyber Crimes & IT ACT
- To enhance their expertise in Cyber Crime Investigation and methodologies
- To carry out real life cyber forensics assignments

Theory syllabus:

Unit	Content	Hrs
1.	**Introduction to Cyber Crime Investigation & Cyber Forensics:** Cyber Crime Investigation, Cyber Warfare, Terrorism & Social Networking, Cyber Forensics and Incident Handling, Cyber Forensic Basics, Storage Fundamentals - File System Concepts.	06
2.	**Investigating Real World Cyber Crimes:** Investigating Social Media Profile Impersonation cases - Phishing Cases, Data Theft Cases, Corporate Espionage Cases, Email Fraud Cases, Credit Card Fraud Cases, Cyber Pornography Cases, Denial of Service Attacks Cases, Cyber defamation Cases, Real Life Case Studies.	10
3.	**IT ACT, Offenses and Penalties:** Offences under the Information and Technology Act 2000 - Penalty and adjudication, Punishments for contraventions under the Information Technology Act 2000 (Case Laws, Rules and recent judicial pronouncements to be discussed), Limitations of Cyber Law.	07
4.	**Data Recovery Tools, Process, and Ethics:** Gathering Evidence, Precautions, Preserving and safely handling original media for its admissibility, Document a Chain of Custody and its importance, Complete timeline analysis of computer files based on file creation, file modification and file access, Data Protection and Privacy.	10
5.	**Cyber Forensics Investigation:** Introduction to Cyber Forensic Investigation, Investigation Tools – eDiscovery, Digital Evidence Collection, Evidence Preservation, Email Investigation, Encryption and Decryption methods, Search and Seizure of Computers, Work on open Source, Commercial tools.	12

Practical content:

- Performing method to create image of hard disk and removable storage media.
- Performing Deleted File Recovery and Formatted Partition Recovery.
- Performing Recovery of Internet Usage Data - Recovery Swap Files/Temporary Files/Cache Files.
- Performing forensic investigation using Encase Forensic Edition or ProDiscover tool.
- Working with Forensic Toolkit.
- Using computer forensics software tools to cross validate findings in computer evidence-related cases
- Performing tracking on EMail, IP Tracking, EMail Recovery

- Recovering deleted evidence, Password Cracking, Cracking with GPU Systems .

Text Books:

1.	Investigating computer- related crime, a handbook for corporate investigators. Boca Raton Stephenson P.R. & GilbertK.

Reference Books:

1.	Law of Information Technology. New Delhi: Taxmann Publications Pvt.Ltd by Paintal D.
2.	International domain name law: ICANN and the UDRP. Oxford: Hart Publishing by Lindsay D.
3.	Cyber Laws. New Delhi: Ane Books Pvt. Ltd by Sharma J. P &Kanojia S.
4.	Cyber Laws. Universal Law Publishing by DuggalP.
5.	Law relating to computers, internet and e-commerce: A guide to Cyber Laws and the IT Act, 2000 with rules, regulations and notifications. Delhi: Universal Law Publishing Co. by Kamath N.
6.	Cyber Law: The Law of the Internet and Information Technology. Pearson Education by Craig B.
7.	Incident response & computer forensics, McGraw-Hill Companies by Prosise C. & Mandia K.

ICT/MOOCs Reference:

1.	www.coursera.org/lecture/managing-network-cybersecurity/digital-forensics-auditing-part-1-ePjQ4

Course Outcomes:

COs	Description
CO1	Understand cyber crime investigation & its role
CO2	Explain different types of cyber crimes
CO3	Apply IT ACT, Offenses and Penalties as per cyber crime incident
CO4	Learn various Data Recovery Tools, Process, and Ethics
CO5	Implement different types Cyber Forensics Investigation techniques

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	1	1	3	2	3	1	-	-	2
CO2	2	1	-	1	2	3	2	3	1	2	-	2
CO3	2	2	2	2	2	3	2	3	3	1	2	3
CO4	3	2	2	3	2	3	2	3	3	1	3	2
CO5	2	2	3	3	3	3	2	3	3	1	3	3

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology				Branch/Spec.	Computer Engineering / Information Technology		
Semester	VII				Version	1.0.0.0		
Effective from Academic Year		2021-22			Effective for the batch Admitted in		July 2018	
Subject code	2CEIT78PE9	Subject Name			Advanced Algorithms			
Teaching scheme					Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic knowledge of programming, data structures and computer algorithms

Objectives of the course:

The objectives of this course are:

- To equip the students with mathematical preliminaries required to analyze and design computer algorithms
- To know the basics of computational complexity analysis and various algorithm design paradigms
- To provide a thorough knowledge of the most common algorithms and data structures
- To introduce the concept of NP-complete problems and different techniques to deal with them
- To study online and randomized algorithms
- To apply knowledge of advanced algorithms to deal with real world computational problems

Theory syllabus:

Unit	Content	Hrs
1.	**Algorithmic Strategies and Graph Algorithms:** Undirected and Directed Graphs, Bipartite Graphs, Connectivity, Traversability, Trees, Spanning Trees, Rooted and Binary Trees Algorithms – Kruskal's and Prim's Minimal Spanning Tree (Greedy), Dijkstra's Algorithm, Bellman Ford Algorithm, Floyd-Warshall Algorithm (Dynamic Programming), Johnson's algorithm for sparse graph, Max-flow Min-cut theorem, Finding Hamiltonian Circuits (Backtracking), Travelling Salesman Problem (Branch and Bound).	09
2.	**Computational Geometry, String Matching and Number Theoretic Algorithms:** Line - segment properties, Line Segment Intersection, Finding Convex Hull by Graham's scan and Jarvis's march, finding closest pair of problems (1D and 2D) String Matching Algorithms: Naive Algorithm, Robin-Karp Algorithm. Number Theoretic Algorithms: Elementary notions, GCD, Modular arithmetic, Solving modular linear equations, Chinese remainder theorem.	08
3.	**Advanced Data Structures and Randomized Algorithms:** Hash table, Binary Search tree, AVL Trees, Red Black Trees, K-D Trees, B Tree, Splay Tree Randomized Algorithms: A randomized algorithm to solve the closest pair problem, the average performance of the randomized closest pair problem, A randomized algorithm to test whether a number is a prime, A randomized algorithm for pattern matching, A randomized linear time algorithm for minimum spanning trees.	12
4.	**Parallel and Online Algorithms:** Parallel Algorithms: Introduction, models for parallel computing, computing with complete binary tree, Pointer doubling algorithm Online Problems and Algorithms: Introduction, k-server problem, Job shop scheduling problem,	09

	List update problem, Bandit problem.	
5.	**NP completeness and Approximation algorithms**: Introduction to NP completeness, the classes P and NP, polynomial reductions, NP complete problems, Approximation algorithms.	04
6.	**Case studies**	03

Practical content:

- Experiments/ Practicals /Simulations would be carried out based on syllabus

Text Book:

1.	Thomas H Cormen and Charles E.L Leiserson, "Introduction to Algorithm" PHI, Latest Edition, ISBN: 81-203-2141-3.
2.	Horowitz and Sahani, "Fundamentals of computer Algorithms", Galgotia, ISBN: 81-7371-612-9.
3.	Gilles Brassard, Paul Bratle, “Fundamentals of Algorithms “, Pearson, ISBN: 978-81-317-1244-3.

Reference Books:

1.	R.C.T.Lee, S S Tseng, R C Chang, Y T Tsai, “ Introduction to Design and Analysis of Algorithms, A Strategic approach”, Tata McGraw Hill, ISBN-13:978-1-25-902582-2, ISBN-10:1-25-902582-9.
2.	Steven S Skiena, The Algorithm Design Manual, Springer, Latest Edition, ISBN 978-81-8489-865-1.

ICT/MOOCs Reference:

1.	https://onlinecourses.swayam2.ac.in/cec21_cs02/
2.	https://nptel.ac.in/courses/106/106/106106211/

Course Outcomes:

COs	Description
CO1	To equip the students with mathematical preliminaries required to analyze and design computer algorithms.
CO2	To know the basics of computational complexity analysis and various algorithm design paradigms.
CO3	To provide a thorough knowledge of the most common algorithms and data structures.
CO4	To introduce the concept of NP-complete problems and different techniques to deal with them.
CO5	To study online and randomized algorithms.
CO6	To apply knowledge of advanced algorithms to deal with real world computational problems.

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	0	1	0	1	1	2	2
CO2	3	2	3	2	2	0	2	0	1	0	2	2
CO3	3	2	2	2	2	1	2	0	1	0	2	2
CO4	3	3	2	2	3	0	3	0	1	1	2	3
CO5	3	3	3	3	3	0	3	0	2	1	2	3
CO6	3	3	3	3	3	1	3	0	2	1	3	3

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelors of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VII	Version	1.0.0.0
Effective from Academic Year	2021-22	Effective for the batch Admitted in	July 2018
Subject code	2CEIT78PE10	Subject Name	Fog Computing

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Basic knowledge of IoT, Molding & simulations, Concept of data management & security

Objectives of the course:

The objectives of this course are:

- To extend the students' knowledge of fog computing & edge computing
- To enhance their expertise in area of wearable computing enjoinment
- To carry out real life application of fog computing

Theory syllabus:

Unit	Content	Hrs
1.	**INTRODUCTION TO FOG COMPUTING:** Fog Computing-Definition-Characteristics-Application Scenarios - Issues –Fog. Computing and Internet of Things-Pros and Cons-Myths of Fog Computing -Need and Reasons for Fog Computing Fog Computing and Edge Computing-IoT, FOG, Cloud Benefits.	09
2.	**ARCHITECTURE:** Working Procedure -Performance Evaluation Components- Software Systems – Architecture-Modeling and Simulation –Challenges.	09
3.	**FOG PROTOCOLS:** Fog Protocol-Fog Kit- Proximity Detection Protocols- DDS/RTPS computing protocols.	09
4.	**MANAGEMENT OF DATA AND SECURITY ANALYSIS:** Smart Management of Big Data-Smart Data-Structure of Smart Data- Smart Data Life. Cycle-System Architecture-Multi-dimensional Payment Plan- -Security and Privacy. Issues-Multimedia Fog Computing-Architecture-Deduplication-Hybrid Secure. Deduplication- Security Challenges-Security Requirements.	09
5.	**CASE STUDY:** Case Study: Wind Farm - Smart Traffic Light System, Wearable Sensing. Devices, Wearable Event Device, Wearable System, Demonstrations, Post. Application Example. Event Applications Example.	09

Practical content:

Experiments / Practical / Simulations would be carried out based on syllabus

Text Books:

1. Assad Abbas, Samee U. Khan "Fog Computing: Theory and Practice " wiley India May2020.

Reference Books:

1. Stojan Kitanov (Mother Teresa University, Macedonia)"Introduction to Fog Computing" IGI Global Publication.
2. Ivan Stojmenovic, Sheng Wen ," The Fog Computing Paradigm: Scenarios and Security Issues" Proceedings of the 2014 Federated Conference on Computer Science and Information Systems pp. 1–8

3.	Fog Computing: Helping the Internet of Things Realize its Potential Amir Vahid Dastjerdi and Rajkumar Buyya, University of Melbourne.
4.	Multidimensional payment Plan in Fog Computing with Moral Hazar, Yanru Zhang,Nguyen H. Tran, Dusit Niyato, and Zhu Han,IEEE,2016.
5.	Farhoud Hosseinpour,Juha Plosila,Hannu Tenhunen,"An Approach for Smart management of Big Data in the Fog Computing Context", IEEE 8th International Conference on Cloud Computing Technology and Science,2016

ICT/MOOCs Reference:

1.	https://www.coursera.org/lecture/iot-wireless-cloud-computing/5-11-fog-computing-467Gr

Course Outcomes:

COs	Description
CO1	Understand fog computing
CO2	Know architecture of fog computing
CO3	Implement fog computing protocols
CO4	Do security risk analysis
CO5	Know various industry based application of fog computing

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	3	0	0	0	0	0	0	1
CO2	3	2	2	3	3	0	0	0	1	0	1	1
CO3	3	3	3	3	3	0	0	0	2	0	1	1
CO4	3	2	2	3	3	0	0	0	2	0	3	1
CO5	3	2	2	2	3	0	0	0	0	0	0	1

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology		Branch/Spec.	Computer Engineering/Information Technology	
Semester	VII		Version	1.0.0.0	
Effective from Academic Year	2021-22		Effective for the batch Admitted in	July 2018	
Subject code	2CEIT78PE11	Subject Name	Fault Tolerant Systems		

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Probability and statistics, digital design, computer architecture, and operating systems

Objectives of the course:

The objectives of this course are:

- To extend the students' knowledge about faults & errors
- To students know different recovery methods
- How students handle faults in different computing environments

Theory syllabus:

Unit	Content	Hrs
1.	**Introduction to Fault-Tolerance:** Fault Classification: Error, Faults and Failures; Fault tolerant matrix, Reliability and Availability; Dependability Measures.	03
2.	**Mathematical Reliability Modelling:** Probability Basics, Reliability and Availability Modelling, Analysis using Markov Models.	05
3.	**Hardware Fault-Tolerance:** Canonical and Resilient Structures; Reliability Evaluation Techniques and Models; Processor-level Fault Tolerance; Byzantine Failures and Agreements.	06
4.	**Information Redundancy:** Error Detection / Correction Codes (Hamming, Parity, Checksum, Berger, Cyclic, Arithmetic); Data replication (Hierarchical Vs. Non-hierarchical organization), Primary backup approach; Resilient Disk Systems (RAID), Algorithm based fault tolerance.	07
5.	**Fault-Tolerant Networks:** Measures of resilience (graph theoretical measures, computer networks measures), Network Topologies and their Resilience; Fault-tolerant Routing.	05
6.	**Software Fault-Tolerance:** Single-Version Fault Tolerance; N-Version Programming; Recovery block Approach; Exception and Pre/Post Conditional (Assert) Handling; Software Reliability Models (Jelinski–Moranda, Littlewood–Verrall, Musa–Okumoto), Model selection and parameter estimation, Fault-Tolerant Remote Procedure Calls.	07
7.	**Checkpointing:** What is Checkpointing, Nontrivial checkpointing, checkpointing level, Optimal Checkpointing, Checkpointing in Distributed and Shared-memory Systems, Check pointing in real-time systems.	06
8.	**Fault-Tolerant System Design/Applications:** Defect-tolerance in VLSI Designs: Manufacturing Defects and Circuit Faults, Probability of Failure and Critical Area, Basic Yield Models, Yield Enhancement Through Redundancy; Fault Detection in Cryptographic Systems: Security Attacks Through Fault Injection, Countermeasures.	06

Practical content:

- Experiments/Practicals/Simulations would be carried out based on syllabus

Text Books:

1. Fault-Tolerant Systems Israel Koren and C. Mani Krishna, Morgan-Kaufman Publishers.

Reference Books:

1. Fault-Tolerant Design by Elena Dubrova; Springer.
2. Handbook of Software Reliability Engineering by Michael R. Lyu; IEEE CS Press and McGraw-Hill.
3. Reliability of Computer Systems and Networks by Martin L. Shooman; John Wiley & Sons Inc.
4. Probability and Statistics with Reliability, Queuing and CS Applications by Kishor Trivedi, John Wiley & Sons.

ICT/MOOCs Reference:

1.	https://www.coursera.org/learn/real-time-mission-critical-systems-design
2.	https://nptel.ac.in/courses/106/106/106106176/
3.	https://www.coursera.org/lecture/big-data-essentials/fault-tolerance-live-demo-A8VUM

Course Outcomes:

COs	Description
CO1	Enumerate the need and necessity to consider fault tolerant design in digital systems
CO2	Explain vividly, the various techniques for fault modelling and tests generation
CO3	Determine the various forms of redundancy for enhancing reliability of digital systems
CO4	Evaluate reliability of systems with permanent and temporary faults
CO5	Carry out assessment of the relationship between software testing, residual defects and security vulnerabilities

Mapping of CO and PO:

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1	2	2	0	1	0	0	0	0	0
CO2	3	2	2	3	2	1	1	0	0	0	0	0
CO3	3	2	1	1	1	0	0	0	0	0	0	0
CO4	2	2	3	2	2	0	0	0	0	0	0	0
CO5	2	3	1	1	2	0	0	0	1	0	0	0

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering/Information Technology
Semester	VII	Version	1.0.0.0
Effective from Academic Year	2021-22	Effective for the batch Admitted in	July 2018
Subject code	2CEIT78PE12	Subject Name	High Performance Computing

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Computer Architecture and Organization

Objectives of the course:

The objectives of this course are to provide you with an understanding of:

- Various computing technology architecture
- Emerging trends in computing technology
- Parallel Computers and programming
- Memory Parallel Programming using OpenMP
- Memory Parallel Programming using and MPI

Theory syllabus:

Unit	Content	Hrs
1.	**Cluster Computing and its Architecture:** Ease of Computing, Scalable Parallel Computer Architecture, Towards Low Cost Parallel Computing & Motivation, Windows opportunity, A Cluster Computer And Its Architecture, Cluster Classification, Commodity Components for Clusters, Network Services/Communication SW, Cluster Middleware and Single Systems Image ,Resource management & Scheduling (RMS).	10
2.	**Cluster Setup and Administration:** Introduction, Setting up the cluster, Security , System Monitoring, System Tuning.	05
3.	**Introduction to Grid and its Evolution:** Introduction to Grid and its Evolution, Beginning of the Grid Building blocks of Grid, Grid Application and Grid Middleware, Evolution of the Grid: First, Second & Third Generation.	06
4.	**Parallel Processing Concepts:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processor, Multicore processors, Multithreaded processors.	07
5.	**Introduction to message passing and MPI programming:** Memory hierarchies, Cache, Cache mapping Technique, Cache coherence, Distributed-memory Computers, introduction to MPI, Distributed-memory parallel programming with MPI- Message passing, MPI implementation, Performance properties, MPI performance tools.	08
6.	**Introduction to shared memory and OpenMP programming:** Shared-memory computers, introduction to OpenMP, OpenMP-parallel Jacobi Algorithm, OpenMP: Wavefront parallelization, Efficient OpenMP programming, OpenMP work sharing for loops, Determining OpenMP overhead for short loops.	09

Practical content:

- Experiments/Practical/Simulations would be carried out based on syllabus

Text Books:

1.	High Performance Cluster Computing, Volume 1, Architecture and Systems, Rajkumar Buyya, Pearson

	Education.
Reference Books:	
1.	JohnLevesque,GeneWagenbreth,"HighPerformanceComputing:Programming and Application "CRC Press,2010.
2.	Berman, Fox and Hey, Grid Computing – Making the Global Infrastructure a Reality, Wiley India.
3.	KaiHwang, Zhiweixu"ScalableParallelComputing:Technology,Architecture,Programming".
ICT/MOOCs Reference:	
1.	https://nptel.ac.in/courses/106/108/106108055/
2.	https://nptel.ac.in/courses/106/105/106105033/

Course Outcomes:

COs	Description
CO1	To know Emerging trends in computing technology
CO2	Acquire the knowledge of various computing technology architecture
CO3	Understand the parallel architectures and different shared and distributed memory architectures
CO4	Understand the MPI and OpenMP are discussed along with their applications

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	3	2	2	1	3	1	3	2
CO2	3	3	3	2	3	1	1	1	3	0	2	1
CO3	3	2	2	2	2	0	1	0	3	0	2	1
CO4	3	2	2	2	2	0	1	0	1	0	2	1

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FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology		Branch/Spec.	Computer Engineering & Information Technology	
Semester	VII		Version	1.0.0.0	
Effective from Academic Year	2021-22		Effective for the batch Admitted in	July-2018	
Subject code	2CEIT78PE13	Subject Name	Computer Vision		

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	40	60	100
Hours	3	0	2	-	5	Practical	30	20	50

Pre-requisites:

Fundamental of Image Processing, Computer programming and Algorithms

Objectives of the course:

The Course objectives are:

- Understand an overview of the challenges of computer vision, the commonly used techniques and the current approaches
- Investigate different transformation operation, depth estimation, feature extraction and shading
- Identify current research topics in computer vision with an emphasis on recognition tasks and deep learning

Theory syllabus:

Unit	Content	Hrs
1.	**Introduction:** Machine vision systems, optics and lenses, image sensors, human vision and Neuro-visual model; Marr's paradigm; Imaging geometry - world coordinate system and camera coordinate system, coordinate transformations, projection geometry.	03
2.	**Early processing and image filtering:** Noise removal, region segmentation, concept of primal sketch, scale space, edge detection and localization, edge linking, Hough transform, corner and junction detection. Reflectance map and photometric stereo: Image brightness and radiometry, image formation and surface reflectance under different conditions, reflectance map and bidirectional reflectance distribution function, shape from shading.	09
3.	**Range measurement and recovering scene geometry:** Binocular technique stereo pair, epipolar line and plane, Stereo matching, photogrammetry, monocular technique - texture processing and shape from texture, depth from focusing and symmetry, different range finder (active) - laser range finder, light-stripe method. Depth estimation and Multi-camera views, Robust Correspondence Estimation, Perspective, 3-D reconstruction framework; Auto-calibration.	09
4.	**Motion estimation:** Motion field, optical flow - smoothness, boundary conditions, discontinuities of optical flow, block based method, pre-recursive method, Bayesian method, Motion segmentation method, motion from points and lines, token tracking, stereo and motion tracking, use of Kalman filter, focus of expansion, structure from motion, motion compensated filtering and restoration, video compression, active and passive surveillance.	09
5.	**Object Recognition:** Recognition: Building blocks, Detectors and Descriptors, SIFT & Single Object Recognition, Optical Flow & Tracking, Introduction to Object Recognition and Bag of-Words Models, Constellation Model, Recognition: Objects, Scenes, Activities, Object classification and Detection: a part-based discriminative model (Latent SVM), Objects in	09

	Scenes.	
6.	**Advanced Topics:** Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint,Face Detection, Deep Learning, Image Segmentation, Feature Tracking & Motion Layers.	06

Practical content:

- Experiments/ Practicals /Simulations would be carried out based on syllabus

Text Book:

1.	D. Forsyth and J. Ponce, Computer Vision: A Modern Approach, Prentice Hall, (Latest Edition). ISBN 978-9332550117.

Reference Books:

1.	Prince, Simon JD., Computer vision: models, learning, and inference, Cambridge University Press, (Latest Edition). ISBN 978-1107011793.
2.	Richard Szeliski, Computer Vision: Algorithms and Applications , Springer, (Latest Edition). ISBN 978-1848829350.
3.	Emanuele Trucco and Alessandro Verri, Introductory Techniques for 3D Computer Vision, Pearson,(Latest Edition). ISBN 978-0132611084.
4.	D. H. Ballard and C. M. Brown: Computer Vision, Prentice Hall, New York,(Latest Edition).
5.	R. M. Haralick, L. G. Shapiro: Computer and Robot Vision, Addison-Wesley Pub Co, reading, Mass., (Latest Edition).
6.	Jan Erik Solem, Programming Computer Vision with Python, Shroff Publisher/O'Reilly Publisher.

ICT/MOOCs Reference:

1.	https://nptel.ac.in/courses/106/105/106105216/
2.	https://nptel.ac.in/courses/108/103/108103174/

Course Outcomes:

COs	Description
CO1	Understand key features of Computer Vision to analyse and interpret the visible world around us
CO2	Design and implement multidimensional signal processing, feature extraction, pattern analysis, visual geometric modelling, and stochastic optimization
CO3	Apply the computer vision concepts to Biometrics, Medical diagnosis, document processing, mining of visual content, to surveillance, advanced rendering

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	3	0	2	0	1	0	0	2
CO2	3	3	3	3	3	0	3	0	1	0	1	3
CO3	3	3	2	3	3	0	3	0	1	0	1	3

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Technology	Branch/Spec.	Computer Engineering / Information Technology
Semester	VIII		
Effective from Academic Year	2021-22	Effective for the batch Admitted in	July 2018

TEACHING SCHEME-A #

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
2CEIT801	Industrial Training	-	-	-	20	-	20	-	-	-	40	-	40	-	-	-	200	200	400
Total		-	-	-	20	-	20	-	-	-	40	-	40	-	-	-	200	200	400

TEACHING SCHEME-B #

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
2CEIT78PE*	Elective-VII	3	-	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT78PE*	Elective-VIII	3	-	3	1	-	1	3	0	3	2	-	2	40	60	100	30	20	50
2CEIT802	Major Project		-	-	12	-	12	-	-	-	24	-	24	-	-	-	150	150	300
Total		06	-	06	14	-	14	06	0	06	28	0	28	80	120	200	210	190	400

NOTE:

indicates, Student have to Choose any one of the teaching model (Either Teaching Scheme-A or Teaching Scheme -B)

Teaching Scheme -A content only Industrial Project or Start-up Project

Teaching Scheme -B contents subject and IN-HOUSE/ R&D Project

* indicates any number from the following set of subjects in given order

indicates, this subject will offer only for those students, who have taken (2CEIT78PE3 : Fundamental of Image Processing) subject as an elective in Semester VII.