Baba Ghulam Shah Badshah University

Rajouri-(J&K)-185131

B. Tech ITE Syllabus-2018

Syllabus

B. Tech. Degree Course

Department of Information Technology & Engineering

Baba Ghulam Shah Badshah University

Rajouri (J&K)-185131.

General Introduction

A. Definition of Credit

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week 2 Hours Practical(Lab)/week	0.5 credit 1 credit

B. Number of Credits needed -A total of 183 credits are needed by a student to be eligible to get Under Graduate degree in Engineering. 20% Credits may be acquired through MOOCs with in-house examination being conducted.

C. Course code and definition:

Course code	**Definitions**
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Science including Management Courses
PCC-ITE	Professional Core Courses
PEC -ITE	Professional Elective Courses
OEC-ITE	Open Elective Courses
LC-ITE-	Laboratory Course
MC-	Mandatory Courses
PROJ-ITE	Project/Industrial Training

D. Semester-wise credit distribution

S.no	Semester	Credits
1.	Semester-I	21
2.	Semester-II	22
3.	Semester-III	25
4.	Semester-IV	25
5.	Semester-V	26
6.	Semester-VI	25
7.	Semester-VII	24
8.	Semester-VIII	15
TOTAL		**183**

Course structure

SEMESTER-I

Course Code	Title	Scheme of Exam				Hrs./Week			Credits
		Duration (Hrs.)	IA	UE	Total Marks	L	T	P	
BSC-ITE-101	Mathematics-I	3	40	60	100	3	1	0	4
ESC-ITE-101	Basic Electrical Engineering	3	40	60	100	3	0	0	3
BSC-ITE-102	Engineering Chemistry	3	40	60	100	3	1	0	4
BSC-ITE-103	Engineering Physics	3	40	60	100	3	1	0	4
MC-ITE-101	Environmental Science*	3	40	60	100	2	0	0	0
Total			**160**	**240**	**400**				**15**
Laboratory Courses									
ESC-ITE-111	Basic Electrical Engineering Lab	2	25	25	50	0	0	2	1
BSC-ITE-111	Engineering Chemistry	2	25	25	50	0	0	2	1
BSC-ITE-112	Engineering Physics	2	25	25	50	0	0	2	1
ESC-ITE-112	Engineering Graphics Lab**	2	40	60	100	1	0	4	3
PROJ-ITE-111	Induction Program***	2	0	0	0	0	0	0	0
Total			**115**	**135**	**250**				**6**
Total (Theory + Lab)			**275**	**375**	**650**	**Total Credits**			**21**

*****Environmental science course is non-credits and the student has to get at-least minimum pass marks to qualify the subject. Non-credits course marks are not included in total marks.

** The examination pattern of engineering graphics shall be same as of other theory courses.

*******Induction Program is also non-credits and the student is required to obtain 75 percent attendance in the induction program. The head of the department must keep the record of attendance and has to certify it at the time of internal assessment awards to the controller of examination.

SEMESTER-II

Course Code	Title	Scheme of Exam				Hrs./Week			Credits
		Duration (Hrs.)	IA	UE	Total Marks	L	T	P	
BSC-ITE-201	Mathematics-II	3	40	60	100	3	1	0	4
ESC-ITE-201	Basic Electronics	3	40	60	100	3	0	0	3
ESC-ITE-202	Engineering Mechanics	3	40	60	100	3	0	0	3
HSMC-ITE-201	Communication Skills	2	40	60	100	2	0	0	2
ESC-ITE-203	Computer Fundamental and Programming	3	40	60	100	3	1	0	4
MC-ITE-201	Indian Constitution*	2	40	60	100	2	0	0	0
Total			**200**	**300**	**500**				**16**
Laboratory Courses									
ESC-ITE-211	Basic Electronics	2	25	25	50	0	0	2	1
ESC-ITE-212	Engineering Mechanics Lab	2	25	25	50	0	0	2	1
ESC-ITE-213	Computer Fundamental and Programming Lab	2	25	25	50	0	0	2	1
ESC-ITE-214	Workshop Practice	2	50	0	50	0	0	4	2
HSMC-ITE-211	Communication Skills Lab	2	25	25	50	0	0	2	1
Total			**150**	**100**	**250**				**6**
Total (Theory + Lab)			**350**	**400**	**750**	**Total Credits**			**22**

N.B: 1. * Indian constitution course is non-credits and the student has to get at-least minimum pass marks to qualify the subject. Non-credits course marks are not included in total marks

Semester-III

Theory Courses

Course Code	Title	Scheme of Examination				Hrs./Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
BSC-ITE-301	Mathematics-III	3	40	60	100	3	1	0	4
ESC-ITE-301	Digital Logic Design	3	40	60	100	3	0	0	3
PCC-ITE-301	Operating System	3	40	60	100	3	1	0	4
PCC-ITE-302	Data structure using C	3	40	60	100	4	0	0	4
PCC-ITE-303	Object Oriented Programming	3	40	60	100	4	0	0	4
HSMC-ITE-301	Human Values and Professional Ethics	3	40	60	100	3	0	0	3
Total			**240**	**360**	**600**				**22**
Laboratory Courses									
PCC-ITE-311	Data Structures using C Lab	2	25	25	50	0	0	2	1
PCC-ITE-312	Object Oriented Programming Lab	2	25	25	50	0	0	2	1
ESC-ITE-311	Digital Logic Design Lab	2	25	25	50	0	0	2	1
Total			**75**	**75**	**150**				**3**
Total (Theory + Lab)			**315**	**435**	**750**	**Total Credits**			**25**

Semester-IV

Theory Courses

Course Code	Title	Scheme of Examination				Hrs./Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
PCC-ITE-401	Database Management System	3	40	60	100	3	1	0	4
PCC-ITE-402	Computer Organization & Architecture	3	40	60	100	3	1	0	4
PCC-ITE-403	Design & Analysis of Algorithms	3	40	60	100	3	1	0	4
PCC-ITE-404	Discrete mathematics	3	40	60	100	3	0	0	3
PCC-ITE-405	Computer Networks	3	40	60	100	3	1	0	4
PCC-ITE-406	Python Programming	3	40	60	100	3	0	0	3
Total			**240**	**360**	**600**				**22**

Laboratory Courses

PCC-ITE-411	Python Programming Lab.	2	25	25	50	0	0	2	1
PCC-ITE-412	Database Management System Lab.	2	25	25	50	0	0	2	1
PCC-ITE-413	Computer Networks Lab	2	25	25	50	0	0	2	1
Total			**75**	**75**	**150**				**3**
Total (Theory + Lab)			**315**	**435**	**750**	**Total Credits**			**25**

Semester-V

Theory Courses

Course Code	Title	Scheme of Examination				Hrs./Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
OEC-ITE-50X	Open Elective-Course-I	3	40	60	100	3	0	0	3
PEC-ITE-50X	Professional Elective Courses-I	3	40	60	100	3	0	0	3
PCC-ITE-501	Theory of Automata	3	40	60	100	3	1	0	4
PCC-ITE-502	Internet and Web Technologies	3	40	60	100	4	0	0	4
PCC-ITE-503	Software Engineering	3	40	60	100	4	0	0	4
PCC-ITE-504	Java Programming	3	40	60	100	4	0	0	4
Total			**240**	**360**	**600**				**22**
Laboratory Courses									
PCC-ITE-511	Internet and Web Technologies Lab	2	25	25	50	0	0	2	1
PCC-ITE-512	Software Engineering Lab	2	25	25	50	0	0	2	1
PCC-ITE-513	Java Programming Lab	2	25	25	50	0	0	2	1
PROJ-ITE-511	Industrial Training-I	-	25	0	25	0	0	2	1
Total			**100**	**75**	**175**				**4**
Total (Theory + Lab)			**340**	**435**	**775**	**Total Credits**			**26**

Open Elective I Courses

CODE	SUBJECT
OEC-ITE-501/ PCC-CE-504	Estimation and Costing
OEC-ITE-502/ PEC-CSE-702	Internet of Things
OEC-ITE-503/ PCC-CSE-701	Fundamentals Of Digital Image Processing
OEC-ITE-504/ PEC-EE-701	Engineering Material Science

Professional Elective I Courses

CODE	SUBJECT
PEC-ITE-501	Visual programming
PEC-ITE-502	Compiler design
PEC-ITE-503	Advance algorithms

Semester-VI

Theory Courses

Course Code	Title	Scheme of Examination				Hrs./Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
OEC-ITE-60X	Open Elective Courses-II	3	40	60	100	3	0	0	3
PEC-ITE-60X	Professional Elective Courses-II	3	40	60	100	3	0	0	3
PEC-ITE-60X	Professional Elective Courses-III	3	40	60	100	3	0	0	3
PCC-ITE-601	Computer Graphics & Multimedia	3	40	60	100	4	0	0	4
PCC-ITE-602	Network Security	3	40	60	100	4	0	0	4
PCC-ITE-603	Unix/Linux & Shell Programming	3	40	60	100	4	0	0	4
Total			**240**	**360**	**600**				**21**

Laboratory Courses

PCC-ITE-611	Computer Graphics & Multimedia Lab	2	25	25	50	0	0	2	1
PCC-ITE-612	Unix/Linux & Shell programming Lab	2	25	25	50	0	0	2	1
PROJ-ITE-611	Minor Project	-	50	0	50	0	0	2	2
Total			**100**	**50**	**150**				**4**
Total (Theory + Lab)			**340**	**410**	**750**	**Total Credits**			**25**

Open Elective II Courses

CODE	SUBJECT
OEC-ITE-601/ PEC-ECE-601	Mobile and Wireless Communication
OEC-ITE-602/ PEC-CSE-806	Neural Networks
OEC-ITE-603/ PEC-EE-603	Energy Audit and Management
OEC-ITE-604/ PEC-ECE-602	VLSI Design

Professional Elective II Courses

CODE	SUBJECT
PEC-ITE-601	Advance Computer Architecture
PEC-ITE-602	Cloud Computing
PEC-ITE-603	Distributed Database System
PEC-ITE-604	Advanced Java Programming

Professional Elective III Courses

CODE	SUBJECT
PEC-ITE-605	Software Testing
PEC-ITE-606	Data Mining & warehousing
PEC-ITE-607	Distributed Computing

Semester-VII

Theory Courses

Course Code	Title	Scheme of Examination				Hrs./Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
PCC-ITE-701	Machine learning	3	40	60	100	3	1	0	4
OEC-ITE-70X	Open Elective Courses-III	3	40	60	100	3	0	0	3
PEC-ITE-70X	Professional Elective Courses-IV	3	40	60	100	3	0	0	3
PEC-ITE-70X	Professional Elective Courses-V	3	40	60	100	3	0	0	3
HSMC-ITE-701	Entrepreneurship Development & Management	3	40	60	100	3	0	0	3
PROJ-ITE-701	Major Project Phase – I	-	100	0	100	0	0	8	4
Total			**300**	**300**	**600**				20

Laboratory Courses

PCC-ITE-711	Application Development Using Android Lab.	2	25	25	50	0	0	2	1
PCC-ITE-712	Machine Learning Lab	2	25	25	50	0	0	2	1
PROJ-ITE-711	Industrial Training-II	-	25	-	25	0	0	0	2
Total			**75**	**50**	**125**				**4**
Total (Theory + Lab)			**375**	**350**	**725**	**Total Credits**			**24**

Open Elective III Courses

CODE	SUBJECT
OEC-ITE-701/ PCC-CE-502	Environmental Engineering
OEC-ITE-702/ PEC-CSE-713	Communication system
OEC-ITE-703/ PEC-ECE-704	Optical Communication

Professional Elective IV Courses

CODE	SUBJECT
PEC-ITE-701	Software Project Management
PEC-ITE-702	Computer Based Numerical Techniques
PEC-ITE-703	Bio Metrics and Network security

Professional Elective V Courses

CODE	SUBJECT
PEC-ITE-704	Artificial Intelligence
PEC-ITE-705	Linux Administration
PEC-ITE-706	Simulation and Modeling

Semester VIII

Course Code	Title	Scheme of Examination				Hrs./Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
PEC-ITE-80X	Professional Elective Courses VI	3	40	60	100	3	0	0	3
PEC-ITE-80X	Professional Elective Courses-VII	3	40	60	100	3	0	0	3
PROJ-ITE-801	Major Project Phase-II	-	250	200	450	0	0	18	9
Total			**330**	**320**	**650**	**Total Credits**			**15**

Professional Elective VI Courses

CODE	SUBJECT
PEC-ITE-801	Real Time Operating System
PEC-ITE-802	Big Data Analytics
PEC-ITE-803	Distributed Systems

Professional Elective VII Courses

CODE	SUBJECT
PEC-ITE-804	Wireless Networks
PEC-ITE-805	Deep Learning
PEC-ITE-806	Embedded System

Open and Professional Electives

Electives will be introduced in 5 threads besides the Open Elective. There are 6 slots for professional Electives and 3 slots for Open Electives. The department may permit students to take 50% of these (electives + open electives) from other disciplines, based on the choices of the students and consent of course advisers.

A. Theory

B. Systems

C. Data Science

D. Applications

E: Communications

The students will have options of selecting the electives from the different threads depending on the specialization they wish to acquire. There should be at least two electives from the open elective choices; the rest two can be taken from the other threads, if intended. On-line MOOC courses may contribute upto 20% of the credits, with in-house examination being conducted.

Open Electives

The following are the courses open to students from other departments and are offered by the department of Information Technology Engineering, based on the choices of the students and consent of course advisers.

Open Course Code	Subject
Odd Semester	
PCC-ITE-301	Operating System
PCC-ITE-303	Object Oriented Programming
PCC-ITE-502	Internet and Web Technologies
PCC-ITE-504	Java Programming
PEC-ITE-705	Linux Administration
PEC-ITE-706	Simulation and Modeling

Even Semester	
PCC-ITE-404	Discrete Mathematics
PCC-ITE-601	Computer Graphics & Multimedia
PEC-ITE-602	Cloud Computing
PEC-ITE-606	Data Mining & Warehousing

Guidelines for Project-I/Project-II/Industrial training/Seminar

Project I

The object of Project Work I is to enable the student to take up investigative study in the broad field of Information Technology Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. The assignment to normally include:

1. Survey and study of published literature on the assigned topic;
2. Working out a preliminary Approach to the Problem relating to the assigned topic;
3. Conducting preliminary Analysis/ Modeling/ Simulation/ Experiment/Design/ Feasibility;
4. Preparing a Written Report on the Study conducted for presentation to the Department;
5. Final Seminar, as oral Presentation before a departmental committee.

Project II

The object of Project Work II & Dissertation is to enable the student to extend further the investigative study taken up under ITE Project-I, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In depth study of the topic assigned in the light of the Report prepared.
2. Review and finalization of the Approach to the Problem relating to the assigned topic.

3. Preparing an Action Plan for conducting the investigation, including team work.

4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed.

5. Final development of product/process, testing, results, conclusions and future directions.

6. Preparing a paper for Conference presentation/Publication in Journals, if possible.

7. Preparing a Dissertation in the standard format for being evaluated by the Department.

8. Final Seminar Presentation before a Departmental Committee.

Summer internship/Industrial training

Minimum of six weeks in an Industry in the area of Information Technology Engineering. The summer internship should give exposure to the practical aspects of the discipline. In addition, the student may also work on a specified task or project which may be assigned to him/her. The outcome of the internship should be presented in the form of a report.

Seminar

Students should choose topics around latest developments in the field of Information Technology Engineering for presentation as Seminar. The students are expected to submit a report and deliver the seminar in the form of a presentation.

Semester-I

Course Title: Mathematics-I **Max Marks: 100**
Course Code: BSC-ITE-101 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Course Objective: The course is designed to impart elementary knowledge of theory of calculus, linear algebra and sequence & series to engineering students that will serve them to solve various engineering problems.

Unit-I: Differential Calculus

Rolle's Theorem, Mean value theorems, indeterminate forms and L'Hospital's rule; Successive differentiation and Leibnitz's theorem, Taylor's and Maclaurin's series of function of single variable, Expansion of functions of single variable.

Unit-II: Multivariable Calculus (Differentiation)

Limit, continuity and partial derivatives, physical significance of partial derivative, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, directional derivatives, curl and divergence.

Unit-III: Integral Calculus

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit-IV: Sequences and series

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-V Matrices (9 Lectures)

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Course Outcomes: Upon the successful completion of the course, the student will be able to:

1. Understand the significance of Rolle's Theorem, Mean Value theorem, Taylor's and Maclaurin's series for differentiable functions.
2. Identify the extrema of a function on an interval and classify them as minima, maxima or saddles using the first derivative test.

3. Use basic the integral rules to evaluate both definite and indefinite integrals and apply the same to find areas and volume of revolutions. Apart from these, they have a basic understanding of Beta and Gamma functions.
4. Apply the tools of power series and Fourier series to deal with functions of several variables that are essentials in most branches of engineering.
5. Learn the essential tools of matrices and linear algebra in a comprehensive manner.

TEXT BOOKS

1. **Erwin kreyszig,** Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. **D. Zill,** Advanced Engineering Mathematics, Jones & Bartlett
3. **N. Piskunov,** Differential & Integral calculus, Vol-I & II.
4. **Jain &Iyengar,** Advanced Engineering Mathematics, Narosa Publishers

REFERENCE BOOKS

1. **G.B. Thomas and R.L. Finney**, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. **Erwin kreyszig**, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. **Veerarajan T.,** Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. **Ramana B.V.,** Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. **D. Poole**, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions shall be set from each Unit. The student has to attempt five questions, selecting one from each Unit.

Semester-I

Course Title: Basic Electrical Engineering **Max Marks: 100**
Course Code: ESC-ITE-101 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: The course has been designed to provide basic knowledge to the students about the principles of electric circuit analysis, electromagnetism and transformers.

UNIT-I

REVIEW OF ELECTRIC CIRCUITS: Basic Electrical circuit terminology, concept of charge and energy, circuit parameters (resistance, inductance. Capacitance), ohm's law, Kirchoff's current law (KCL), Kirchoff's voltage law (KVL), series and parallel combinations of resistance, inductance& capacitance. Ideal and practical voltage & current sources and their transformations, dependent voltage and current sources.

UNIT-II

D.C CIRCUIT ANALYSIS: Power & energy relations, analysis of series parallel DC circuits, StarDelta transformations (ΔΥ), Loop & Nodal methods, Network Theorems: Thevenin's, Norton's, Maximum Power Transfer and Superposition Theorems (D.D Analysis only).

UNIT-III

A.C. CIRCUIT ANALYSIS: Basic terminology and definitions, phasor and complex number representations, power energy relations in AC circuits, application of Network Theorems to AC circuits ,Resonance in series and parallel circuits, Concepts of active & reactive powers, Introduction to 3 phase circuits.

UNIT-IV

ELECTROMAGNETISM: Review of Fundamentals of Electromagnetism, Ampere's Law, analogies between electric circuits and magnetic circuits, Faraday's laws of electromagnetic induction, direction of induced emf, Lenz's law, magnetic saturation and leakage fluxes.

UNIT-V

BASIC ELECTRICAL INSTALLATIONS: Transformers: Concept of Inductance, Self & Mutual Inductance, Conventions for magnetically coupled circuits, Transformers: introduction, classification & construction of single phase transformer, emf equation and phasor diagrams.

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability

1. To understand the concepts and applications of different laws used in the circuits and network.
2. To study and analyze the D.C. Circuits with different theorem.
3. To study and analyze the A.C. Circuits with different theorem.
4. To study the concepts related to Electromagnetism.
5. To study and understand the working of transformers incorporating with different types of Basic Electrical Installations.

TEXT/ REFERENCES BOOKS:

1. **V. D. Toro**, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
2. **L. S. Bobrow**, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. **E. Hughes**, "Electrical and Electronics Technology", Pearson, 2010.
4. **D. P. Kothari and I. J. Nagrath**, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
5. **D. C. Kulshreshtha**, "Basic Electrical Engineering", McGraw Hill, 2009.

Note For Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each Unit .The student has to attempt five questions at least one from each Unit.

Semester-I

Course Title: Engineering Chemistry **Max Marks: 100**
Course Code: BSC-ITE-102 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: The course is designed to familiarizing the students of engineering with Water treatment, polymerization, photochemistry, corrosion and transition metal chemistry.

UNIT-1
WATER TREATMENT: Water quality measurement, Hardness of water, Estimation of hardness of water, Disadvantages of hard water ,Scale and sludge formation; disadvantages, prevention and treatment, Desalination method, reverse osmosis ,Electro dialysis, Domestic water treatment.

UNIT-2
POLYMERISATION: Basic concept of polymerisation, Broad classification and industrial applications (Buna-N, Buna-S, Polyester, Polyethene, Polypropene, Polystyrene,), Thermosetting plastic and its softening, Biodegradable and non-biodegradable wastes.

UNIT 3
PHOTOCHEMISTRY: Photo excitation, Luminescence and types, Norrish-I and Norrish-II reactions, Application examples of photolysis, Photosynthesis Z –Diagram, Chemistry of vision, MRI equipment and procedure of working.

UNIT-4
TRANSITION METAL CHEMISTRY: Structure of organic compounds up to coordination no 6, Isomerism (geometrical, optical, ionisation, linkage and coordination isomerism, bonding in coordination compounds by CFT, VBT. Application of coordination compounds in organic synthesis and Medical fields.

UNIT 5
CEMENT AND LIME: Introduction and types of cement, Manufacture of Portland Cement, Setting and hardening of cement, Introduction and properties of Lime, Setting and hardening of lime.

COURSE OUTCOMES: At the end of course, the student will be able to

1. Apply the methods to produce soft water for industrial use and potable water at cheaper cost.
2. Substitute metals with conducting polymers and also produce cheaper bio-degradable polymers to reduce environmental pollution,

3. Apply knowledge about photochemical and photo physical processes and the reactivity of excited states to explain applications in photochemical energy conversion.
4. Understand structure of organic compounds and transition metal compound synthesis,
5. Understand the manufacturing process of cement and lime.

BOOKS RECOMMENDED:

1. **Odion G.G**-Principles of Polymerisation, John Wiley and sons.
2. **S.S Dara**-A Text Book of Engineering. Chemistry.
3. **B.Sivasankar**-Engineering Chemistry, Tata Mc Graw Hill Publication.
4. **S.Chand**-Practical Manual for Engineering Chemistry.

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each Unit .The student has to attempt five questions at least one from each Unit

Semester-I

Course Title: Engineering Physics **Max Marks: 100**
Course Code: BSC-ITE-103 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE:

1. To understand the importance of applications of Applied Physics in daily life
2. To provide the students with a basic understanding of Physics that may be required by engineers in the course of their careers
3. To acquaint students with the fundamentals of vibrations, acoustics and ultrasonic and how they help in mankind by using engineering skills.
4. To enhance knowledge related to principle working of Lasers and its different components to make it suitable for various purposes
5. To introduce the learners to the basics of Quantum Mechanics.

UNIT-I

WAVES, OSCILLATIONS AND INTRODUCTION TO ACOUSTICS: Wave motion, its types, Equations of wave motion, Energy and Intensity of a progressive wave, Introduction to ultrasonic waves, magnetostriction and piezoelectric effect, productions of ultrasonic waves, their detections and applications. A brief introduction to the acoustics of a hall, factors affecting the acoustics of the buildings, Reverberation Period, Sabine's Formula for calculating Reverberation Time.

UNIT-II

ELECTROSTATICS IN A LINEAR DIELECTRIC MEDIUM & MAGNETOSTATICS: Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; Solving simple electrostatics problems in presence of dielectrics – Point charge at the centre of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field. Magnetostatics: Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

UNIT-III

QUANTUM MECHANICS FOR ENGINEERS: Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wavefunction, Born interpretation, probability current, Expectation values, Free-particle wavefunction and wave-packets.

UNIT-IV

APPLYING THE SCHRODINGER EQUATION: Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, particle in attractive delta-function potential, square-well potential, linear harmonic oscillator.

UNIT-V

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

Diffraction: Introduction, Difference between Fresnel and Fraunhofer diffraction, Single slit diffraction, Transmission diffraction grating, Absent spectra. Spontaneous and stimulated emissions, Einstein's coefficients, Laser and its principle, He-Ne laser.

COURSE OUTCOMES:

After completing of the course, the students will:

1. Understand the importance of Applied Physics in describing the technology we are using today in different engineering fields
2. Acquired knowledge of Waves, Vibration and acoustics, helps the students to develop the acoustically good hall.
3. Knowledge of basic Quantum Mechanics can help the students for further research applications as they can be applied to any quantum, mechanical situation to find energy, momentum etc.
4. Acquired knowledge of Optics help the students to
   a) Know more about propagation of light and wave optics.
   b) Describe the requirements for a system to act as a laser.
   c) Differentiate the various types of lasers and their means of excitation.
   d) Able to explain, which laser would best meet the need for a industrial or research task.
   e) Demonstrate an awareness of the safety responsibilities involved in working with lasers.

TEXTBOOKS/REFERENCE BOOKS:

1. **Pathania K. S. & Khera S. K.,** Waves and Vibration,
2. **Beiser**, **Arthur**, Concepts of Modern physics, TMH.
3. **Rangwala** and **Mahajan**, "Electricity and Magnetism", Tata McGraw Hill, 1998
4. **Ghatak A. K., Dass P.,** Laser theory & application of ultrasonic waves,
5. **David J. & Cheek**, Fundamentals and application of ultrasonic waves,
6. **Avadhanulu M. N. & Khsirsagar P. G.,** Engineering Physics (S. Chand & Co.)
7. **Vijaya K. K., Chandralingam S.,** Modern Physics, S. Chand & Co. Ltd, New Delhi
8. **Mani and Mehta**, G.K. "Modern Physics", Affiliated East-West Press Pvt. Ltd., 1998.
9. **Arora C.L**, Refresher Course in Physics, S. Chand & Company Ltd.
10. **Grifiths David J.,** Introduction to Quantum Mechanics, 2nd Edition 2016, Cambridge University Press
11. **Sharma K. K.**, Optics: Principles and Applications 2017, Elsevier
12. **Shankar R.**, Principles of Quantum Mechanics 2011, Springer
13. **Jenkins & White H E**, Fundamentals of Optics 4 edition 2017, McGraw Hill Education

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student must attempt five questions at least one from each unit.

Semester-I

Course Title: Environmental Science **Max Marks: 100**
Course Code: MC-ITE-101 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: This course is designed to make the engineering students to understand the significance of environment and ecology in human survival and growth. It also aims to connect the budding engineers to nature.

UNIT-I

ELEMENTS OF ECOLOGY: Definition, Scope and basic principles of ecology and environment. Biological levels of organization, population, community, ecosystem and biosphere. Climatic factors - Solar radiations, temperature, water and precipitation.

UNIT-II

ENVIRONMENTAL POLLUTION: Types of pollution, Air pollution, Noise pollution, Water pollution, Soil pollution, Thermal pollution, Radiation pollution

UNIT-III

BIOGEOCHEMICAL CYCLES: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Global Oxygen Cycles. Hydrological cycles.

UNIT-IV

SUCCESSION: Concepts of succession, Types of Succession, Trends in succession, Climax and stability, Co-evolution and group selection.

UNIT-V

MAJOR BIOMES OF THE WORLD: Characteristics of terrestrial fresh water and marine ecosystems; Forests, grasslands, lake, river and marine ecosystems of India.

COURSE OUTCOMES: Upon the completion of the course, students will able to:

1. Learn about the environment and ecology.
2. Understand different types of pollution. Air, Noise, Water, Soil, Thermal and Radiation pollution.
3. Understand biogeochemical cycles and human contribution in it.
4. Learn succession and various types of succession.
5. Demonstrate the ability to understand the biomes of world and its importance in human survival.

Books Suggested:

1. **J.S.Singh, S.P. Singh and S.R. Gupta**. 2008. Ecology, Environment and Resource Conservation. Anamaya Publications (New Delhi).
2. **S.C. Santra.** 2011. Environmental Science. New Central Book Agency.
3. **M.H. Rao and H.V.H. Rao.** 1998. Air Pollution. Tata McGraw Hill Publication.
4. **V.P. Kudesia**. 1997. Air Pollution. Pragati Prakashan.

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each Unit .The student has to attempt five questions at least one from each Unit.

Semester-I

Laboratory Courses

Course Title: Basic Electrical Lab **Max Marks: 50**
Course Code: ESC-ITE-111 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

List of experiments:

1. Introduction to Circuit Elements.
2. Verification of Ohms Law.
3. Verification of Kirchhoff's Current and Voltage Law (KCL & KVL)
4. Verification of Thevenin's Theorem & Norton's Theorem.
5. Transformation of Star & Delta Networks.
6. Measurement of Power using 2-Wattmeter method.
7. Verification of Superposition Theorem.
8. Verification of reciprocity theorem.
9. To plot the Resonance curve for a Series & Parallel Resonance.
10. Determination of resonance frequency using LCR Meter.

Course Outcomes:

1. To study and analyze different circuit elements.
2. To study and implements different laws and theorems of electrical circuits.
3. To make the students aware about the principles and applications of basic electrical laws.
4. To measure the power using two wattmeter method.
5. To study and analyze the phenomenon of Resonance in Series and Parallel circuits.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

Semester-I

Course Title: Engineering Chemistry **Max Marks: 50**
Course Code: BSC-ITE-111 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

LIST OF EXPERIMENTS:

1. Acid Base Titrations.
2. Viscosity of Solutions, Determination of composition of sugar solutions from Viscosity.
3. Synthesis of Aspirin.
4. Determination of Functional Groups in Organic Compounds.
5. Synthesis pf p-Nitro Aniline from Acetanilide.
6. Conductometric Titrations.
7. Determination of Proteins in given sample of Food.
8. Determination of Flash and Fire Point of a Lubricant.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

Laboratory Outcome:
At the end of practical course the students will be familiarized about
CO1. Titrations,
CO2. Synthesis of organic compounds,
CO3. protein determination and viscosity of solutions and
CO4. temperature dependent properties of lubricant.

Semester-I

Course Title: Engineering. Physics **Max Marks: 50**
Course Code: BSC-ITE-112 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

COURSE OBJECTIVE: The course is designed to provide experimental foundation for the theoretical concepts and to familiarize students with experimental apparatus, the scientific method and method of data analysis.

List of Experiments: (Perform any 08)

1. Measurement of Resistance.
2. Measurement of e/m by Helical method/Thomson's method.
3. Determination of Resistivity of a given wire.
4. Determination of Band Gap of a semiconductor.
5. To determine the refractive index of the prism material using spectrometer.
6. To determine Young's modulus of a bar.
7. To determine the wavelength using Fresnel's bi-prism/diffraction grating.
8. To Determine Plank's Constant.
9. Verify the Stefan's law by incandescent lamp
10. To determine the susceptibility of a ferromagnetic material
11. Study of nano TiO2 solar cell
12. Ultrasound measurement a given liquid
13. Joule's constant experiment
14. Determination of unknown capacitance of a capacitor by de-Sauty bridge method.
15. Refractive index of a glass slab/ water by travelling microscope
16. To determine the frequency of an ac supply by using electrical vibrator
17. To find the inner and outer diameter of a hollow cylinder by using Vernier caliper.
18. To determine the diameter of a thin wire by using screw gauge and its area of cross section.
19. Measurement of 'g' and Time period by using compound pendulum.
20. To find the viscosity of a liquid using stoke's method.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

Semester-I

Course Title: Engineering. Graphics
Course Code: ESC-ITE-112
Duration of Exam: 2 hours

Max Marks: 100
University Examination: 60
Internal Assessment: 40

COURSE OBJECTIVE: The course is designed to develop the ability to visualize and communicate three-dimensional shapes and train the students to create drawings following the engineering graphics conventions.

UNIT-I

INTRODUCTION TO ENGINEERING GRAPHICS: Engineering drawing as language of Engineers. Drawing instruments and their uses. Projections: The planes of projections, first and third angle projections, projection of points lying in any quadrant. Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scale: needs and importance, to find representative factor of a scale, drawing of simple and diagonal scales.

UNIT-II

PROJECTION OF STRAIGHT LINE AND THEIR TRACES: projection of planes. Planes parallel to reference plane; plane perpendicular to both reference planes; planes perpendicular to one and inclined to other reference plane. Projection of solids with their axes perpendicular or inclined to one reference plane but parallel to other.

UNIT-III

SECTION OF SOLIDS & DEVELOPMENT OF SURFACES: Definition of sectioning and its purpose, Procedure of sectioning, Illustration through examples, types of sectional planes.sectional orthographic views of geometrical solids, Purpose of development, , Development of prism, cylinder, cone and pyramid surface

UNIT-IV

ORTHOGRAPHIC PROJECTIONS: Theory of orthographic projections (Elaborate theoretical instructions) Drawing 3 views of given objects (Non symmetrical objects and blocks may be selected for this exercise) Exercises on both first angle are third angle.

UNIT-V

ISOMETRIC PROJECTION: Classification of pictorial views, Basic Principle of Isometric projection, Isometric Views of lines, Planes, Simple and compound Solids;, Difference between isometric projection and Isometric view, Isometric projection of solids such as cube, prism, pyramid and cylinder. Introduction to computer aided drafting (CAD)

Laboratory Outcome:
On completion of course students must be able
CO1. To read Engineering Drawing and execute the construction work with the help of available drawing
CO2. To represent three dimensional objects by two dimensional views.

CO3. Students must be in a position to show hidden details of objects or underground constructions work by drawing sectional views.

CO4. Exposure to creating working drawings

CO5. Exposure to the visual aspects of engineering design.

TEXT BOOKS:

1. **Bhat, N. D. & Panchal, V. M**, *Engineering Drawing*, Charotar Publishers, Anand.
2. **Narayana, K. L. & Kannaiah P**, *Engineering Graphics*, Tata McGraw Hill, New Delhi.
3. **Shah, M.B. & Rana B.C.** (2008), Engineering Drawing and Computer Graphics, Pearson Education
4. **Agrawal B. & Agrawal C. M**. (2012), Engineering Graphics, TMH Publication.

REFERENCE BOOKS:

1. **Gill P. S**., *Engineering Graphics and Drafting*, Katria and Sons, Delhi.
2. **Luzzadde Warren J**., *Fundamentals of Engineering Drawing*, PHI.

Note for paper setter: The Question paper shall comprise of 10 questions and two questions shall be set from each Unit. The student has to attempt five questions, selecting one from each Unit.

Semester-I

Course Title: Induction Program
Course Code: MC-ITE-111
Duration of Exam: - hours

Max Marks: -
University Examination: -
Internal Assessment: -

INDUCTION PROGRAM

Induction program for students to be offered right at the start of the first year. It should include but not limited to following Activities

1. Physical activity
2. Creative Arts
3. Universal Human Values
4. Literary
5. Proficiency Modules
6. Lectures by Eminent People
7. Visits to local Areas
8. Familiarization to Dept./Branch & Innovations

SEMESTER-II

Course Title: MATHEMATICS-II **Max Marks: 100**
Course Code: BSC-ITE-201 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Course Objective: This course is designed to impart advanced knowledge of multivariable integration, theory of differential equations and complex variable to engineering students that will serve them to solve real life engineering problems.

Unit- I

Multivariable Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, spheres and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes' (without proofs).

Unit- II

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Second order linear differential equations with variable coefficients, method of variation of parameters.

Unit- III

Partial Differential Equations: Partial differential equations and its formation, Linearand non-linear partial differential equations of first order and their solutions, Charpit's method, Lagrange's method, Homogenous and non-homogenous linear partial differential equations with constant coefficients and their solutions, Applications of Partial Differential Equations with initial and boundary conditions, Solution by the method of separation of variables.

Unit- IV

Complex Variable – Differentiation:

Differentiation, Cauchy-Riemann equations, analytic functions, elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

Unit- V

Complex Variable – Integration:

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem (without proof) and Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

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

1. Compute double and triple integrals over rectangular and spherical domains and memorize important theorems: Green, Gauss divergence and Stokes with their applications in various engineering problems.
2. Distinguish between linear and non-linear equations. Recognize and solve equations of Bernoulli, Euler and Clairaut.
3. Solve partial differential equations of various kinds and apply the same to solve problems of real world.
4. Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations and conformal mapping.
5. Apply the Cauchy Residue theorem to evaluate definite integrals, compute the Taylor and Laurent expansions of simple functions and determine the nature of the singularities and calculating residues.

Text Books

1. **Erwin Kreyszig**, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. **D. Zill,** Advanced Engineering Mathematics**,** Jones & Bartlett.
3. **N. Piskunov,** Differential& Integral calculus, Vol-I & II
4. **Jain & Iyengar**, Advanced Engineering Mathematics, Narosa Publishers

Reference Books

1. **G.B. Thomas and R.L. Finney**, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. **S. L. Ross**, Differential Equations, 3rd Ed., Wiley India, 1984.
3. **E. A. Coddington**, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
4. **E. L. Ince**, Ordinary Differential Equations, Dover Publications, 1958.
5. **J. W. Brown and R. V. Churchill**, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each Unit .The student has to attempt five questions at least one from each Unit.

SEMESTER-II

Course Title: Basic Electronics
Course Code: ESC-ITE-201
Duration of Exam: 3 hours

Max Marks: 100
University Examination: 60
Internal Assessment: 40

COURSE OBJECTIVE: This course aims to provide students with solid background of semiconductors and some basic solid state electronic devices used in circuits.

UNIT-I

SEMICONDUCTORS: Classification of materials and energy band diagram, Semiconductor types, Energy band diagram for Semiconductors, Drift and Diffusion Current, Mass Action Law, Charge Neutrality equations, Current density and Conductivity, Hall Effect.

UNIT-II

P-N JUNCTION AND APPLICATIONS: Basic structure, PN junction Diode and Characteristics, Current components in p-n junction, temperature dependence, equivalent circuits. Rectifiers, half wave, full wave rectifiers, bridged rectifiers (efficiency, ripple factor). Clipping and clamping circuits. Basic operations of Zener, Avalanche and Photo Diodes.

UNIT-III

TRANSISTORS: Types of transistors, operation& characteristics, CE, CB and CC configurations, Input output characteristics, biasing and bias stability, use of transistor as an amplifier and switch.

UNIT-IV

JUNCTION FIELD EFFECT TRANSISTORS: Operation and characteristics. JFET configurations and biasing. JFET as amplifier.

UNIT-V:

MOSFET: Types (Depletion and Enhancement), Operation and Characteristics (no derivation), Introduction to MOSFET Scaling and types, Introduction to Short-Channel Effects (V_{TH} roll-off, DIBL, Hot-carrier injection)

COURSE OUTCOMES: At the end of the course, the student will be able to

1 Describe the energy bands and the scientific principles behind controlled conductivity in semiconductors.

2 Analyze the working of PN junction diode and apply diode in various applications such as rectifiers and other wave shaping circuits.
3 Analyze the working of the traditional transistor BJT and as well as the concept of biasing.
4 Understand the operation of MOSFET and various issues of scaling in MOSFET.
5 Design basic analog circuits.

TEXT BOOKS:

1. **Millman&Halkias**, Integrated Electronics, TMH
2. **Boylestad andNashelky,** Electronic Devices & Circuits, PHI.

REFERENCE BOOKS:

1. **Floyd T. L.,** Electronic Devices, Pearson Education.
2. **Mehta V. K.**, Electronic Devices, S. Chand and Sons, New Delhi
3. **Sedra & Smith,** Microelectronic Circuits, Oxford Printing Press.

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each Unit .The student has to attempt five questions at least one from each Unit

SEMESTER-II

Course Title: Engineering Mechanics
Course Code: ESC-ITE-202
Duration of Exam: 3 hours

Max Marks: 100
University Examination: 60
Internal Assessment: 40

COURSE OBJECTIVE: This course has been designed to make the students acquainted about forces and its effects, kinematics and statics.

UNIT-I

TWO DIMENSIONAL FORCE SYSTEM: Basic Concepts, principal of transmissibility, resultant of a force System, Free body Diagrams, Equilibrium and equation of equilibrium Applications. Moment of a force about a point, Varrigon theorem, friction, law of friction, equilibrium of body lying on horizontal and inclined plane, Static and Dynamic Friction, wedge friction, Ladder friction applications.

UNIT-II

CENTROID AND CENTRE OF GRAVITY: Centroid and moment of inertia; centroid of plane area and solid bodies. Moment of inertia of plane area. Theorem of parallel axis, Theorem of perpendicular axis, radius of gyration composite ideas. Mass moment inertia of circular plate, Cylinder, Sphere.

UNIT-III

MEMBER FORCES IN TRUSSES: Planer truss structure, trust joint identification, strategy for planer truss analysis, Statistical determinacy and stability of planer trusses. Numerical truss analysis (Method of joints and method of sections).

UNIT-IV

KINEMATICS OF PARTICLES: Velocity and acceleration in rectilinear motion along a plane and curved path. Tangential and normal components of velocity and acceleration motion curves. Kinematics of rigid bodies rotation, absolute motion, relative motion. Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT-V

VIRTUAL WORK AND ENERGY METHOD: Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic

and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

COURSE OUTCOME:

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

1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures
2. Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts);
3. Understand basic dynamics concepts – force, momentum, work and energy;
4. Understand and be able to apply Newton's laws of motion;
5. Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy;

TEXT BOOKS:

1. **Bansal R.K. (2010),** A Text Book of Engineering Mechanics, Laxmi Publications

2. **Khurmi R.S. (2010),** Engineering Mechanics, S. Chand & Co.

REFERENCE BOOKS:

1. **Irving H. Shames (2006),** Engineering Mechanics, 4th Edition, Prentice Hall

2. **F. P. Beer and E. R. Johnston (2011),** Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill

3. **R. C. Hibbler (2006),** Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.

4. **Andy Ruina and Rudra Pratap (2011),** Introduction to Statics and Dynamics, Oxford University Press

5. **Shanes and Rao (2006),** Engineering Mechanics, Pearson Education,

6. **Hibler and Gupta (2010),** Engineering Mechanics (Statics, Dynamics) by Pearson Education

7. **Reddy Vijay kumar K. and K. Suresh Kumar (2010),** Singer's Engineering Mechanics

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each Unit .The student has to attempt five questions at least one from each Unit.

SEMESTER-II

Course Title: Communication Skills
Course Code: HSMC-ITE-201
Duration of Exam: 2 hours

Max Marks: 100
University Examination: 60
Internal Assessment: 40

COURSE OBJECTIVE: This subject is designed to attain the general proficiency in English language for the engineering students.

UNIT-I

VOCABULARY BUILDING: The concept of Word Formation**,** Root words from foreign languages and their use in English**,** Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.**,** Synonyms, antonyms, and standard abbreviations.

UNIT-II

BASIC WRITING SKILLS: Use of phrases and clauses in sentences**,** Importance of proper punctuation**,** Creating coherence**,** Organizing principles of paragraphs in documents**,** Techniques for writing precisely.

UNIT-III

IDENTIFYING COMMON ERRORS IN WRITING: Subject-verb agreement**,** Noun-pronoun agreement**,** Articles**,** Prepositions**,** Redundancies and Clichés.

UNIT-IV

NATURE AND STYLE OF SENSIBLE WRITING: Describing**,** Defining**,** Classifying**,** Providing examples or evidence**,** writing introduction and conclusion.

UNIT-V

WRITING PRACTICES: Comprehension**,** Précis Writing**,** Essay Writing

COURSE OUTCOMES: Upon the completion of the course, the students will be able:

1. To acquire basic proficiency in English including reading, listening comprehension, writing and speaking skills.
2. To make the students authoritative in self-expression in their day to day life in this fast-changing world.
3. To identify the common errors involved in writing.
4. To understand the nature and style of sensible writing.
5. To write effective and coherent paragraphs.

TEXT BOOKS

1. **Michael Swan**, Practical English Usage. OUP. 1995.
2. **F.T. Wood. Macmillan,** Remedial English Gramma.2007
3. **Liz Hamp-Lyons and Ben Heasly**, Study Writing. Cambridge University Press. 2006.
4. **Sanjay Kumar and Pushp Lata**, Communication Skills.. Oxford University Press. 2011.

REFERENCE BOOKS:

1. **Michael Swan**, Practical English Usage, OUP. 1995.
2. **F.T. Wood, Macmillan**, Remedial English Grammar,.2007
3. **William Zinsser**, On Writing Well, Harper Resource Book. 2001

SEMESTER-II

Course Title: Computer Fundamental and Programming **Max Marks: 100**
Course Code: ESC-ITE-203 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Course Objective: This course is provided aiming to achieve a basic knowledge of computer and its programming among engineering students.

UNIT I

INTRODUCTION: History and Generations of Computers, Classification and Applications of Computers. **Computer Hardware:** Components of a computer system, Input and Output devices, Memory Hierarchy, Primary and Secondary memory.

Software and Languages: Computer Software, System and Application Software, Operating systems, Booting Process. **Programming Languages:** Generations and types of Languages, Compilers, Interpreter, Assemblers, Introduction to algorithm and Flow chart.

UNIT II

INTRODUCTION TO C PROGRAMMING: History of C, Structure of a C Program, Compiling & Executing a C program. Constants, Variables and Data Types, Storage classes, Operators and Expressions, Data Input and Output.

Control Statements: Decision making and branching, IF statement, IF-ELSE statement, nested IF-ELSE statement, Switch statement, break statement, continue statement. Looping: while statement, do-while statement, for statement.

UNIT III

INTRODUCTION TO ARRAYS: One dimensional arrays, Two dimensional arrays and Multidimensional arrays, basic operations on arrays, strings, basic string operations**.**

Functions: Introduction to Function, Types of functions, function declaration, calling a function, passing arguments to functions, passing arrays to functions, Recursion.

UNIT IV

USER DEFINED DATA TYPES: Structure, Defining structures, Array of Structures, Introduction to Union and enumerated data types.

Introduction to Pointers & Files: Operations on pointer, pointers & multidimensional arrays, pointers & character strings. Dynamic Memory Allocation in C: malloc, calloc, realloc and free functions. Introduction to File, Operations on files: open, close, read and write.

UNIT V

NETWORKING: Introduction to networking, Applications, types of computer networks, Network Topology, LAN, MAN, WAN. Networking devices: Hub, switch, router, repeater, and gateway. History of internet, internet, extranet and intranet, WWW. E-mail, ISPs, surfing, phishing.

COURSE OUTCOMES:

The student will be able:

1. To assemble a computer system and troubleshoot problems.
2. To formulate simple algorithms for arithmetic and logical problems.
3. To translate the algorithms to programs (in C language).
4. To test and execute the programs and correct syntax and logical errors.
5. To solve the problems using control statements.
6. To decompose a problem into functions and synthesize a complete program.
7. To use arrays, pointers and structures to formulate algorithms and programs.
8. To be familiar with the concept of computer networking.

Text Books

1. **Pradeep K. Sinha and Preeti Sinha,** "Computer Fundamentals", Fourth Edition, BPB Publication.
2. **Yashavant P. Kanetkar ,** Let Us C, BPB Publication, 15th Edition.
3. **Deepali Srivastava, S. K. Srivastava**, "C in Depth", third edition, BPB Publication.

Reference Books

1 **B Ram and Sanjay Kumar,** "Computer Fundamentals: Architecture and organization", New age international publication.

2 **Preter Norton**, Introduction to Computers, TMH.

3 **Byron Gottfried, Schaum's,** "Outline of Programming with C", McGraw-Hill.

4 **Brian W. Kernighan and Dennis M. Ritchie**, The C Programming Language, Prentice Hall of India.

5 **E. Balaguruswamy**, Programming in ANSI C, Tata McGraw-Hill.

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each Unit .The student has to attempt five questions at least one.

SEMESTER-II

Course Title: Indian Constitution
Course Code: MC-ITE-201
Duration of Exam: 2 hours

Max Marks: 100
University Examination: 60
Internal Assessment: 40

COURSE OBJECTIVE: The basic purpose of this subject is to make a general awareness about our constitution.

UNIT I

CONSTITUTIONAL FRAMEWORK: Historical Background, Making of the constitution, Salient features of the Indian Constitution, Preamble to the Constitution, Union and its territory, Citizenship, Fundamental rights, Directive principles of state policy, Fundamental duties, Amendment of the constitution, Basic structure of the constitution.

UNIT II

SYSTEM OF GOVERNMENT: Parliamentary system, Federal System, Centre-state relations, Inter-state relations, Emergency provisions

UNIT III

CENTRAL GOVERNMENT: President, Vice-President, Prime Minister, Central Council of Ministers, Cabinet committees, Parliament, Parliamentary committees, Parliamentary forums, Supreme Court

State Government: Governor, Chief Minister, State Council of Ministers, State legislature, High court, Subordinate Courts, Special status of Jammu and Kashmir, Special provision for some states

Local Government: Panchayati raj, Municipalities

UNIT IV

CONSTITUTIONAL BODIES: Election commission, Union Public service commission, State Public Service Commission, Finance Commission, National Commission for SC's, National Commission for ST's, Special officer for Linguistic minorities, Comptroller and auditor general of India, Attorney General of India, Advocate General of India.

UNIT V

NON-CONSTITUTIONAL BODIES: Planning Commission, National Development Council, National Human Rights Commission, State Human Rights Commission, Central Information Commission, State Information Commission, Central vigilance Commission, Central Bureau of Investigation, Lokpal and Lokayuktas

Other Constitutional Dimensions: Co-operative societies, Official Language, Public services, Tribunals, Rights and Liabilities of the Government, Authoritative text of the Constitution in Hindi Language, Special Provision relating to certain classes.

COURSE OUTCOME: Upon the completion of this, the students will able to know:

1. About the constitutional framework.
2. About the government system
3. Various type of government
4. About Constitutional bodies: Election commission, UPSC, SPSC, Commission for ST/SC and many others.
5. Non-constitutional bodies: Planning Commission, NDC, NHRC, SHRC, CBI, Vigilance Commission and other dimensions of constitution.

BOOKS RECOMMENDED:

1. **M.P. Jain**, Indian Constitutional Law, 7th Edition.
2. **B. K. Sharma**, Introduction to the Constitution of India,PHI.

SEMESTER-II

Course Title: Engineering Mechanics Lab **Max Marks: 50**
Course Code: ESC-ITE-212 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

List of Experiments:

1. To conduct tensile test and determine the ultimate tensile strength, percentage elongation and reduction.
2. To conduct the compression test and determine the ultimate compressive strength for a specimen.
3. To determine centroid of Lamina.
4. To determine the hardness of a given specimen using vicker/brinel/Rockwellhardness testing machine.
5. To very Lami's theorem.
6. To verify polygon law of forces.
7. Friction experiment on inclined plane.
8. Experiment on screw Jack.
9. To verify reactions at the supports of a simply supported beam.
10. To determine moment of inertia of various shapes.

Course Outcome:
After the completion of lab course students will be-
CO1. Able to understand different engineering mechanics apparatus.
CO2. Able to understand the mechanical properties of materials.
CO3. Able to understand the moment of inertia of various shapes.
CO4. Get the practical idea of frictional forces.
CO5. Get working principle of screw jack.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER-II

Course Title: Comm. Skills Lab
Course Code: HSMC-ITE-211
Duration of Exam: 2 hours

Max Marks: 50
University Examination: 25
Internal Assessment: 25

Lab Objective: The Language Lab focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

The following course content is prescribed for the English Language Laboratory sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
4. Oral Presentations- Prepared and Extempore.
5. 'Just A Minute' Sessions (JAM).
6. Describing Objects / Situations / People.
7. Information Transfer
8. Debate
9. Telephoning Skills.
10. Giving Directions.

Course Outcome:
Upon the completion of the lab, the students will be able to:
CO1. Developing intellectual, personal and professional abilities.

CO2. On completion of the course, the students will be accurate in communication.

CO3. The students will be able to communicate effectively on complex engineering activities with the engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions

SEMESTER-II

Course Title: Basic Electronics Lab **Max Marks: 50**
Course Code: ESC-ITE-211 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

List of Experiments:

1. To plot the Resonance curve for a series & parallel resonance.
2. To determine and plot operating characteristics of a PN junction diode
3. To study the input / output waveforms of Half wave and bridge wave rectifiers
4. To suppress the ripple in rectifiers using RC filters.
5. To study the clipper and clamper circuits.
6. To study the Zener characteristics and its application as voltage regulator
7. To plot characteristics of transistor in CE/CB configuration
8. To plot characteristics of a BJT.
9. To plot MOSFET characteristics.
10. To study frequency response of RC Coupled Oscillators.

Course Outcome:
Upon the completion of course, the students will be able to:
CO1. Determine the characteristics of PN Junction and Zener diode.
CO2. Design various rectifiers configuration and evaluate its various performance parameters.
CO3. Design and analyze various wave shaping circuits.
CO4. Determine the characteristics of a BJT and MOSFET
CO5. Design and analyze the frequency response of RC Coupled Oscillators

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER-II

Course Title: Computer Fundamentals & Programming Lab **Max Marks: 50**
Course Code: ESC-ITE-213 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

List of Experiments:

1. Assembling and Troubleshooting of computer system.
2. Introduction and working on MS office Packages like word, power point, excel etc.
3. Familiarization with programming environment.
4. Simple computational problems using arithmetic expressions.
5. Problems involving if-then-else structures.
6. Iterative problems e.g., sum of series.
7. Performing operations on 1D Array.
8. Performing operations on 2D Array.
9. Performing operations on String.
10. Function declaration and calling.
11. Implementation of Mathematical function
12. Programming for solving Numerical methods problems.
13. Recursive functions.
14. Pointers and structures.
15. File operations.

Course Outcomes:

1. To understand the working and troubleshooting of computer system.
2. To formulate the algorithms for simple problems
3. To be able to correct syntax and logical errors as reported by the compilers and run time.
4. To be able to write iterative as well as recursive programs
5. To be able to represent data in arrays, strings and structures and manipulate through a program
6. To be able to declare pointers of different types and use them in defining self-referential structures.
7. To be able to create, read and write to and from simple text files

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER-II

Course Title: Work Shop Practice **Max Marks: 50**
Course Code: ESC-ITE-214 **University Examination:**
Duration of Exam: 2 hours **Internal Assessment: 50**

Detailed contents

Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods

1. Fitting operations & power tools.
2. Electrical & Electronics
3. Carpentry
4. Plastic moulding, glass cutting.
5. Metal casting.
6. Welding (arc welding & gas welding), brazing**.**

COURSE OUTCOMES: Upon completion of this course, the students will:

1. Gain knowledge of the different manufacturing processes which are commonly employed in the industry,
2. Be able to fabricate components using different materials.

TEXT BOOKS:

1. **Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K.,** ―Elements of Workshop Technology‖, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. **Kalpakjian S. And Steven S. Schmid**, ―Manufacturing Engineering and Technology, 4th edition, Pearson Education India Edition, 2002.
3. **Gowri P. Hariharan and A. Suresh Babu,** Manufacturing Technology – I‖ Pearson Education, 2008.
4. **Roy A. Lindberg**, Processes and Materials of Manufacture‖, 4th edition, Prentice Hall India, 1998.
5. **Rao P.N**., Manufacturing Technology, Vol. I and Vol. II, Tata McGrawHill House,

Workshop Practice

1. Machine shop **(10 hours)**
2. Fitting shop **(8 hours)**
3. Carpentry **(6 hours)**
4. Welding shop **(8 hours (Arc welding 4 hrs + gas welding 4 hrs)**
5. Smithy **(6 hours)**

Laboratory Outcomes: Upon completion of this laboratory course, the students will be able to:

1. Fabricate components with their own hands.

2. Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. Assemble different components and produce small devices of their interest.

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

SEMESTER-III

Course Title: Mathematics-III **Max Marks: 100**
Course Code: BSC-ITE-301 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:
Collect, organize, represent, analyze, interpret data and make conclusions and predictions from its results. Apply mathematical knowledge and skills to familiar and unfamiliar situations, appreciate the role, value and use of Mathematics in society.

UNIT-I

INTEGRAL TRANSFORM-I: Introduction, Laplace transform, Existence theorem, Properties and theorem of Laplace transform, Laplace transform of unit-step function, impulse function, periodic function and error functions, Inverse Laplace transform, Convolution theorem. Applications of Laplace transform in solving differential and integral differential equations.

UNIT-II

INTEGRAL TRANSFORM-II: Fourier integral, Fourier Sine and Cosine integrals, Complex form of Fourier integral, Fourier transform, Inverse Fourier transform, Fourier Sine and Cosine transforms, Properties of Fourier transform, Inverse Fourier transform, Convolution theorem, Parseval's identities for Fourier transforms, Fourier transform of the derivatives of a function, Applications of F-transform to Boundary Value Problems.

UNIT-III

Z-T RANSFORM: Introduction and definition of z-transform, Some standard forms, Linearity property, Damping rule Some standard results, shifting un to the right and to the left, Multiplication by n. Two basic theorems, Inverse Z-Transform, Convolution theorem, Application to difference equations.

UNIT-IV

BASIC PROBABILITY: Probability spaces, conditional probability, independence; discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequence of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables.

UNIT-V

BASIC STATISTICS: Measures of Central tendency: Moments, skewness and Kurtosis -

Probability distributions: Binomial, Poisson and Normal-evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas.

COURSE OUTCOME:

1. Understand special functions and series solutions
2. Applications of Laplace transform in solving differential and integro-differential equations.
3. Understand and apply Applications of F-transform and its applications.
4. Understand and apply Measurement of central tendency for problem solving.
5. Understand and apply laws of probability and various data distributions and its applications.

TEXT BOOKS:

1. **Erwin kreyszig**, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. **Ross, A**: First Course in Probability, 6th Ed., Pearson Education India, 2002.
3.

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit. Use of calculator is allowed in the examination.

SEMESTER-III

Course Title: Digital Logic Design **Max Marks: 100**
Course Code: ESC-ITE-301 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

The objective of this subject is to enable the students to know basic concepts of digital electronics design and build digital hardware.

UNIT I

Introduction, Binary numbers, Base-conversions, Octal and hexadecimal numbers, Binary codes, Concept of fixed and floating point numbers, Complement Number Representation, Addition, Subtraction, Multiplication, and Division. Review of Boolean algebra, DeMorgan's Theorems, Boolean functions and representation in canonical and standard forms, SOP and POS forms.

UNIT II

Digital Logic Gates, IC Digital Logic Families, Karnaugh Map Method: 3 variable , 4 variable, 5 variable Map, limitations of K-maps for larger variables, POS-simplification, NAND/NOR implementation, other 2-level implementations, Don’t-care conditions, Tabular method.

UNIT-III

Combinational Logic Circuits: Problem formulation and design of Basic Combinational Logic Circuits, Combinational Logic Using Universal Gates. Basic Adders, ALU, ParityCheckers and Generators, Comparators, Decoders, Encoders, Code Converters, Multiplexer (Data Selector), De-multiplexers

UNIT-IV

Sequential Circuits: Latches, Flip-flops (SR, JK, T, D, Master/Slave FF,) Edge-Triggered Flip-Flops, Flip-Flop Operating Characteristics, Basic Flip-Flop Applications, Asynchronous Counter Operation, Synchronous Counter Operation, Up/Down Synchronous Counters.

UNIT V

Shift registers & Memories, Shift Register Functions, Serial In - Serial Out Shift Registers, Serial In - Parallel Out Shift Registers, Parallel In - Serial Out Shift Registers, Parallel In - Parallel Out Shift Registers, Bidirectional Shift Registers, Basics of Semiconductor

Memories, Random-Access Memories (ROM), Read Only Memories (ROMs), Programmable ROM's (PROMs and EPROM's), PAL, PLA.

COURSE OUTCOMES: At the end of this course, students will demonstrate the ability to

1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
2. To understand and examine the structure of various number systems and its application in digital design.
3. Ability to identify basic requirements for a design application and propose a cost effective solution.
4. The ability to identify and prevent various hazards and timing problems in a digital design.
5. To develop skill to build and trouble digital circuits.

TEXT BOOKS:

1. **Morris Mano**, Digital Logic Design, TMH..
2. **Kumar Anand**, Digital Logic Design, PHI.

REFERENCE BOOKS:

1. **Thomas L. F.,** Digital Fundamentals, Prentice Hall, Inc, 4thEdition 1997
2. **Tocci R. J. &Widner**, Digital Systems: Principles and Applications, PHI.

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit. Use of calculator is allowed in the examination.

SEMESTER-III

Course Title: Operating Systems **Max Marks: 100**
Course Code: PCC-ITE-301 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5. To know the components and management aspects of concurrency management

UNIT-1

Introduction: Introduction to Operating System, History of Operating System and Function, Evolution of Operating System, Batch Systems, Time Sharing and Real Time System, System Protection and Methods. Operating System Structure: System Components, System Structure.

UNIT-II

Process Management: Process concept, Process states, Principle of Concurrency, Semaphores and its types. Process Scheduling, Process Synchronization, Classical problems in Concurrency, Producer Consumer, Critical Section and readers writers problem, Producer Consumer Problem, Inter Process Communication, Process Generation, Resident Monitors.

UNIT-III

CPU Scheduling: Scheduling Concept, levels of Scheduling, Scheduling Algorithms, Multiprocessor Scheduling.
Deadlock: System Model, Shared resource, Resource allocation and Scheduling, Resource allocation graph, Deadlock Characterization, Prevention, Detection and Recovery.

UNIT-IV

Memory Management: Multiprogramming with Fixed Partition and Variable Partition, Multiple Base Register, Paging, Demand Paging, Segmentation, Virtual Memory Concept, Allocation of Frames, Paged Replaced Algorithm, Thrashing, Cache Memory Concept.

UNIT-V

I/O Management: I/O Devices and Organization of I/O Function, I/O Buffering, DISKI/O, Disk Scheduling algorithms and Operating System Design Issues.

File System: File Concept, File Organization and Access Mechanism, File Directories, File Sharing.
Unix and Linux Operating System as case studies, Time OS and Mobile OS.

COURSE OUTCOMES: At the end of this course, the students will able to do the following:

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

TEXT BOOKS:

1. **Milenekovic**, Operating System Concepts, McGraw Hill
2. **Silverschwatz**, Operating System Concepts, Willey & Willey.

REFERENCE BOOKS:

1. **Dietel**, An introduction to operating system, Addision Wesley.
2. **Tannenbaum A. S**., Operating system design and implementation, PHI

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER-III

Course Title: Data structure using C **Max Marks: 100**
Course Code: PCC-ITE-302 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures.

UNIT-I

REVIEW OF DATA TYPES AND CONCEPTS: Review of data types, Scalar types, Primitive types, Structures, Unions, Enumerated types, Records, Sparse Matrices, Recursion and its importance.

UNIT-II

SEARCHING AND SORTING: Searching: Sequential search, Binary search, Hashing, General Idea, Hash Function, Separate Chaining, Open Addressing, Linear Probing. Sorting**:** Bubble sort, Insertion Sort, Selection sort, Heap sort, Merge sort, Quick sort, External Sorting.

UNIT-III

EXPRESSION AND LINEAR DATA STRUCTURE: Definition of a Data structure, ADT, Linear Data structures. Stack: Operations, Applications, implementation using linked list as well as arrays, Expressions and their conversions, Infix, Postfix & Prefix. Queue: Types, Operations, Applications, implementation using linked list as well as arrays. Linked List: Types, Operations, Applications, Implementation.

UNIT-IV

TREES: Preliminaries, Trees, Forest, Binary Trees, Binary Search Tree ADT, Binary Search Trees: Conversion of Forest to Binary Tree, Binary Search Tree, AVL Trees, Tree Traversals, Priority Queues (Heaps), Model, Simple implementations,Binary Heap.

UNIT-V

GRAPHS: Definitions, Graphs, Representation of Graphs: Adjacency Matrix, Path Matrix, Operations on Graphs, Traversing a graph: BFS and DFS, Shortest Path Algorithms: Dijkstra's Algorithm and Warshall's Algorithm, Minimum Spanning Tree, Kruskal's Algorithm and Prim's Algorithm.

COURSE OUTCOMES:

1. For a given algorithm student will able to analyze the algorithms to determine the computational complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyse the same to determine the computational complexity.
4. Student will able to write an algorithm based on Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the computational complexity

TEXT BOOKS:

1. **Tanenbaum A. S**., Data Structure Using C, Dorling Kindersley Publisher.
2. **Ellis Horowitz and Satraj Sahni**, An Introduction to Data Structures, Computer Science Press, Rockville MA 1984.

REFERENCE BOOKS:

1. **E. Horowitz and S. Shani,** Fundamentals of Data Structures in C, Galgotia Pub. 1999.
2. **Richard F. Gilberg, Behrouz A. Forouzan**, Data Structures: A Pseudocode Approach with C, Thomson Cole, 1998.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER-III

Course Title: Object Oriented Programming **Max Marks: 100**
Course Code: PCC-ITE-303 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

To provide a good understanding of Object Oriented Programming Language and its implementation using C++.

UNIT-I

CONCEPTS OF OBJECT-ORIENTED PROGRAMMING: Object Oriented Programming Paradigm, Basic concepts of OOP's, Benefits of OOPS, Introduction to object oriented analysis and design, Design steps, Design example, Object oriented languages, Comparison of structured and object-oriented programming languages.

UNIT-II

EXPRESSIONS, CONTROL STRUCTURES, ARRAYS, POINTERS AND FUNCTIONS: Data Types, Operators, expressions and control structures. Arrays, Storage of arrays in memory, Initializing Arrays, Multi-Dimensional Arrays, Strings, Pointers, accessing array elements through pointers, Arrays of pointers, Pointers to pointers, Void Pointers, Functions, Arguments, Passing Pointers as Function Arguments.

UNIT-III

CLASSES AND OBJECTS: Classes and objects, access specifies in C++, constructors, destructors, Inline Functions, Friend Functions. Polymorphism: Function Overloading, Operator Overloading, Type Conversions in C++. Dynamic memory allocation in C++.

UNIT-IV

INHERITANCE: Inheritance, single Inheritance, Multiple Inheritance, Multi level inheritance, hierarchical inheritance, hybrid inheritance, Virtual base classes, Virtual functions, function overriding.

Generic programming with templates: Class templates, Function Templates.

UNIT-V

EXCEPTION HANDLING AND FILES: Exceptions, Types of Exceptions, throwing and catching exceptions. Streams and Files: Opening and closing a file, File Pointers and their Manipulations, sequential Input and Output Operations, multi-file Programs, Command Line Arguments.

COURSE OUTCOMES: After taking the course, students will be able to:

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

TEXT BOOKS:

1. **Robert Lafore**, Object Oriented Programming in Turbo C++, Galgotia Publications.
2. **Balagurusamy E**, Object Oriented Programming with C++, Tata McGraw Hill.

REFERENCE BOOKS:

1. **BjarneStrustrup**, The C++ programming Language, Addison Wesley.
2. **Booch**, Object Oriented Analysis and Design with Applications, Addison Wesley.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER-III

Course Title: Human Values and Professional Ethics **Max Marks: 100**
Course Code: HSMC-ITE-301 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

To enable the students to create awareness on Engineering Ethics and Human Values, to instil Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I

HUMAN VALUES: Morals, values and Ethics, Integrity, Work ethic, Service learning, Civic virtue, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Cooperation, Commitment, Empathy, Self-confidence, Character, Spirituality, Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II

ENGINEERING ETHICS: Senses of "Engineering Ethics" Variety of moral issues, 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

UNIT III

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as Experimentation, Engineers as responsible Experimenters, Codes of Ethics, A Balanced Outlook on Law.

UNIT IV

SAFETY, RESPONSIBILITIES AND RIGHTS: Safety and Risk, Assessment of Safety and Risk, Risk Benefit Analysis and Reducing Risk, Respect for Authority, Collective Bargaining, Confidentiality, Conflicts of Interest, Occupational Crime, Professional Rights, Employee Rights, Intellectual Property Rights (IPR), Discrimination.

UNIT V

GLOBAL ISSUES: Multinational Corporations, Environmental Ethics, Computer Ethics, Weapons Development, Engineers as Managers, Consulting Engineers, Engineers as Expert Witnesses and Advisors, Moral Leadership, Code of Conduct, Corporate Social Responsibility.

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

1. Recognize importance of human values
2. Harmony and ethical behaviour in real life situations
3. Apply ethics in society
4. Discuss the ethical issues related to engineering
5. Realize the responsibilities
6. Rights in the society

TEXT BOOKS:

1. **Mike W. Martin and Roland Schinzinger**, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
2. **Govindarajan M, Natarajan S, Senthil Kumar V. S,** "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS:

1. **Charles B. Fleddermann,** "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. **Charles E. Harris, Michael S. Pritchard and Michael J. Rabins,** "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt 5 questions selecting at least one question from each unit

Laboratory Courses

SEMESTER-III

Course Title: Data Structures using C Lab **Max Marks: 50**
Course Code: PCC-ITE-311 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

OBJECTIVES:

The course is designed to develop skills to design and analyze simple linear and non linear data structures. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem.

List of Experiments:

1. Program to demonstrate concept of structures.
2. Program to implement single Linked List.
3. Program to implement Doubly Linked List.
4. Program to implement Stack using Linked List.
5. Program to implement Queue using Linked List.
6. Program to implement Stack using arrays.
7. Program to implement Queue using arrays.
8. Program to Create and Copy a Tree.
9. Program to implement Tree Traversal.
10. Program to implement Insert and Delete Operation on Trees.
11. Program to implement AVL Trees.
12. Program to implement Warshal's algorithm to find path matrix.
13. Program to implement Djikstra's algorithm.
14. Program to implement Binary Search.
15. Program to implement Bubble, Selection, Insertion, Heap, Merge and Quick Sort.

COURSE OUTCOMES:

1. Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
2. Understand basic data structures such as arrays, linked lists, stacks and queues. Describe the hash function and concepts of collision and its resolution methods
3. Solve problem involving graphs, trees and heaps.
4. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER-III

Course Title: Object Oriented Programming Lab **Max Marks: 50**
Course Code: PCC-ITE-312 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

OBJECTIVES:

Understand fundamentals of programming such as variables, conditional and iterative execution methods.

List of Experiments:

1. Program to break a number into its factors.
2. Program to find the prime numbers from the list.
3. Program to overload <= and + operator.
4. Program to get tomorrow's date.
5. Program to add two complex numbers using add as member function of class complex.
6. Program to add 2 complex numbers using friend function.
7. Program to overload unary operator.
8. Program to demonstrate multiple inheritance.
9. Program to demonstrate multilevel inheritance.
10. Program to demonstrate containership.
11. Program to demonstrate hybrid inheritance.
12. Program to overloading member functions.
13. Program to illustrate virtual base class.
14. Program to find sum of array passing pointers to functions.
15. Program to convert polar to rectangular coordinates using constructor in destination class.
16. Program to concatenate 2 strings using inheritance.
17. Program to perform operation on strings.

COURSE OUTCOMES: At the end of this course, the student will able to do the following:

1. Understanding and implementation of various object oriented programming concepts like inheritance, polymorphism, object and classes etc.
2. Designing the application using the object oriented concepts

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER-III

Course Title: Digital Logic Design Lab **Max Marks: 50**
Course Code: ESC-ITE-311 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

OBJECTIVES:

To provide hand-on experience in designing and implementing digital/logic circuits**.** The laboratory exercises are designed to give students ability to design, build, and implement digital circuitsand systems

List of experiments:

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary
3. Design and implementation of functions, code converters.
4. Design and implementation of combinational circuits using MSI devices:
   a. 4 – bit binary adder / subtractor
   b. Parity generator / checker
   c. Magnitude Comparator
   d. Application using multiplexers
5. Design and implementation of sequential circuits:
6. Shift –registers
7. Synchronous and asynchronous counters
8. Coding combinational / sequential circuits using HDL.
9. Design and implementation of a simple digital system.

COURSE OUTCOMES: At the end of this course, the students will able to do the following:

1. Design and implementation of combinational circuits like adder, subtractor, encoder and decoder, multiplexer and De-multiplexer etc.
2. Able to simulate various circuit designs through circuit maker and electronics workbench or any other tools.

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER IV

Course Title: Database Management System **Max Marks: 100**
Course Code: PCC-ITE-401 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modelling, relational, hierarchical, and network models
3. To understand and use data manipulation language to query, update, and manage a database
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

UNIT-I

INTRODUCTION: Drawbacks of Files Management System, Database System Concepts and Architecture, Data Abstraction, Schemas and Instances, Data Independence, Data Models, Database Language and Interface, DDL, DML, Overall Data Base Structure.

Data Modeling Using Entity Relationship Model: E.R. Model Concept, Notation for ER Diagrams, Mapping Constraints, Weak and Strong Entity Types, Keys, Concept of Super Key, Candidate Key, Primary Key, Extended ER Model, Specialization, Generalizations, Aggregation.

UNIT-II

RELATIONAL DATA MODEL AND LANGUAGE: Relational Data Model Concepts, Keys Constraints, Integrity Constraints, Domain Constraints, Referential Integrity, Assertions, Triggers, Relational Algebra, Relational Calculus, Domain and Tuple Calculus.

UNIT-III

INTRODUCTION TO SQL: SQL Data Type and Literals, Types of SQL Commands, SQL Operations (DDL, DML, and DCL), Tables, Views and Indexes, Queries and Nested Sub queries, Aggregate and Scalar Functions, Joins, Unions, Intersection, Minus, Triggers, Cursors, Procedures and Functions in SQL.

UNIT-IV

DATA BASE DESIGN AND NORMALIZATION: Functional Dependencies, Armstrong's Axioms, Normalization: First, Second and Third Normal forms, BCNF, Multi-Valued Dependencies, Fourth Normal form, Join Dependencies and Fifth Normal form, DKNF, Decomposition, Dependency Preservation and Lossless Join.

UNIT-V

TRANSACTION & CONCURRENCY CONTROL: Transaction Concept, Transaction State, Schedules, Serializability of Schedules, Conflict & View Serializability, Testing of Serializability, Recoverability, Recovery From Transaction Failures, Log Based Recovery, Checkpoints, Shadow Paging, Recovery with Concurrent Transactions. Concurrency Control Techniques: Concurrency Control, Lock Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularity, Multi-Version Schemes, Deadlock Handling.

COURSE OUTCOMES:

1. For a given query write relational algebra expressions for that query and optimize the developed expressions
2. For a given specification of the requirement design the databases using E R method and normalization.
3. For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
4. For a given query optimize its execution using Query optimization algorithms
5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.
6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

TEXT BOOKS:

1. **Abraham Silberschatz, Henry F. Korth, S. Sudarshan**, "Database System Concepts", 6th Edition by, McGraw-Hill.
2. **R. Elmasri and S. Navathe** "Fundamentals of Database Systems", 5th Edition by, Pearson Education

REFERENCE BOOKS:

1. **J. D. Ullman** "Principles of Database and Knowledge – Base Systems", Vol 1 by, Computer Science Press.
2. **R. Elmasri and S. Navathe,** "Fundamentals of Database Systems", 5th Edition by Pearson Education

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt 5 questions selecting at least one question from each unit

SEMESTER IV

Course Title: Computer Organization & Architecture **Max Marks: 100**
Course Code: PCC-ITE-402 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES OF THE COURSE: To expose the students to the following:

1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles.
5. To provide the knowledge on Instruction Level Parallelism
6. To impart the knowledge on micro programming
7. Concepts of advanced pipe-lining techniques.

UNIT-I

FUNDAMENTALS OF A COMPUTER SYSTEM: Functional Units of a Digital Computer, Hardware, Software Interface, Translation from a High Level Language to the Hardware Language, Instruction Set Architecture Styles and features RISC and CISC Architectures, Performance Metrics, Amdahl's Law, Case Studies of ISA

UNIT II

ARITHMETIC FOR COMPUTERS: Integer Addition and Subtraction, Fast Adders, Multiplication, Booths multiplication algorithm, Division, Floating Point Numbers Representation, IEEE 754 single and double precision formats, floating point arithmetic.

UNIT III

BASIC PROCESSING UNIT: Components of the Processor, Data path and Control, Execution of a Complete Instruction, Hardwired and Micro programmed Control, Instruction Level Parallelism, Basic Concepts of Pipelining, Pipelined Implementation of Data path and Control – Hazards – Structural, Data and Control Hazards –Exception handling

UNIT IV

ADVANCED CONCEPTS IN ILP AND CURRENT TRENDS: Exploitation of more ILP, Hardware and Software Approaches, Dynamic Scheduling, Speculation, Compiler Approaches, Multiple Issue Processors, ILP and Thread Level Parallelism, Current Trends, Multicore Processors, Graphics and Computing GPUs.

UNIT V

MEMORY AND I/O: Need for a hierarchical memory system, Types and characteristics of memories – Cache memories –Improving cache performance – Virtual memory – Memory

management techniques – Associative memories. Accessing I/O devices – Programmed Input/output – Interrupts – Direct Memory Access – Interface circuits – Need for Standard I/O Interfaces like PCI, SCSI, USB

COURSE OUTCOMES:

1. Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
2. Write assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).
3. Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

TEXTBOOKS:

1. **David A. Patterson and John L. Hennessy** , "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by Elsevier.
2. **Carl Hamacher** "Computer Organization and Embedded Systems", 6th Edition by McGraw Hill Higher Education.

REFERENCE BOOKS:

1. **John P. Hayes,** "Computer Architecture and Organization", 3rd Edition by WCB/McGraw-Hill
2. **William Stallings,** "Computer Organization and Architecture: Designing for Performance", 10th Edition by Pearson Education.

Notefor paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt 5 questions selecting at least one question from each unit.

SEMESTER IV

Course Title: Design & Analysis of Algorithms **Max Marks: 100**
Course Code: PCC-ITE-403 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures.

UNIT-I

INTRODUCTION TO ALGORITHM: Areas of Study of Algorithms, Algorithm Design Paradigms, Concept of Algorithmic Efficiency, Run Time Analysis of Algorithms, Asymptotic Notations (O, Ω, Θ). Divide and Conquer: Structure of Divide and Conquer Algorithms: Examples; Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort, Strassen's Matrix Multiplication; Analysis of Divide and Conquer Run Time Recurrence Relations.

UNIT-II

GREEDY METHOD: Overview of the Greedy Paradigm, Examples of Exact Optimization Solution (Minimum Cost Spanning Tree Using Prim's and Kruskal's Algorithms), Approximate Solution (Knapsack Problem), Single Source Shortest Paths.

UNIT-III

DYNAMIC PROGRAMMING: Overview, Difference between Dynamic Programming and Divide and Conquer, Applications: Shortest Path In Graph (Multistage Graph, All-Pairs Shortest Paths, Single-Source Shortest Paths: General Weights), Matrix Chain Multiplication, Traveling Salesman Problem, Longest Common Sub-sequence Problem.

UNIT-IV

GRAPH SEARCHING AND TRAVERSAL: Overview, Binary Tree Traversal, Graph Traversal Methods (Depth First and Breadth First Search). Back Tracking: Overview, 8-Queens Problem, 0/1 Knapsack Problem.

UNIT-V

BRANCH AND BOUND: LC Searching, Bounding, FIFO Branch and Bound, LC Branch and Bound Application: 0/1 Knapsack Problem, Traveling Salesman Problem. Basic

Concepts of Complexity Classes P, NP, Polynomial vs. Non-Polynomial Time Complexity, Reducibility, NP-Hard and NP-Complete Classes.

COURSE OUTCOMES:

1. For a given algorithm student will able to analyze the algorithms to determine the computational complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the computational complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

TEXT BOOKS:

1. **Horowitz E., Sahni S., &Rajasekaran S.,** Fundamental of Computer Algorithms, Galgotia Publication
2. **Basse Sara, Gelder A. V.,** Computer Algorithms, Addison Wesley.

REFERENCE BOOKS:

1. **Cormen T. H., Leiserson, Rivest and stein**, Introduction of Computer algorithm, PHI..

Notefor paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt 5 questions selecting at least one question from each unit.

SEMESTER IV

Course Title: Discrete mathematics **Max Marks: 100**
Course Code: PCC-ITE-404 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

The Course is designed to impart basic knowledge of Set theory, Logic and Graph theory and their applications to engineering pupils.

UNIT-I

SET THEORY AND FUNCTIONS: Basic concepts, Venn diagram, Set Operations, principle of Inclusion and Exclusion, Relation types of relations, properties of relation, Function: definition and notation, one to one, onto, one to one and onto, composition of functions.

UNIT-II

LOGIC: Propositional Calculus-Statements and Notations, Logical operators, Connectives and Truth tables, Bi-conditional statements, Tautologies, Duality Law.

UNIT-III

GRAPHS: Definitions and examples of graphs Incidence and degree, Handshaking lemma, Isomorphism Sub-graphs, Weighted Graphs, Eulerian Graphs, Hamiltonian Graphs Walks, Paths and Circuits, Shortest Path Algorithm, Fleury's and Dijsktra's Algorithm, Chinese Postman problem.

UNIT-IV

TREES: Definition and properties of trees Pendent vertices centre of a tree Rooted and binary tree, spanning trees, minimal spanning tree, Prim's and Kruskal's Algorithms for minimal spanning tree.

UNIT-V

PLANAR GRAPHS & MATRIX REPRESENTATION OF GRAPHS: Definition of planar graph, Euler's theorem for planar graph, Kuratowski's graphs, Incidence, Adjacency Matrices and their properties.

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

1. Understand basic concept of functions and relations
2. Understand and use argument, evaluation, analysis, logic and truth tables.
3. Comprehend the basic terminology and analyze applications of graph theory in modern society.

4. Learn to model problems using graphs and understand some basic algorithms to solve these real world problems.
5. Understand relation between matrix theory and graph theory.

TEXT BOOKS:

1. **Kolman, Busby & Ross,** "Discrete Mathematical Structures". Prentice Hall 6th edition.
2. **S. Santha**, "Discrete Mathematics with Combinatorics and Graph theory". Cengage Learning.

REFERENCE BOOKS:

1. **Kenneth H Rosen**, "Discrete Mathematics and its applications with Combinatorics and Graph Theory", McGraw Hill
2. **Graham, R. M., D. E., Knuth & O. Patashnik [1989]**, Concrete Mathematics, A Foundation for Computer Sciences, Addison Wesley

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt 5 questions selecting at least one question from each unit

SEMESTER IV

Course Title: Computer Networks **Max Marks: 100**
Course Code: PCC-ITE-405 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

To provide insight about fundamental concepts and reference models (OSI and TCP/IP) and its functionalists.To gain comprehensive knowledge about the principles, protocols, and significance of Layers in OSI and TCP/IP.To know the implementation of various protocols

UNIT- I

DATA COMMUNICATION COMPONENTS: Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT-II

DATA LINK LAYER AND MEDIUM ACCESS SUB LAYER: Error Detection and Error Correction, Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols, Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

UNIT-III

NETWORK LAYER: Packet Switching and Datagram approach, IP addressing methods, IPV4, IPV6, Subnetting, Routing, Distance Vector Routing, Link State Routing, Broadcast and Multicast Routing, ARP, RARP, BOOTP and DHCP.

UNIT-IV

TRANSPORT LAYER: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT-V

APPLICATION LAYER: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

COURSE OUTCOMES:

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area

networks (LANs) and Wireless LANs (WLANs) describe the function of each block.

3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
4. For a given problem related TCP/IP protocol developed the network programming.
5. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW,
6. HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

TEXT BOOKS:

1. **Behrouz A. Forouzan,** Data Communication and Networking, 4th Edition, McGraw-Hill.
2. **William Stallings**, Data and Computer Communication, 8th Edition, Pearson Prentice Hall India.

REFERENCE BOOK:

1. **Andrew S. Tanenbaum**, Computer Networks, 8th Edition, Pearson New International Edition.
2. **Douglas Comer,** Internet working with TCP/IP, Volume 1, 6th Edition Prentice Hall of India.

Notefor paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt 5 questions selecting at least one question from each unit.

SEMESTER IV

Course Title: Python Programming **Max Marks: 100**
Course Code: PCC-ITE-406 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

Python is a modern language useful for writing compact code specifically for Programming in Server Side web Development, AI, data analytics and Game Programming. This course covers the basics and advanced python programming to harness its potential for modern computing requirements

UNIT-I

Introduction to Python: Introduction to Python, History of python, Status of python, Installation and Working with Python, Understanding Python variables, Python basic Operators, Understanding python blocks.

Python Data Types: Declaring and using Numeric data types: int, float, complex, Using string data type and string operations, Defining list and list slicing, Use of Tuple data type, Working with sequence.

Python Program Flow Control: Conditional blocks using if, else and else if, Simple for loops in python For loop using ranges, string, list and dictionaries, Use of while loops in python, Loop manipulation using pass, continue, break and else Programming, using Python conditional and loops block.

UNIT-II

Python Functions, Modules and Packages: Organizing python codes using functions, organizing python projects into modules, Importing own module as well as external modules, Understanding Packages, Powerful Lamda function, Programming using functions, modules and external packages

Python String, List and Dictionary Manipulations: Building blocks of python programs, Understanding string in build methods, List manipulation using in build methods, Dictionary manipulation, Programming using string, list and dictionary in build function

UNIT-III

Python Object Oriented Programming –Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support.

Multithreading: Understanding threads, Forking threads, Synchronizing the threads, Programming using multithreading.

Interfacing with the OS: Working with System (sys Module), Working with Operating System (os module).

UNIT-IV

Python File Operation: Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations.

Python Regular Expression: Powerful pattern matching and searching, Power of pattern searching using regex in python, Real time parsing of networking or system data using regex, Password, email, URL validation using regular expression, Pattern finding programs using regular expression

UNIT-V

Python Exception Handling:Avoiding code break using exception handling, Safe guarding file operation using exception handling, Handling and helping developer with error code, Programming using Exception handling, Built-in exception.

Python Database Interaction: SQL Database connection using python, Creating and searching tables, Reading and storing config information on database, Programming using database connections

COURSE OUTCOMES: At the end of this course, the students will able to do the following:

1. To Understand data types (like character strings, integers, and real numbers)and the Operations that can be applied to each data type
2. To write programs that get input, perform calculations, and provide output (using Conditional logic, loops, Functions).
3. To understand the OOPs concepts with respect to fourth generation language
4. To write well designed and well documented programs that is easily maintainable.
5. To test and debug programs (find out what is wrong and fix it).

TEXT BOOKS:

1. **R. NageswaraRao,** "Core Python Programming", Dreamtech.
2. **Wesley J. Chun.,** "Core Python Programming", -2nd Edition Prentice Hall.

REFERCENCE BOOKS:

1. **Luke Sneeringer,** "Professional Python", Wrox.
2. **John V Gutttag.,** "Introduction to Computation and Programming using Python", Prentice Hall of India.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt 5 questions selecting at least one question from each unit.

Laboratory Courses

SEMESTER IV

Course Title: Python programming lab **Max Marks: 50**
Course Code: PCC-ITE-411 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

OBJECTIVES:

1. To write, test, and debug simple Python programs.
2. To implement Python programs with conditionals and loops.
3. Use functions for structuring Python programs.
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python.

LIST OF EXPERIMENTS:

1. Write a program to compute the GCD of two numbers.
2. Write a program to find the square root of a number (Newton‘s method).
3. Write a program to calculate power of a number.
4. Write a program to find the maximum and minimum of a list of numbers.
5. Write a program to implement Linear search and Binary search.
6. Write a program to implement Selection sort, Insertion sort.
7. Write a program to implement Merge sort.
8. Write a program to find first n prime numbers.
9. Write a program to multiply matrices.
10. Write Programs that take command line arguments (word count)
11. Write a program to find the most frequent words in a text read from a file
12. Write a program to retrieve, insert, and update data in a database.

COURSE OUTCOMES: Upon completion of the course, students will be able to:

1. Write, test, and debug simple Python programs.
2. Implement Python programs with conditionals and loops.
3. Develop Python programs step-wise by defining functions and calling them.
4. Use Python lists, tuples, dictionaries for representing compound data.
5. Read and write data from/to files in Python.

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course content.

SEMESTER IV

Course Title: Database Management System Lab **Max Marks: 50**
Course Code: PCC-ITE-412 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

OBJECTIVES:

The major objective of this lab is to provide a strong and formal foundation in database concepts, technology and practice to the participants, to groom them into well-informed database application developers.

LIST OF EXPERIMENTS:

1. Login and logout of the SQL.
2. Creation of users and roles.
3. Database schema creation.
4. Database schema modification.
5. Dropping of Database schema.
6. Use of Insert command, Update, Delete, Select commands.
7. Use of various aggregate functions.
8. Making reports with SQL report writer
9. Creation of PL/SQL stored procedures.
10. Creation of Database triggers.
11. Creation of Cursors.
12. One case study on Database Application Development.

COURSE OUTCOMES: At the end of this course, the students will able to do following:

1. Understand the basis of SQL and PL/SQL.
2. Design and implementation of database for an application

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER IV

Course Title: Computer Networks Lab **Max Marks: 50**
Course Code: PCC-ITE-413 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

OBJECTIVES:

1. To understand working principle of various communication protocols
2. To analyze various routing protocols
3. To know the concept of various data transfer between nodes.

LIST OF EXPERIMENTS:

1. Networks Cabling (Theoretical)
2. Networks Cabling (Practical)
3. Building a peer to peer PC network
4. Building a LAN with HUPs and Switches
5. IP Addressing and subnetting.
6. Introduction to Packet Tracer.
7. Router Configuration Using Packet Tracer
8. Router Configuration Using Packet Tracer
9. Static Route Configuration on Router-Part 1
10. Static Route Configuration on Router-Part 2
11. Standard access control list (ACL) configuration in packet tracer
12. Extended access control list (ACL) configuration in packet tracer
13. Wireless connection using packet tracer

COURSE OUTCOME: At the end of this course, the students will able to do following:

1. Understand fundamentals underlying of computer networks.
1. Understand details and functionality of computer network layered architecture
2. Compare routing networks.
3. Analyze performance of various communication protocols.

Note: These are only the suggested list of practical. Instructor may add or change some practical relevant to the course contents.

SEMESTER V

Course Title: Theory of Automata **Max Marks: 100**
Course Code: PCC-ITE-501 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE**:** The objective of this course is to introduce students to this fundamental area of computer science which enables students to focus on the study of abstract models of computation.

UNIT-I
INTRODUCTION**:** Alphabets, Strings and Languages; Automata and Grammars.

Machines: Basic Machine, FSM, Transition Graph, Transition Matrix, Deterministic and Non-Deterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore Machines, Minimization of Finite Automata, Two-Way Finite Automata.

UNIT-II
REGULAR SETS AND REGULAR GRAMMARS**:**Regular Sets, Finite Automata and Regular Expression, Pumping Lemma and Regular Sets, Application of Pumping Lemma, Closure Properties of Regular Sets. Formal Grammars & Languages: Basic Definitions and Examples of Languages, Chomsky Hierarchy, Regular Grammars, Context Free & Context Sensitive Grammars, Normal Forms -CNF and GNF, Binary Operations on Languages.

UNIT-III
PUSHDOWN AUTOMATA**:** Formal Definition, Behavior and Graphical Notation, Instantaneous Descriptions and Language of PDA. Equivalence of PDAS and CFGS. Linear Bounded Automata: Context Sensitive Language and Linear Bounded Automata

UNIT-IV
TURING MACHINES**:**TM Model, Representation and Languages Acceptability of TM. Design of TM, Universal TM & Other Modification, Composite & Iterated TM. Properties of Recursive & Recursively Enumerable Languages, Universal Turing Machine and an Undecidable Problem

UNIT-V
DECIDABILITY**:** Post's Correspondence Problem, Rice's Theorem, Decidability of Membership, Emptiness and Equivalence Problems of Languages. Time and Tape Complexity Measures of Turing Machines, Random Access Machines, the Classes P and NP, NP-Completeness, Satisfiability and Cook's Theorem.

COURSE OUTCOMES:

1. Write a formal notation for strings, languages and machines.
2. Design finite automata to accept a set of strings of a language.
3. For a given language determine whether the given language is regular or not.
4. Design context free grammars to generate strings of context free language
5. Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars.
6. Write the hierarchy of formal languages, grammars and machines.
7. Distinguish between computability and non-computability and Decidability and undecidability

TEXT BOOKS:

1. **John E. Hopcroft, Jeffery Ullman**, Introduction to Automata theory, Languages & Computation, Narosa Publishers.
2. **Xavier S. P. E.**,Theory of Automata and Formal Languages, New Age Intl.2005 Ed.

REFERENCE BOOK:

1. **E. V. Krishnamurthy**, Introductory Theory of computer science. 2.K. L. P. Mishra, Theory of computer Science, Prentice Hall of India Pvt. Ltd.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER V

Course Title: Internet and Web Technologies **Max Marks: 100**
Course Code: PCC-ITE-502 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The objective of this subject is to understand about Website Development and internet.

UNIT-I
INTERNET & WEB**:** History and growth of Internet and Web, Basics of Clients, Servers, and Communications, Introduction to WWW, http, Web Architecture, Web Browsers and Search Engines, Static, Dynamic and active websites and their applications, Symantec Web Technology, web hosting.

UNIT-II
HTML: Introduction to HTML , Overview, Tags, Elements, Attributes, Heading, Paragraphs, Styles, Colours, Links, Images, Tables, frames and forms, Overview of DHTML, Overview of Extensible Mark-up Language(XML).

UNIT-III
CASCADING STYLE SHEETS (CSS): Text or font properties, background, border, margin, padding properties, Align, Navigation Bar, Drop downs, Image Gallery, page layout properties and user interface properties, JavaScript: Overview, forms processing, objects, functions, arrays, popup and HTML DOM, AJAX

UNIT-IV
SECURITY**:** Principles of web security, security threats to websites, attacks on websites and their mitigation, Cryptographic tools, Digital certificates, Digital Signatures, Secure Socket Layer, Network Security: Firewalls, IP Security, Virtual Private Networks,.

UNIT-V

INTRODUCTION TO SERVER SIDE PROGRAMMING**:** PHP, Overview, variable, Control statements, Arrays, functions and forms, advanced PHP. MySQL Database Connectivity.

COURSE OUTCOME:

1. Develop simple static websites.
2. Static websites with CSS.
3. Dynamic websites using Java Scripting.
4. Dynamic website with server side scripting using PHP.
5. Address various web security related issues

TEXT BOOKS:

1. **Thomas Powell**, Complete Reference HTML/XHTML.
2. **S. AchyutGodbole and AtulKahate**, Web Technologies, Tata McGraw Hill.

REFERENCE BOOKS:

1. **H.M.Deitel, P.J.Deitel and T.R.Nieto**, Internet and World Wide Web: How to Program, Pearson Education, 2000
2. **Xavier C**., Web Technology & Design, New Age International Publishers.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER V

Course Title: Software Engineering **Max Marks: 100**
Course Code: PCC-ITE-503 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVES: The program's goal is to provide a professionally guided education in software engineering that prepares graduates to transition into a broad range of career options: industry, government, computing graduate program, and professional education.

UNIT-I
Introduction to Software:
Definitions to know the meaning of Software Engineering. Need to discuss Importance of software engineering, The Software evolution, Software characteristic, Goals of Software Engineering, Software development life-cycle: Requirement analysis, software design, coding, testing and maintenance.

UNIT-II
Software Models and Software requirement Specification
Water fall Model: Introduction, Diagram, Characteristics, Strengths. Weakness Prototyping model: Diagram, Characteristics, and Strengths Weakness. Iterative development model: Diagram, Characteristics, Strengths, Weakness. Spiral model: Diagram, Characteristics, Strengths, Weakness.
Types of requirements, functional and non-functional requirements, requirement engineering, requirement engineering process. Requirements elicitation, Requirement Validation, SRS Document –Goals, properties and characteristics of SRS documents,

UNIT-III
System Design: What is software design, Importance of design, objective of design and comparison of good and bad design, Design framework, Problem partitioning, Abstraction, Top down and Bottom up – design, Cohesiveness, coupling

UNIT-IV
Coding: Top-down and bottom-up, structure programming, information hiding, and programming style.
Testing: Levels of testing, functional testing, structural testing, test plane, test case specification, reliability assessment, Software testing strategies, Verification and validation, Unit, Integration Testing, Top down and bottom up integration testing, Alpha and Beta

UNIT-V
Software Maintenance: Software maintenance definitions, need for software maintenance, categories of maintenance, software maintenance process models, techniques for reducing need of software maintenance.

COURSE OUTCOMES: At the end of this course, the students will able to,

1. Learn about the phases in software development cycle
2. To understand various types of models and requirements engineering
3. To understand the design principles.
4. Learn about the levels of testing and testing approaches
5. Learn about the maintenance model.

TEXT BOOKS:

1. **Peters**, Software Engineering, Wiley India.
2. **PankajJalote**, An integrated Approach to Software Engineering, Narosa Publishing.

REFERENCE BOOKS:

1. **Thompson**, Software Engineering Project management, Wiley India.
2. **Richard Fairley**, Software Engineering, TMH.

Note for paper setter: The question paper shall comprise of 10 questions. Twoquestions will be set from each unit. The student has to attempt five questions selectingat least one question from each unit.

SEMESTER V

Course Title: Java programming **Max Marks: 100**
Course Code: PCC-ITE-504 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: To enhance skills of student with the ever demanding programming language Core Java.

UNIT-I
OVERVIEW OF JAVA: Introduction to Java, Features of Java, Object Oriented Concepts, Lexical Issues, Data Types, Variables, Arrays, Operators, Java Virtual Machine, Byte code, Control Statements: Selection, Iteration and Jump Statements, Java Bean Standards.

UNIT-II
CLASSES AND INHERITANCE: Classes, Objects, Constructors, Overloading Method, Access Control, Static and Final Keywords, Nested and Inner Classes, Abstract Class, Object Class, Inheritance, Overriding Methods, Using Super, Dynamic method Dispatch. Packages, Access Protection, Importing Packages, Interfaces.

UNIT-III
EXCEPTION HANDLING AND MULTITHREADING**:** Exception Handling, Multiple Catch Clauses, Nested Try and Throw. Multithreading: Thread, Creating a Thread, Creating Multiple Threads, Synchronization, Inter Thread Communication, Deadlock, Suspending, Resuming and Stopping Threads, Multithreading.

UNIT-IV
I/O, APPLETS AND STRING HANDING FILES:Files, Stream Classes, Serialization, Reading Console Input, Writing Console Output, Print Writer Class, Reading and Writing Files, Transient And Volatile Modifiers, InstanceOf, Strictfp, Native Methods. Applets: Introduction: Applet Fundamentals, Applet Architecture. Strings: String Constructors, String Operations, String Buffer, String Builder, Sting Tokenizer.

UNIT-V
COLLECTIONS FRAMEWORK: Collections Overview, Collection Interfaces, Collection Classes, Accessing a Collection via Iterator, Map Classes and Map Interfaces, Comparators, Arrays, Legacy Classes and Interfaces, Wrapper Classes.

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Identify classes, objects, members of a class and relationships among them needed for a specific problem.
2. Write Java application programs using OOP principles and proper program structuring.
3. Demonstrate the concepts of polymorphism and inheritance.
4. Write Java programs to implement error handling techniques using exception handling.

TEXT BOOKS:

1. **P. Naughton& H. Schildt**, Java2 (The Complete Reference), 3rd Edn, TMH 1999.
2. **K. Arnold & J. Gosling**, the Java Programming Language, 2nd Edn, Addison Wesley, 1996.

REFERENCE BOOKS:

1. **Cay S. Horstmann, Gary Cornell**, Core Java 2 Volume I Fundamentals, 5th Edn. PHI, 4000.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Laboratory Courses

SEMESTER-V

Course Title: Internet and Web Technologies Lab	**Max Marks: 50**
Course Code: PCC-ITE-511	**University Examination: 25**
Duration of Exam: 2 hours	**Internal Assessment: 25**

COURSE OBJECTIVE: This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.

LIST OF EXPERIMENTS:

1. Designing web pages using HTML.
2. Designing web pages using HTML and CSS.
3. Design of interactive web pages using JavaScript.
4. Design of interactive web pages using Ajax.
5. Creating simple webpage using PHP.
6. Designing web applications using PHP and MySQL.

COURSE OUTCOME:

1. Analyze a web page and identify its elements and attributes.
2. Create web pages
3. Build dynamic web pages using java scripts
4. Create XML documents and schemes

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER-V

Course Title: Software Engineering Lab **Max Marks: 50**
Course Code: PCC-ITE-512 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

Course Objective: It aims to develop a broad understanding of the discipline of software engineering. It seeks to complement this with a detailed knowledge of techniques foe analysis and design of complex software intensive systems.

Suggestive list of practical's related to software Engineering (without coding) :

1. Performing Case studies related to various stages of Software development Life cycle
2. Preparing User requirement for a software.
3. Writing System requirement specification.
4. Performing analysis of the user requirement.
5. Preparing designs of software using tools such as flow charts, DFD, UML diagrams.
6. Preparing test cases of sample programs

Course Outcomes:

1. Plan a software engineering process life cycle
2. Able to elicit, analyse and specify software requirements.
3. Analyse and translate a specification into design.
4. Realize design practically, using an appropriate software engineering methodology

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER-V

Course Title: Java programming lab **Max Marks: 50**
Course Code: PCC-ITE-513 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

COURSE OBJECTIVE:

This main Objective of this course is introduced to understand the basic concepts of Java, Class syntax, data types, flow of control, classes, methods, objects, arrays, exception handling, multithreading. Writing and testing applets for inclusion in web pages.

LIST OF EXPERIMENTS:

1. Write a Java program to demonstrate the usage of constructor overloading.
2. Write a Java program to demonstrate the usage of Method Overloading and Overriding.
3. Write a Java program to demonstrate the usage of packages.
4. Write a Java program to demonstrate the usage of inheritance.
5. Write a Java program to demonstrate the usage of interfaces.
6. Write a Java program to demonstrate the usage of various keywords(Static, Super, Final,this).
7. Write a program to demonstrate exception handling
8. Write a program to demonstrate Applet
9. Write a program to demonstrate the concept of single thread creation and multithread creation, inter thread communication
10. Write a Java program to demonstrate the usage of String Classes
11. Write a program to demonstrate the concept of Several Collection Classes of Java.

COURSE OUTCOMES:

1. Implement Object Oriented Programming Concepts(class, constructor, overloading, inheritance, overriding) in Java.
2. Use and create packages and interfaces in a Java program
3. Implement exception handling in Java.
4. Implement Multithreading in Java.
5. Use of Input/output Streams in Java

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

OEC

Open Elective-I

SEMESTER V

Course Title: Estimation and costing **Max Marks: 100**
Course Code: OEC-ITE-501/PCC-CE-504 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: The aim of this course is to make the students able enough to determine various quantities and the cost of civil engineering projects.

UNIT-I

Estimate & Types of Estimate: Importance, Items of a work and their Units. Types of estimates, viz. preliminary, Plinth are estimate, Cube rate estimate(for buildings),Approximate quantity method estimate, detailed estimate/Item rate estimate, revised estimate, supplementary estimate, bill of quantities and abstract of cost.

UNIT-II

Analysis of Rates: Preparing analysis of rates, labour schedule, material schedule & rate schedule. Analysis of rates - of lime concrete in foundation; Brickwork in Foundation, super structure, R.C.C. work (Beams, Slabs, Columns), Cement Plastering, white washing, earth work in foundation, D.P.C, Steel work for Reinforcement .

UNIT-III

Specifications: General specifications and detailed specifications, Book of specifications, specifications for earth work in foundation, L.C in foundation, R.C.C. work, Brick work, R.B. Work, Wood work in doors, windows. D.P.C,Centering and Shuttering.

UNIT-IV

Methods of Building Estimates: Estimates of building Estimates of walls, methods of building estimate, Long-wall, short-wall and centre line methods, Estimate of masonry platform, estimate of a masonry tank, estimate of roof trusses (wooden/steel). Estimate of a single room. Building-Estimate of a two roomed building, estimate of an R.C.C beam and R.C.C. Slab.

UNIT-V

Road Estimating & Valuation: Methods of estimating: earth work, estimate of metallic road. Valuation, Purpose of valuation, Methods of valuation,(1:Rental Method, 2:Direct Comparison with the capital value, 3:Valuation based on profit 4: Valuation based on profit, 5: Depreciation method of valuation), Depreciation, Methods of calculating depreciation. Valuation of building-various methods, rent fixation, plinth area requirement.

COURSE OUTCOME: The course will enable the students to:

1. Explain types of estimate and duties of an Estimator.
2. Undertake rate analysis of civil engineering works.
3. Determine the rates of various items of civil works.
4. Calculate estimated cost of civil construction projects.
5. Evaluate the actual value of any property.

TEXT BOOKS:

1. **Datta B. N** :Estimating and Costing, UBS Publication
2. **Mahajan S.P, SatyaSrakashan:** Civil Estimating, Costing Evaluation & Specifications.

REFERENCE BOOKS:

1. **Khanna**: Hand Book of Civil Engineering.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

SEMESTER V

Course Title: Internet of Things **Max Marks: 100**
Course Code: OEC-ITE-502/PCC-CSE-702 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVES: The main objectives of this course are:

1. To assess the vision and introduction of IoT.
2. To Implement Data and Knowledge Management and use of Devices in IoT Technology.
3. To Understand State of the Art - IoT Architecture.
4. To classify Real World IoT Design Constraints, Industrial Automation in IoT.

UNIT-I

Introduction to Internet of Things (IoT):Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

UNIT-II

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

UNIT-III

IP as the IoT Network Layer: The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

UNIT-IV

Data and Analytics for IoT: An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of IOT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.

UNIT-V

IoT Physical Devices and Endpoints: Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals ofArduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to Raspberry Pi, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture. Smart City Security Architecture, Smart City Use-Case Examples.

COURSE OUTCOMES: After completion of this course, the students will able to do following:

1. Interpret the vision of IoT from a global context.
2. Compare and contrast the use of Devices, Gateways and Data Management in IoT.
3. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
4. To study and analyse data and to understand the security issues in IoT
5. To study IoT physical devices and end points and to understand the communications between components

TEXTBOOK:

1. **Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle**,"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",1st Edition, Academic Press, 2014.

REFERENCE BOOKS:

1. **VijayMadisetti and ArshdeepBahga**,"Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.
2. **Francisda Costa,"**Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",1st Edition, Apress Publications, 2013

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER V

Course Title: Fundamentals Of Digital Image Processing **Max Marks: 100**
Course Code: OEC-ITE-503/PCC-CSE-701 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: To introduce the different low level and high level computer vision techniques. Students are also made aware about the different image processing techniques.

UNIT-I

INTRODUCTION TO IMAGE PROCESSING: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation. Intensity transform functions, histogram processing.

UNIT–II

IMAGE FILTERING**:** spatial domain filtering, Fourier domain analysis**:** Fourier transforms and its properties, frequency domain filters, Homomorphism Filtering.

UNIT-III

IMAGE COMPRESSION: Coding redundancy, Inter-pixel redundancy, Psycho visual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression.

UNIT-IV

IMAGE MORPHOLOGICAL PROCESSING: Introduction to basic operation on binary and grayscale images: Dilation, Erosion, Opening & Closing, Morphological Algorithms: Boundary & Region Extraction, Convex Hull, Thinning, Thickening, Skeletons, Pruning.

UNIT-V

IMAGE SEGMENTATION, REPRESENTATION & DESCRIPTIONS**:** Point, Line and Edge Detection, thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Contour following, Boundary representations, Region Representations, shape properties, Boundary Descriptors, Regional Descriptors, Texture representations, Object Descriptions

COURSE OUTCOME: At the end of this course, students will demonstrate the ability to:

1. Have an understanding of various steps of Digital image Processing and image representation.
2. Understand and implement image enhancement in spatial domain and in frequency domain.
3. Understand image compression algorithms and choose an appropriate algorithm for specific application needs.
4. Understand and implement basic Morphological operation on Image.
5. Understand and implement image segmentation, representation and description.

TEXT BOOKS:

1. **Gonzalez and Woods**: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.
2. **Forsyth and Ponce**: Computer Vision A Modern Approach Pearson Education Latest Edition.

REFERENCE BOOK:

1. **Pakhera Malay K**: Digital Image Processing and Pattern Recognition, PHI.
2. **Trucco&Verri**: Introductory Techniques for 3-D Computer Vision, Prentice Hall, Latest Edition.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each.

SEMESTER V

Course Title: Engineering Material Science **Max Marks: 100**
Course Code: OEC-ITE-504/PEC-EE-701 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The course has been designed to get student acquainted with the properties of various engineering materials and their applications in Engineering Sciences.

UNIT-I

Atomic packing, crystal lattice, Different type of crystal Bands, structure of silicon & Germanium, Energy Bands in solids, one dimensional lattice, Electron in periodic potential, concept of hole, Three dimensional Lattice and Brullioun Zones Elastic Wave and Photons (Elementary Ideas).

UNIT-II

Introduction to Insulators, dielectric behavior, Properties of Insulating Materials, Insulators in Static & Alternating fields, classification as per temperature rise, Practical Dielectrics, Liquid: Solid and Gaseous and their applications.

UNIT-III

Polarization, Quantitative and qualitative discussion of dielectric constants of polyatomic molecules, Internal fields in solids and Liquids. Ferroelectrics & Piezoelectric Materials, spontaneous polarization, Frequency dependence of polarizabilities, complex dielectric constant of non-dipolar solids, Dipolar relaxation, dielectric losses, Dielectric Break downs.

UNIT-IV

Review of magnetic field concepts, Orbital dipole, and angular momentum of simple atomic models, classification of magnetic materials, spontaneous magnetism, Curie- Weiss Law, coercive forces; antiferro magnetic materials, ferromagnetic materials, Properties & applications of ferrites.

UNIT-V

Conductivity of Metals: Ohm's Law, Relaxation time, collision time and mean free path, resistivity of conductors, temperature dependence of resistivity, super conductivity.

Semiconductor Materials: classifying materials as semiconductors, chemical bond in Si and Ge& its consequences, density of carriers in intrinsic semiconductors, the energy gap, the conductivity of intrinsic semiconductors, Carrier densities in n-type semiconductors & p-type semi-conductors, Hall Effect and Carrier Density.

COURSE OUTCOMES:

1. Given a type of material, the students will be able to qualitatively describe the bonding scheme

   and its general physical properties, as well as possible applications in electrical engineering.

2. This will be helpful for the students to understand about the insulating properties of the materials.
3. This will be helpful for the students to understand about the Dielectric properties of the materials.
4. Students will be able to do comparative analysis of magnetic materials based upon their

   properties.

5. Students will be able to differentiate among various materials such as conductor and

   Semiconductor based upon the internal composition and conductivities.

TEXT BOOKS/REFERENCE BOOKS:

1. **Dekker**, Electrical Engineering Materials.
2. **Allison**, Materials & Electronics Engineering & Devices.

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.

PROFESSIONAL ELECTIVES COURSES-I

SEMESTER V

Course Title: Visual Programming **Max Marks: 100**
Course Code: PEC-ITE-501 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES: The student should be made to:

1. Understand the foundations of CLR execution
2. Learn the technologies of the. NET framework
3. Know the object oriented aspects of C#
4. Learn web based applications on. NET(ASP.NET)

UNIT-I
Introduction to C#:Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.

UNIT-II
Object Oriented Aspects of C#Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

UNIT-III
Application Development on. NET 9:Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.

UNIT-IV
Web Based Application Development on .NET 9:Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

UNIT-V

CLR and .NET Framework 9:Assemblies, Versoning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remoting, security in .NET

COURSE OUTCOMES:

1. List the major elements of the .NET frame work
2. Explain how C# fits into the .NET platform.
3. Analyze the basic structure of a C# application
4. Debug, compile, and run a simple application.
5. Developprograms using C# on .NET

TEXT BOOKS:

1. **Herbert Schildt**, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2. **Christian Nagel et al.** "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

REFRENCES:

1. **Andrew Troelsen,** "Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
2. **Ian Griffiths, Matthew Adams, Jesse Liberty,** "Programming C# 4.0", Sixth Edition, O"Reilly, 2010.

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit

SEMESTER V

Course Title: Compiler Design **Max Marks: 100**
Course Code: PEC-ITE-502 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The main objectives of these courses are to give students hands-on experience with crafting a simple compiler, working on a sizable software engineering project, using modern software tools, and most importantly correlating theory with practice.

UNIT-I

INTRODUCTION TO COMPILER**:** Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Implementation of lexical analyzers, lexical-analyzer generator, Lex compiler, compiler construction tools, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.

UNIT-II

BASIC PARSING TECHNIQUES**:** Parsers, Shift reduce parsing, operator precedence Parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR (0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables, constructing LALR sets of items.

UNIT-III

SYNTAX-DIRECTED TRANSLATION**:** Syntax-directed Translation schemes, Implementation of Syntax- directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser.

UNIT-IV

SYMBOL TABLES**:** Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in

block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.

UNIT-V

INTRODUCTION TO CODE OPTIMIZATION**:** Loop optimization, the DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis. Implementation of a subset of C using YACC.

COURSE OUTCOME:

1. Master using lexical analyzer and parser generator tools.
2. Master building symbol tables and generating intermediate code.
3. Master generating assembly code for a RISC machine.
4. Master programming in Java.
5. Be familiar with compiler architecture.
6. Be familiar with register allocation.
7. Be exposed to compiler optimization

TEXT BOOK

1. **Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman.** "Compilers Principles, Techniques and Tools". Pearson Education, 2008

REFERENCES:

1. **Aho, Sethi& Ullman,** "Compiler Design", Addision Wesley/ Pearson.
2. **O. G. Kakde**; Compiler Design,4/e; Universities Press (2008)

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit

SEMESTER V

Course Title: Advance Algorithms **Max Marks: 100**
Course Code: PEC-ITE-503 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

1. To provide the foundations of the practical implementation and usage of Algorithms and Data Structures. One objective is
2. To ensure that the student evolves into a competent programmer capable of designing and analyzing implementations of algorithms and data structures for different kinds of problems.
3. To expose the student to the algorithm analysis techniques, to the theory of reductions, and to the classification of problems into complexity classes like NP.

UNIT- I

ALGORITHM ANALYSIS**:** Asymptotic Notation, Amortization Basic Data Structure: Stacks and Queues, Vectors, Lists and Sequences, Trees, Priority Queues, Heaps, Dictionaries and Hash Tables Search Trees and Skip Lists: Ordered Dictionaries and binary Search Trees, AVL trees, Bounded-Depth Search Trees.

UNIT-II

FUNDAMENTAL TECHNIQUES**:** The Greedy Method, Divide and Conquer, Dynamic Programming Graphs: The Grpah abstract data Type, Data Structures for Graphs, Graph Traversal, Directed Graphs.

UNIT-III

WEIGHTED GRAPHS**:** Single Source Shortest Paths, All pairs Shortest Paths, Minimum Spanning Trees Network Flow and Matching: Flows and Cuts, Maximum Flow, Maximum Bipartite Matching, Minimum Cost Flow

UNIT-IV

TEXT PROCESSING**:** Strings and Pattern Matching algorithms, Tries, Text Compression, Text Similarity testing. Number Theory and Cryptography: Fundamental Algorithms involving numbers, Cryptographic Computations, Information Security Algorithms and Protocols.

UNIT-V

COMPUTATIONAL GEOMETRY**:** Range Trees, Prority Search Trees, Quadtrees and k-d Trees, Convex Hulls, N-P Complete.

COURSE OUTCOMES:

1. Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency.
2. Master a variety of advanced abstract data type (ADT) and data structures and their implementations.
3. Master different algorithm design techniques (brute-force, divide and conquer, greedy, etc.)
4. Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

TEXT BOOKS:

1. **T.H. Cormen, C.E.Leiserson and R.L. Rivest,** Introduction to Algorithms.
2. **G.Brassard and P.Bratley**, Fundamentals of Algorithmics.

REFERENCE BOOKS

1. **S. Dasgupta, C. Papadimitrou, U Vazirani,** Algorithms, by McGraw Hill.
2. **J. Klienberg and E. Tardos,** Algorithm Design, by Pearson Education Limited.

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit

SEMESTER VI

Course Title: Computer Graphics & Multimedia **Max Marks: 100**
Course Code: PCC-ITE-601 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSEOBJECTIVE: To understand the basics of various inputs and output computer graphics hardware devices. Exploration of fundamental concepts in 2D and 3D computer graphics. To know 2D raster graphics techniques, 3D modelling, geometric transformations, 3D viewing.

UNIT–I
BASIC OF COMPUTER GRAPHICS:Introduction to computer graphics, Applications of computer graphics, Display devices, Raster scan systems, Graphics input devices, Graphics software and standards.

UNIT–II
GRAPHICS PRIMITIVES**:** Points, lines, circles as primitives, scan conversion algorithms for primitives, Fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes.

UNIT–III
2D TRANSFORMATION AND VIEWING**:** Transformations, matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping, polygon clipping.

UNIT–IV
3D CONCEPTS AND OBJECT REPRESENTATION**:**3D display methods, polygon surfaces, tables, equations, curved lies and surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves. 3D transformation and viewing: 3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation.

UNIT–V
INTRODUCTION TO MULTIMEDIA**:** Introduction to multimedia, Multimedia computer system, Multimedia components, Multimedia terminology: communication modes, media types, Multimedia networks, Applications of multimedia, distributed multimedia systems, Synchronization

COURSE OUTCOMES:

1. Explain various applications of computer Graphics.
2. To be able to understand a graphics processing system.
3. To able to under and implement computer graphics algorithms.

4. To be able to implement 3D graphics primitives
5. To be able to understand and use multimedia aids.

TEXT BOOKS:

1. **Steven Harrington**, Computer Graphics, A programming approach second Edn.
2. **J. D. Foley, A.Van Dam, S. K. Feiner and J. F. Hughes; Addison Wesley,** Computer Graphics; Principles and practice; Second Edition in C 1997.

REFERENCE BOOKS:

1. **Rogers**, Procedurals elements of Computer Graphics, McGraw hill.
2. **Newman and Sproul**, Principle of interactive Computer Graphics, McGraw Hill.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER VI

Course Title: Network Security **Max Marks: 100**
Course Code: PCC-ITE-602 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: To understand the principles of encryption algorithms: conventional and cryptography. To have a detailed knowledge about authentication, hash functions and application level security mechanisms.

UNIT-I
INTRODUCTION: Introduction to security, need of security, security attacks, services and mechanisms, introduction to cryptology. conventional encryption model, classical encryption techniques substitution ciphers & transposition ciphers, cryptanalysis, steganography.

UNIT-II
MODERN BLOCK CIPHERS**:** Ideal block ciphers fiestel structure, principles, standards (des), strength of des, differential & linear cryptanalysis of des, block cipher modes of operation, triple des, aes encryption & decryption, key distribution, random number generation.

UNIT-III
PUBLIC KEY CRYPTOGRAPHY: Principle of public key cryptography, prime and relative prime numbers, modular arithmetic, key management. diffie-hellman key exchange, elliptic curve architecture and cryptography. introduction to number theory, rsa.

UNIT-IV
AUTHENTICATION AND HASH FUNCTION**:** Authentication Recruitment's, Authentication Functions and Message Authentication Codes. Digital Signatures, MD5 Message Digest Algorithm. Secure Hash Algorithm-I (SHA-1).

UNIT-V
NETWORK SECURITY & SYSTEM LEVEL SECURITY: Electronics Mail Security: Pretty Good Privacy (PGP), S/MIME IP Security: IP Security Overview, Architecture, and Authentication Header. Web Security: Security Socket Layer & Transport Layer Security, System Security: Intruders, Viruses and Related Threats, Firewall Design Principles.

COURSE OUTCOME: At the end of the course the students will be able to do following:

1. Understand cryptography and network security concepts and application.
2. Apply security principles to system design.
3. Identify and investigate network security threat.

4. Analyses and design network security protocols.
5. Conduct research in network security.

TEXT BOOK:

1. **William Stallings**, Cryptography and network security: principles and practices. Pearson Education India, 2006.
2. **Behrouz A. Forouzan, and DebdeepMukhopadhyay.** Cryptography and Network Security (Sie). McGraw-Hill Education, 2011.

REFERENCE BOOKS:

1. **Kaufman C., Perlman R. & Spenser M**., Network Security, PHI.

Note for paper setter: The question paper shall comprise of 10 questions. Twoquestions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER VI

Course Title: Unix/Linux and shell programming **Max Marks: 100**
Course Code: PCC-ITE-603 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: This subject aims to provide students with fundamental principles and comprehensive knowledge of Unix/Linux & Shell Programming.

UNIT-I
Introduction to the kernel: Architecture of the UNIX, the buffer cache. Internal representation of files, node, accessing blocks, releasing blocks, structure of regular files, conversion of a path name to an inode, inode assignment to a new file, and allocation of disk-block.

UNIT-II
System Calls: System calls for the file systems; open, read, write, close. The pipe system call, opening a named pipe, reading and writing pipes, closing pipes, dup, mounting and un-mounting file system, link, unlink. System calls for time and clock.

UNIT-III
Processes: The structure of processes, process states and transitions, layout of system memory, the context of a process, saving the context of the process, manipulation of the process address space. Process Control, process creation, signals, process termination, awaiting process termination, the user id of a process, changing the size of the process, the system boot and init process.

UNIT-IV
Shell Programming: Study of different types of shells like Bourne shell, C & K shell. Shell variable, shell script, shell command. Looping and making choices, for loop, while and until, passing arguments to scripts. Programming with different shells.

UNIT-V
Inter Process Communication: Inter process communication, process tracing, network communication sockets. Multiprocessor system, problem of multiprocessor systems, solution with master and slave processor, solution with semaphores.Study of distributed UNIX system.

COURSE OUTCOMES: At the end of this course, the students will able to do the following:

1. Understanding the concept of shell programming
2. Understanding the working of kernel and implementing them.
3. Implementing the system calls, process management, and inter process communication
4. Understand Shell Programming and its implementation.

5. Understanding Semaphores along with interprocess communication.

TEXT BOOKS:

1. **Maurice J Bach.,** The design of the UNIX operating system, Prentice-Hall, 1986.
2. **Raymond S. Eric**, The Art of UNIX Programming.

REFERENCE BOOKS:

1. **StephenPrata,** Advanced UNIX: A Programmer Guide, Howard W. Sams, 1987
2. **Rochkind,** Advanced Unix Programming.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Laboratory Courses

SEMSETER-VI

Course Title: Computer Graphics & multimedia Lab **Max Marks: 50**
Course Code: PCC-ITE-611 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

OBJECTIVE: The objective of the laboratory is to support research and education of students in the fields of Multimedia Technology.

LIST OF EXPERIMENTS:

1. To draw a line using DDA Algorithm.
2. To draw a line using Bresenham‟s Algorithm.
3. To draw a circle using trigonometric Algorithm.
4. To draw a circle using Bresenham‟s Algorithm.
5. To implement polygon boundary fill algorithm.
6. To implement polygon flood fill algorithm.
7. To translate an object with translation parameters in X and Y directions.
8. To scale an object with scaling factors along X and Y directions.
9. To rotate an object with a certain angle.
10. To perform composite transformations of an object.
11. Implementation of simple graphics animation.
12. Practice on Multimedia Tools

COURSE OUTCOME: At the end of this course, the students will able to do following:

1. Design and implementation of various algorithms to draw a number of shapes
2. Design and implementation of various algorithms for designing animation graphics and composite objects
3. Design and simulation of various algorithms using multimedia tools

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents

SEMESTER-VI

Course Title: Unix/Linux & Shell programming Lab **Max Marks: 50**
Course Code: PCC-ITE-612 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

OBJECTIVE: The lab course will address the demand for Information technology professionals with UNIX training and experience.

LIST OF EXPERIMENTS:

1. Using the visual editor (vi) and the Picoeditor.
2. Setting file and directory permissions.
3. Controlling userprocesses.
4. Managing, printing, and archiving largefiles.
5. Accessing and touring graphicaldesktops.
6. Administering a Linux PCsystem.
7. General administration issues, root account, creating user in Linux, changing password, deleting user, disabling user account, Linux Password & Shadow File Formats System Shutdown and Restart creating groups, Custom Configuration and administrationissues.
8. Practising various Commands, Using various editors, Shell programming, Networking and TCP/IP on Linux.
9. Common Network Troubleshooting on Linux.
10. FTP and Telnet settings, Web serverconfiguration.

Course Outcomes:

1. **Upon completion of this course, the student will be ableto:**
2. You will be able to run various UNIX commands on a standard UNIX/LINUX Operating system (We will be using Ubuntu flavor of the Linux operatingsystem).
3. You will be able to run C / C++ programs on UNIX.
4. You will be able to do shell programming on UNIXOS.
5. You will be able to understand and handle UNIX system calls.

Note: This is only the suggested list of experiments. Instructor may frame additional experiments relevant to the course contents

OPEN ELECTIVE COURSES-II

SEMESTER-VI

Course Title: Mobile and Wireless Communication **Max Marks: 100**
Course Code: OEC-ITE-601/PEC-ECE-601 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The course has been designed to get student acquainted with basic concepts, principles and applications related to field. Emphasis is given to latest technologies

UNIT-I

Cellular Mobile Radio Systems: Introduction to Cellular Mobile System, evolution of mobile communication systems, Performance criteria, operation of cellular systems, The cellular Concept: Frequency reuse; The basic theory of hexagonal cell layout; Spectrum efficiency. FDM/TDM Cellular systems; Cell splitting and cell sectoring, hand off.

UNIT-II

Interference: Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, fading in mobile environment, inter symbol interference (ISI) and rejection using Near-Maximum Likelihood detection.

UNIT-III

Wireless Communication: Major challenges in wireless communication, Radio propagation characteristics; Propagation mechanisms: Reflection, Diffraction and scattering, Effect of human made structures, phase difference between direct and reflected paths, Multipath propagation, Models for path loss, Shadowing and multipath fading (delay spread, coherence bandwidth, coherence time, Doppler spread).

UNIT-IV

Multiple Access Techniques & Wireless Systems: Multiplexing techniques- FDMA, TDMA and CDMA. Spread spectrum systems: Frequency hopping multiple access and its principle, Code division multiple access-principle behind CDMA, Basic principle behind the Direct Sequence Spread Spectrum.

UNIT-V

OFDM and Multi antenna Systems: Introduction and Principle of OFDM, Orthogonality and its Physical significance, Implementation of transceivers, cyclic prefix, Advantages and disadvantages of OFDM, OFDMA. Smart Antennas, MIMO-Basic Introduction and system model.

COURSE OUTCOMES:

1. Understand cellular mobile system, formulate its performance criteria.
2. Characterize the trade-off among frequency reuse, signal to interference ratio, capacity& able to understand interference's in cellular communication.
3. Apply the knowledge of mathematics to find out the average received signal strength at a distance from the transmitter using different propagation model.
4. Identify the advantages & disadvantages of different mobile antennas.
5. Understand multiple access method, spread spectrum techniques, wireless communication system.

TEXT BOOKS:

1. **Lee**-Mobile Cellular Telecommunications, McGraw Hill, 2nd Edition, 1989.
2. **Theodore, Rapport**-Wireless Communications Pearson education, 2nd Edition, 2002.

REFERENCE BOOKS:

1. **Blake R**-Wireless Communication Technology, Thompson Asia Pvt. Ltd., 2004.
2. **Mark Jon W and WeihuaZhqung** -Wireless Communication and Networking, PHI, 2005.

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.

SEMESTER-VI

Course Title: Neural Networks **Max Marks: 100**
Course Code: OEC-ITE-602/PEC-CSE-806 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The principal objective of this subject is to introduce students to neural networks and fuzzy theory from an engineering perspective

UNIT-I
Introduction: Historical Perspective, Basic Neurobiology, Why Artificial Networks? Network Architectures, the Tasks Neural Networks Can Perform, Characteristics of Neural Networks

UNIT-II
Basic Neuron Models: Mcculloch-Pitts Model, Radial Basis Function Model, etc, Learning Algorithms. Matlab Simulation Exercises.

UNIT-III
Basic Neural Network Models: The Hebbian Hypothesis. Single-Layered Neural Networks, Multilayer Perceptron, Nearest Neighbor Based Multilayer Perceptron, Training of Artificial Neural Networks

UNIT-IV
Basic Learning Algorithms:Supervised Learning, Constructive Algorithms, Single-Hidden Layer Algorithms. The Upstart Algorithm.The Cascade Correlation Algorithm.Neural Networks and Temporal Sequences. Sequence Recognition. Sequence Generation. Unsupervised Learning.Competitive Learning. The Back Propagation Algorithm, Self-Organization Learning, Winner-Take-All Competitive Learning, Evolutionary Learning.

UNIT-V
Applications: Character Recognition, Signal Restoration, Pattern Recognition. Matlab Simulation Exercises.

COURSE OUTCOMES:
At the end of the course, students should be able to understand and appreciate:

1. The role of neural networks in engineering, artificial intelligence, and other areas.
2. Understanding of basic neural network
3. Understanding of the concepts and techniques of neural networks through the study of the most important neural network models.
4. Able to evaluate whether neural networks are appropriate to a particular application.
5. Able to apply neural networks to particular applications, and to know what steps to take to improve performance.

TEXT BOOKS:

1. **Jacek M. Zurada**, Introduction to Artificial Neural Systems, PWS PublishingCompany, (2001)
2. **S. S Haykin,** Neural Networks: A Comprehensive Foundation, Pearson Education.

REFERENCE BOOKS:

1. **ValluruRao**, C++ Neural Networks and Fuzzy Logic, Honary Holt & Co*(1998)*
2. **Freeman**, Neural Networks, Pearson Publication (2003).

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER-VI

Course Title: Energy Audit and Management **Max Marks: 100**
Course Code: OEC-ITE-603/PEC-EE-603 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: This course gives an overview of various aspects of conservation, management & audit of electrical energy.

UNIT-I

ENERGY SCENERIO

Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation, Energy Conservation Act and its features.

UNIT-II:

ENERGY MANAGEMENT AND AUDIT

Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel energy substitution, energy audit instruments. Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

UNIT-III:

ENERGY EFFICIENCY IN ELECTRICAL SYSTEMS

Electrical system: Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.

UNIT-IV:

ENERGY EFFICIENCY IN INDUSTRIAL SYSTEMS

Compressed Air System: Types of air compressors, compressor efficiency, efficient compressor operation, Compressed air system components, capacity assessment, leakage test, factors affecting the performance and savings opportunities in HVAC, Fans and

blowers: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities. Pumps and Pumping System: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities.

Cooling Tower: Types and performance evaluation, efficient system operation, flow control strategies and energy saving opportunities, assessment of cooling towers.

UNIT-V:

ENERGY EFFICIENT TECHNOGIES IN ELECTRICAL SYSTEMS

Maximum demand controllers, automatic power factor controllers, energy efficient motors, soft starters with energy saver, variable speed drives, energy efficient transformers, electronic ballast, occupancy sensors, energy efficient lighting controls, energy saving potential of each technology.

COURSE OBJECTIVES:

At the end of this course, students will demonstrate the ability to

1. Understand the current energy scenario and realize the need for new reforms to efficiently
   manage the energy resources.
2. Learn various auditing techniques used for proper energy management.
3. Realize how energy conservation could be done in Electrical Systems by managing the energy losses and malpractices.
4. Realize how energy conservation could be done in Industrial Systems by finding out the factor affecting the performance of various industrial devices and mitigating the same.
5. How electrical energy management could be achieved using new energy efficient devices.

TEXT/REFERENCE BOOKS:

1. **Guide books** for National Certification Examination for Energy Manager / Energy Auditors Book-I, General Aspects (available online)
2. **Guide books** for National Certification Examination for Energy Manager / Energy Auditors Book-III, Electrical Utilities (available online)

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.

SEMESTER-VI

Course Title: VLSI Design **Max Marks: 100**
Course Code: OEC-ITE-604/PEC-ECE-602 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: To familiarize students with various fundamental technologies required in VLSI design

UNIT-I

Review of MOSFET: Constructional & Operational features of MOSFET, I-V Equation, 2ND Order Effects, MOS Capacitor, C-V Characteristics, MOSFET Switch, Transmission gate, CMOS Inverter (Pull-up & Pull- down), Inverter Static Characteristics, ßn/ ßp Ratio, Noise Margin, switching characteristics of Inverter (Fall Time, Rise Time, Delay Time), Dynamic Characteristics, Power Dissipation.

UNIT-II

VLSI Technology: Wafer Processing, Oxidation, Epitaxy, Deposition, Ion-Implantation & Diffusion, The Silicon Gate Process, n-well CMOS Process, p-well Process, Twin-Tub Process, Silicon on Insulator.

UNIT-III

CMOS Logic Design (Gates):CMOS Logic Gate Design (NAND & NOR Logic), Switching Characteristics (Delay Time, Power, Fan-in, Fan-out), Transistor Sizing, The Compound Gates.

UNIT-IV

CMOS Logic Structures: CMOS Logic, Pseudo-nMOS Logic, Dynamic CMOS Logic, C2MOS Logic, BiCMOS Logic, NP Domino Logic.

UNIT-V

Layout:Design Rules/Floor planning, Simple Layout Examples.

VHDL programming: RTL Design – Combinational Logic – Types – Operators – Packages – Sequential Circuit– Sub-programs–Testbenches.(Examples: Address, Counters, Flip-Flops, FSM, Multiplexers/De-multiplexers).

COURSE OUTCOMES: After completion of the course student will be able to:

1. Describe the operational characteristics of MOSFET and its application as capacitor and switch.
2. Design CMOS Inverters and analyze its static and dynamic characteristics
3. Understand the complete CMOS fabrication process

4. Design various CMOS based logic gates and logic structures
5. Understand and draw the layout of basic CMOS based circuits.

TEXT BOOKS:

1. **Weste&Eshraghian**-Principles of CMOS VLSI design (2/e) AddisonWesley.
2. **SamirPalnitkar**-VerilogHDL-GuidetoDigitaldesignandsynthesis,3rdedition, PearsonEducation, 2003.

REFERENCE BOOKS:

1. **M. J. S. Smith**- Application Specific integrated circuits, Pearson Education,1997.
2. **Wayne Wolf**- Modern VLSI Design, Pearson Education2003.

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.

PROFESSIONAL ELECTIVE COURSES-II

SEMESTER-VI

Course Title: Advance Computer Architecture **Max Marks: 100**
Course Code: PEC-ITE-601 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: The objective of this course is to learn the advanced aspects of computer architecture design and analysis.

UNIT-I
Introduction: Introduction to Parallel Processing and Pipelining, Array Computers, Multiprocessor Systems, Dataflow Diagrams and Applications of Parallel Processors, NUMA, UMA, COMA Models, Pipelining Vs Parallelism.

UNIT-II
Pipeline Processors: Various Types of Pipeline Processors like Arithmetic Pipelines, Instruction Pipelines etc. Reservation Table, Design of various types of Pipelines, Instruction Pre-Fetching and Branch Handling in Pipelines, Data Buffering and Busing Structures in Pipelines, Design of Arithmetic and Logic Circuits, N-bit Parallel Adder.

UNIT-III
Streams: Meaning of Instruction Streams and Data Streams, Classification of Computers based on these as SISD, SIMD, MISD and MIMD, SIMD Computer Organization, Various types of SIMD Interconnected Networks like Static and Dynamic Networks, Mesh-Connected, Networks, Cube Connected Networks etc. SIMD Matrix Multiplication and Parallel Sorting Algorithms.

UNIT-IV
Arrays and Associative Processors: Various types of Array and Associative Processors, Loosely and Tightly Coupled Microprocessors, Various types of Interconnection Networks like Time Shared or Common Bus, Crossbar Switch, Multi-Port Memories etc, Advance processor technology- Design space of processors, Interprocess Communication, RISC and CISC Architecture.

UNIT-V
Control Flow and Data Flow Computers: Control Flow and Data Flow Computers, DataFlow Computers, Data Flow Graphs and Languages, Static and Dynamic Data Flow Computers, Systolic Array Architecture, Memory Hierarchy Technology-Inclusion, Coherence & Locality, TLB, paging with segmentation.

COURSE OUTCOMES:
On successful completion of this course you will be able to:

1. Understand the principles of computer system design

2. Distinguish the various instruction set architectures
3. Understand the operation of performance enhancements such as pipelines, dynamic scheduling, branch prediction, caches, and vector processors
4. Describe modern architectures such as RISC, Super Scalar, VLIW (very large instruction word), multi-core and multi-cpu systems
5. Compare the performance of the existing architectures

TEXT BOOKS:

1. **V. Carl Hamacher**, Computer Organization, TMH.
2. **John P. Hayes**, Computer Architecture and Organization, TMH.

REFERENCE BOOKS:

1. **KaiHwang,** Advanced Computer Architecture, TMH.
2. **David A. Patterson and John l. Hennessy,** Computer Organization and Design, Elsware India.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER-VI

Course Title: Cloud Computing **Max Marks: 100**
Course Code: PEC-ITE-602 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: This course offers a good understanding of cloud computing concepts and prepares students to be in a position to design cloud based applications.

UNIT-I
Cloud Computing Basics: Cloud Computing Overview, Characteristics, Applications, Internet and Cloud, Benefits, Limitations, Challenges, Cloud Computing Services and Deployment Models: Infrastructure as a Service, Platform as a Service, Software as a Service, Private Cloud, Public Cloud, Community Cloud, Hybrid Cloud.

UNIT-II
Cloud Computing vs Other Computing Technologies:
Overview of Grid, Peer-to-Peer, Pervasive and Utility Computing technologies; their characteristics and comparison with Cloud Computing.
Accessing the Cloud: Hardware and Infrastructure requirements, Access Mechanisms: Web Applications, Web APIs, Web Browsers.

UNIT-III
Understanding Abstraction and Virtualization
Virtualization Technologies, Load Balancing and Virtualization, Hypervisors, Machine Imaging.

UNIT-IV
Scheduling in Cloud
Overview of Scheduling problem, Different types of scheduling, Scheduling for independent and dependent tasks, Static vs. Dynamic scheduling, Optimization techniques for scheduling.

UNIT-V
Cloud Storage and Cloud Standards: Overview, Storage as a Service, Cloud Storage Issues, Challenges, Standards.
Cloud Security: Securing the Cloud, Securing Data, Establishing identity and presence.

COURSE OUTCOMES: After completing the course, students will able to:

1. Develop and deploy cloud application using popular cloud platforms.
2. Design and develop highly scalable cloud-based applications by creating and
3. Configuring virtual machines on the cloud and building private cloud.
4. Explain and identify the techniques of big data analysis in cloud.
5. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
6. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

TEXT BOOKS:

1. **Raj Kumar Buyya, James Broberg, AndrezeiM.Goscinski**, Cloud Computing: Principles and paradigms, 2011
2. **Anthony T. Velte, Toby J. Velte, and Robert Elsenpeter**, Cloud Computing: A Practical Approach, McGraw Hill, 2010..

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

SEMESTER-VI

Course Title: Distributed Database System **Max Marks: 100**
Course Code: PEC-ITE-603 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVES:

1. The aim is to impart knowledge to students regarding how distributed database functions and how it is different from traditional file system and centralized database.
2. To provide students knowledge about queries and how queries are handled in distributed database.
3. To provide students knowledge regarding deadlocks in distributed database.

UNIT-I

Distributed Databases- An Overview: Introduction to Distributed Databases, Design issues of Distributed DBMS, Comparison of Distributed and Centralized Systems, DDBMS, Architecture of Distributed DBMS, Global Relations, Fragment and Physical Image, Types of Schemas, Methods of Fragmentation of a Relation, Levels of Transparency in a Distributed System, Integrity Constraints.

UNIT-II

Query Processing: Objective and problems in Distributed Query Processing, Layers of Query processing, Characteristics of Query Processor, Query Decomposition: Representation of Database Operation in form of a Query, Operation in form of a Query, Operations on a Query, Unary and Binary Tree in a Query, Converting a Global Query into Fragment Query, Join and Union Operations Involving a Query, Aggregate Functions, Parametric Queries, data localization.

UNIT-III

Optimization of Access Strategies: Introduction to Query Optimization, Estimation of Profiles of Algebraic Operations, Optimization Graphs, Reduction of Relation Using Semi-Join and Join Operation, Join ordering in distributed queries, Distributed query optimization Approach.

UNIT-IV

Distributed Transaction Management: Properties and Goals of Transaction Management, Distributed Transactions, Types of Transactions, Recovery Mechanism in case of Transaction Failures, Log Based Recovery, Check Pointing, Communication and Site Failures In Case Of a Transaction and Methods to handle them, Serializability and Timestamp in Distributed Databases, Data Replication.

UNIT-V

Concurrency Control & Reliability: Introduction to Distributed Deadlocks, Local and Global Wait for Graphs, Deadlock Detection using Centralized and Hierarchical Controllers,

Prevention of Deadlocks, 2 and 3 Phase Locking and Commitment Protocols, Reliability in Commitment and Locking Protocols, Reliability and Concurrency Control, Reliability and Removal of Inconsistency.

COURSE OUTCOME:

At the end of this course, the students will be able to do the following:

1. Differentiate the centralized and distributed database, its architecture. and other differences
2. Get knowledge of Query optimization, query trees and graphs.
3. How relational schema is fragmented for different locations and various methods to retrieve data from distributed location over a network.
4. Understand the various techniques of deadlocks recovery in a distributed database.
5. Understand the various techniques to handle transactions in a distributed database.

TEXT BOOKS:

1. **Ceri Stefano and PelagattiGuiseppe**, Distributed Databases Principles andSystems, McGraw-Hill International Editions.
2. **M. Tamer Ozsu,** Principles of distributed database systems, Third Edition, 2011, Springer.

REFERENCE BOOKS:

1. **T. Connolly, Begg&Strachan**,Distributed Database Systems, Addition Wesley.
2. **Trindbery Tim,** Distributed Database System, John Wiley.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

SEMESTER-VI

Course Title: Advance Java Programming **Max Marks: 100**
Course Code: PEC-ITE-604 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE:: To emphasize on the basic concepts of advanced Java and web based development.

UNIT-I
Design of User Interfaces: Swing, Japplet, Icons and Labels, Text Fields, Buttons, Jbutton Class, Check Box, Radio Buttons, The Container, Panel, Windows, and Frame Classes, Combo Box, Tabbed Panes, Scroll Panes, Trees, Tables, Custom Rendering of Jlist Cells, Introduction to GUI Programming with JavaFX: JavaFX Controls and Menus, Comparison among the AWT, Swing, and JavaFX.

UNIT-II
JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, working with statements, Creating and Executing SQL statements, working with Result Set Object & Result Set Meta Data.

UNIT-III
Advance Networking: Client Server Computing, Socket programming, Content and Protocol Handler, TCO & UDP protocol, developing distributed application, RMI, Remote object, Object Serialization.

UNIT-IV
Servlets: Introduction to Servlets, Life cycle of Servlets, Creating, Compiling and runningservlet, Reading the servlet Parameters, Reading Initialization parameter, Packages-javax.servlet Package, Handling HTTP Request and Response (GET / POST Request), Cookies and Session Tracking.

UNIT-V
Java Beans: Java Bean, Installing, Starting Bean Development Kit, Use of JAR files and the use of Java Beans API.
JSP: JSP Architecture, JSP Access Mode, JSP Syntax Basic (Directions, Declarations, Expression, Scriplets and Comments), JSP Implicit Object, Object Scope, Synchronization Issue, Session Management, Directive and Custom tag libraries.

COURSE OUTCOMES:
At the end of this course, the students will be able to do the following:

1. Understanding and designing of GUI
2. Understanding the Java Database connectivity
3. Understanding and designing the distributed and web-based applications
4. Understanding the Server-side and client-side programming

5. Understand JSP and its usages

TEXT BOOKS:

1. **Gary Cornell and Horstmann Cay S.,** Core Java, Vol I and Vol II, Sun Microsystems Press.
2. **Herbert Schildt,** Java: The Complete Reference, McGraw-Hill.Ninth Edition.

REFERENCE BOOKS:

1. **Philip Hanna**, JSP: The Complete Reference, McGraw-Hill.
2. **Deital and Deital**, Java How to Program, Prentice Hall (2007).

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.

PROFESSIONAL ELECTIVE COURSES-III

SEMESTER-VI

Course Title: Software Testing **Max Marks: 100**
Course Code: PEC-ITE-605 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES: The student should be able to

1. To introduce the basics and necessity of Software testing.
2. To introduce various testing techniques along with software production.
3. To introduce the concepts of Software bugs and its impact.

UNIT-I

INTRODUCTION: Testing as an Engineering Activity – Testing as a Process – Testing axioms – Basic definitions – Software Testing Principles – The Tester‟s Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support of Developing a Defect Repository – Defect Prevention strategies.

UNIT-II

TEST CASE DESIGN: Test case Design Strategies – Using Black Bod Approach to Test Case Design – Random Testing – Requirements based testing – Boundary Value Analysis – Equivalence Class Partitioning – State-based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Evaluating Test Adequacy Criteria.

UNIT-III

LEVELS OF TESTING: The need for Levers of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing – Compatibility testing – Testing the documentation – Website testing.

UNIT-IV

TEST MANAGEMENT: People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT-V

TEST AUTOMATION: Software test automation – skill needed 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.

COURSE OUTCOMES:

At the end of the course the students will be able to

1. Design test cases suitable for a software development for different domains.
2. Identify suitable tests to be carried out.
3. Prepare test planning based on the document.
4. Document test plans and test cases designed.
5. Use of automatic testing tools.
6. Develop and validate a test plan.

TEXTBOOKS:

1. **Glenford J .Myers, Tom Badgett, Corey Sandler**, "The Art of Software Testing",3rd edition, John Wiley & Sons publication, 2012.
2. **Srinivasan Desikan, Gopalaswamy Ramesh,** "Software testing- Principles and Practices", Pearson education, 2009.

REFERENCE BOOKS:

1. **Ron Patton**, "Software testing", second edition, Pearson education, 2009.
2. **Boris Beizer**, "Software testing techniques", Dream Tech Press, 2009.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

SEMESTER-VI

Course Title: Data Mining & Warehousing **Max Marks: 100**
Course Code: PEC-ITE-606 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVES:

1. To introduce the basic concepts of Data Warehouse and Data Mining techniques.
2. Examine the types of the data to be mined and apply pre-processing methods on raw data.
3. Learning different classification algorithms for data mining.

UNIT-I

Introduction: Sources, Users, Applications and Goals of a Data Warehouse, Components of a Data Warehouse, Operational Data Store, Dimensional Modeling: Fact and Dimension Tables, Star, Snowflake and Hybrid Schemas, Confirmed Facts and Dimensions. Slowly Changing Dimensions, Casual Dimensions, Helper Tables and Surrogate Keys.

UNIT-II

Data Warehouse: Characteristics of a Data Warehouse, Software Architecture and Design, Data Granularity Model, Data Warehouse Bus Architecture. Meta Data: Need and Types of Metadata, Metadata Process Concept. Data Marts and its Characteristics, Comparison between OLTP and OLAP.

UNIT-III

Decision Support System (DSS): Using Data Warehouse for DSS, Techniques and Solutions for constructing a Central Data Warehouse, Data Extraction, Cleanup, and Transformation Tools, Managing a Data Warehouse Environment.

UNIT-IV

Data Mining: Introduction to Data Mining and Uses, Data Mining Functionalities, Classification of Data Mining systems, Data Mining task Primitives.

Association Rules: Association rules mining, Mining Association rules from single level, multilevel transaction databases, multidimensional relational databases and data warehouses, Co-relational analysis, Constraint based association mining.

UNIT-V

Classification and Clustering: Classification and prediction, decision tree induction, Bayesian classification, k-nearest neighbor classification, rule based classification, classification of back propagation, support vector machines, associative classification, cluster analysis, types of data in clustering, categorization of clustering methods, genetic algorithms and data visualization concepts.

COURSE OUTCOMES:

1. Students who complete this course should be able to
2. Describe the fundamental concepts, benefits and problem areas associated with data warehousing.
3. Describe the various architectures and main components of a data warehouse.
4. Design a data warehouse, and be able to address issues that arise when implementation data warehouse.
5. Ability to apply acquired knowledge for understanding data and select suitable methods for data analysis.
6. Applicability of various classification algorithms in data mining for real-world problems.

TEXT BOOKS:

1. **Gray& Smith**, Data Warehousing handbook, CRS, PHI
2. **Berson**, Data Warehousing, Data Mining & OLAP.

REFERNCE BOOKS:

1. **Mallach,** Data Warehousing System, McGraw Hill.
2. **Prabhu,** Data Warehousing–Concepts, Techniques, Products and Applications, 2^{nd}Edn, PHI.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

SEMESTER-VI

Course Title: Distributed Computing **Max Marks: 100**
Course Code: PEC-ITE-607 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: The objective of this course is to introduce students to the fundamentals and techniques of distributed computing. Students are expected to develop distributed applications using latest technologies.

UNIT-I
Introduction: Introduction to Distributed System; Goals, Hardware Concepts, Software Concepts and Client-Server Model. Examples of Distributed Systems.

UNIT-II
Process and Interprocess Communication: Communication: Layered Protocols, Remote Procedures Call, Remote Object Invocation, Message-Oriented Communication. Processes: Threads, Code Migration, Software Agent.

UNIT-III
Naming & Synchronization: Naming Entities, Locating Mobile Entities, Removing Un-Referenced Entities. Synchronization: Election Algorithms, Mutual Exclusion, Distributed Transactions.

UNIT-IV
Consistency and Replication: Consistency and Replication: Introduction, Data Centric Consistency Models, Client Centric Consistency Models, Distribution Protocols. Fault Tolerance; Introduction, Process Resilience, Reliable Group Communication. Distributed Commit.

UNIT-V
Security Policies: Security: Introduction, Secure Channels, Access Control, And Security Management.

COURSE OUTCOMES:
At the end of this course, the student will able to do following:

1. Study software components of distributed computing systems.
2. Know about the communication and interconnection architecture of multiple computer systems.
3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
4. Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.

5. To be familiar with the design, implementation and security issues of distributed system.

TEXT BOOKS:

1. **Tannenbaum A. S.,** "Distributed Systems: Principles and Paradigms", PHI.
2. **M. Singhal& N. Shivaratri**, Advanced Concepts in Operating Systems, TMH.

REFERNCE BOOKS:

1. **G. Coulouris, J. Dollimore, and T. Kindberg**, Distributed Systems: Conceptsand Design, Pearson Education.
2. **Ajay D kshemkalyani and MukeshSinghal,** Distributed Computing: Principles, Algorithms, and Systems, South Asian Edition.

Note for paper setter: The question paper shall comprise of 10 questions. Twoquestions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER VII

Course Title: Machine Learning **Max Marks: 100**
Course Code: PCC-ITE-701 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES:

1. To be able to formulate machine learning problems corresponding to different applications.
2. To understand a range of machine learning algorithms along with their strengths and weaknesses.
3. To understand the basic theory underlying machine learning.

UNIT I

INTRODUCTION: An illustrative learning task, and a few approaches to it. What is known from algorithms/ Theory, Experiment.Biology.Psychology. CONCEPT LEARNING: Version spaces. Inductive Bias.Active queries. Mistake bound/ PAC model. Basic results. Overview of Issues regarding data sources, success criteria.

UNIT II

Decision Tree Learning: – Minimum Description Length Principle. Occam's razor. Learning with active queries Neural Network Learning: Perceptions and gradient descent back propagation.

UNIT III

SAMPLE COMPLEXITY AND OVER FITTING: Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Bayesian Approaches: The basics Expectation Maximization. Hidden Markov Models.

UNIT IV

INSTANCE BASED LEARNING: Lazy vs. eager generalisation. K nearest neighbour, case based reasoning. unsupervised learning:Clustering K-means, EM. Mixture of Gaussians, Factor analysis, PCA (Principal components analysis), ICA (Independent components analysis);

UNIT V

GENETIC ALGORITHMS: Different search methods for induction. Explanation, using prior knowledge to reduce sample complexity.
SUPERVISED LEARNING:Supervised learning setup, LMS, Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Support vector machines, Model selection and feature selection

COURSE OUTCOMES:

1. Student should be we to understand the basic concepts such decision tree and neural networks.
2. Ability to formulate machine learning techniques to respective problems.
3. Apply machine learning algorithms to solve problems of moderate complexity.
4. Apply supervised and unsupervised learning to analyse data.
5. Apply genetic algorithms to solve problems.

TEXT BOOKS

1. **Tom Michel**, Machine Learning. McGraw Hill. 1997
2. **Trevor Hus tie, Robert Tibshirani& Jerome Friedman**. The Elements of Statically Learning, Springer Veriag 2001

REFERENCE BOOKS

1. **William W Hsieh,** Machine Learning Methods en the Environmental Science, Neural Network, Cambridge University Press.
2. **Rbchard o Duda, Peter E. Hart and David G.** Stork, & pattern Classification, John Wiley & Sons Inc,2001.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER VII

Course Title: Entrepreneurship Development & Management	**Max Marks: 100**
Course Code: HSMC-ITE-701	**University Examination: 60**
Duration of Exam: 3 hours	**Internal Assessment: 40**

COURSE OBJECTIVE: To give an overview of who the entrepreneurs are and what competences are needed to become an entrepreneur and to create an awareness of the need for systematic management of projects.

UNIT-I

Entrepreneurship Development: Meaning, Objectives, Type of Entrepreneurs, Importance of Entrepreneurship Training, Factors affecting Entrepreneurship, Linkage between Entrepreneurship and Economic Development, Problem of Increasing Unemployment, Balanced Regional Growth, Harnessing Locally Available Resources, New Industrial Policy and Innovation in Enterprises.

UNIT-II

Entrepreneurship Support System: Small Industries Development Bank of India, Small Industries Service Institute, State Small Industries and Export Corporation, District Industrial Centers and other Supporting Agencies.

UNIT-III

Project Report Preparation: Identifying Business Opportunities, Project Report and its Importance, Various Contents of Project Report: Managerial and Entrepreneurial Capabilities, Socio-Economic Benefits, Demand Analysis, Technical Feasibility and Financial Viability.

UNIT-IV

Introduction to Marketing Management: Brief Introduction to various types of Product Strategies, Pricing Strategies, Channel Strategies and Promotional Strategies. Introduction to Production Management: Types of Production Systems, Production Planning and Control, Functions of Production Manager and Materials Management.

UNIT-V

Introduction to Human Resource Management: Manpower Planning, Recruitment, Selection, Placement and Induction, Training and Development, Compensation.
Introduction to Financial Management: Source of Finance and Working Capital Management.

COURSE OUTCOMES:

At the end of this course, the students will able to do following:

1. Have the ability to discern distinct entrepreneurial traits
2. Understand the systematic process to select and screen a business idea

3. Understanding the market strategy and constraints for newbusiness ideas
4. Design strategies for successful implementation of ideas
5. Write a successful business plan

TEXT BOOKS:

1. **Holt David H**, Entrepreneurship: New Venture Creation, PHI (4000).
2. **Saini Jasmer Singh**, Entrepreneurship Development Programmes and Practices, Deep and Deep Publications, New Delhi (1997).

REFERENCE BOOKS:

1. **Dollinger**, Entrepreneurship Strategies and Resources, Pearson Education (4003).
2. **Jose Paul & Kumar Ajith N**, Entrepreneurship Development and Management, Himalaya Publishers, New Delhi (4000).

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Laboratory Courses
SEMESTER-VII

Course Title: Application Development Using Android Lab. **Max Marks: 50**
Course Code: PCC-ITE-711 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

OBJECTIVE:

Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application life cycle

LIST OF EXPERIMENTS:

1. Introduction to Android Operating System
2. Program for First Android Application.
3. Program for building a simple user interface using an XML for UI layout.
4. Program for developing an Android Application using a linear layout.
5. Program for developing an Android Application using a Relative layout.
6. Program for developing an Android Application using a Table layout.
7. Program for developing an Android Application using an absolute layout.
8. Program for developing an Android Application using a Frame layout.
9. Developing an android application using Relative layout to display Date and time.

COURSE OUTCOMES:

1. Gain knowledge of installing Android Studio and Cross Platform Integrated Development Environment.
2. To learn designing of User Interface and Layouts for Android App.
3. To learn how to use intents to broadcast data within and between Applications.
4. To use Content providers and Handle Databases using SQLite.
5. To introduce Android APIs for Camera and Location Based Service.
6. To discuss various security issues with Android Platform.

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents

SEMESTER-VII

Course Title: Machine learning Lab. **Max Marks: 50**
Course Code: PCC-ITE-712 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

COURSE OBJECTIVE: To introduce students to the basic concepts and techniques of Machine Learning. To develop skills of using recent machine learning software for solving practical problems. To gain experience of doing independent study and research.

LIST OF EXPERIMENTS:

1. Study and Implement the Naive Bayes learner using WEKA
2. Study and Implement the Decision Tree learners using WEKA
3. Estimate the accuracy of decision classifier using 5-fold cross-validation. (You need to choose the appropriate options for missing values).
4. Estimate the precision, recall, accuracy, and F-measure of the decision tree classifier on the text classification task for each of the 10 categories using 10-fold cross-validation.
5. Develop a machine learning method to classifying your incoming mail.
6. Develop a machine learning method to Predict stock prices based on past price variation.
7. Develop a machine learning method to predict how people would rate movies, books, etc.

COURSE OUTCOMES:

1. To develop a deeper understanding of several major topics in machine learning
2. To develop the design and programming skills that will help you to build intelligent, adaptive artefacts.
3. To develop the basic skills necessary to pursue research in machine learning.

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents

OPEN ELECTIVE COURSES-III

SEMESTER-VII

Course Title: Environmental Engineering **Max Marks: 100**
Course Code: OEC-ITE-701/PCC-CE-502 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: This course aims to make students understand the various aspects of environment and to understand the impact of humans on environment.

UNIT-I

Water quality and treatment**:** Water demand Residential, Commercial, Institutional, industrial and agricultural, Sources of Water, water quality parameters, Water quality standards, Water Treatment*:* aeration, sedimentation, coagulation flocculation, filtration, disinfection,advancedtreatmentslikeadsorption,ionexchange,membraneprocesses,Water Supply systems, Components of water supply system, Distribution system, Plumbing and various valves used in water supply systems.

UNIT-II

Sewage Characteristics and treatment: Quantity of Sewage, Sewage flow variations, Characteristics and composition of sewage, Pollution due to improper disposal of sewage, Sewerage system and its components, Design of Sewerage system primary, secondary and tertiary treatment of sewage- description of various unit operation and processes, aerobic and anaerobic treatment systems, suspended and attached growth systems, quality requirements (Regulatory standards) for various usages.

UNIT-III

Air Pollution and control – Definition of Air pollution, major pollutants- sources and impacts, Air Quality standards, Air pollution meteorology, Plum rise and plum behaviour, Introduction to air quality models and their applications, Monitoring of air pollutants, Control measures.

UNIT-IV

Solid waste management- Solid waste, Municipal, industrial and hazardous solid waste, Characteristics and Composition of solid waste, Impact of improper disposal of solid waste, solid waste management, Elements of solid waste management system-generation, collection, transfer and transport, segregation, recycling, reuse, disposal, composting, vermin composting and landfills.

UNIT- V

Noise pollution and control: Noise pollution, sources (Indoor and outdoor) and impacts, Permissible limits, measurement of noise, Addition of Noise, Noise propagation, control of noise pollution- at source, during transmission and at receptor end.

COURSE OUTCOMES: After successfully studying this course, students will:

1. Understand the impact of humans on environment and environment on humans

2. Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
3. Be able to plan strategies to control, reduce and monitor pollution.
4. Be able to select the most appropriate technique for the treatment of water, waste water solid waste and contaminated air.
5. Be conversant with basic environmental legislation.

TEXT BOOKS:

1. **Peavy, H.s, Rowe, D.R, Tchobanoglous, G.** *Environmental Engineering*, Mc-Graw - Hill International Editions, NewYork
2. **Metcalf and Eddy** Inc.: Waste water Engineering

REFERENCE BOOKS:

1. **Modi, P. N;**Water supply Engineering. Volume-I
2. Introduction to Environmental Engineering and Science by Gilbert Masters, PrenticeHall, NewJersey.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

SEMESTER-VII

Course Title: Communication System **Max Marks: 100**
Course Code: OEC-ITE-702/PEC-CSE-713 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The objective of this course is to provide students with a working knowledge of the basic principles underlying the Communication Systems.

UNIT-I

Signal Analysis: Definitions of a signal and a system, classification of signals, basic Operations on various elementary signals, Fourier representation for signals-Fourier series expansion of various elementary signals, Fourier transform of various signals and waveforms, Properties and applications of Fourier transform

UNIT-II

Amplitude Modulation: Concept of modulation, Introduction to Amplitude modulation, Frequency spectrum of AM Waves, Representations of AM waves, Power relation in AM waves, Types of AM, Generation of various formats of AM , AM Transmitters-AM transmitter block diagram, AM RECEIVERS-AM Detection methods ,Tuned radio frequency (TRF) receiver. Super-heterodyne receiver, IF rejection, IFRR

UNIT-III

Frequency Modulation: Concept of angle modulation, Frequency Modulation, Mathematical representation of FM, Power and Bandwidth in FM, Carson's rule. Basic requirements and generation of Frequency Modulation (FM), & methods, direct methods, variable capacitor modulator, varactor diode modulator, reactance modulators, disadvantages of direct method, Indirect modulators-RC phase shift modulator, Armstrong FM systems.FM RECEIVERS-FM detection using balanced slope detector, foster Seelay or phase discriminator, ZCD Detector & PLL, Block diagram of FM receiver, FM receiver characteristics.

UNIT-IV

Digital Modulation Techniques: Introduction, Elements of digital communication systems, advantages of digital communication systems over analog modulation ,Generation & Demands of ASK, FSK, PSK, DPSK, QPSK, M-Ary ASK ,similarity of BFSK and BPSK, Generation and detection of ASK, FSK and PSK Signals, Concept of Signal Constellation Diagrams

UNIT-V

Pulse Modulation: Introduction to Pulse Modulation, Sampling & Quantization, S/H Circuit, Proof of sampling theorem, Quantization error, PCM-Elements of PCM, Companding in PCM systems, Bandwidth of PCM, Differential PCM systems (DPCM). Adaptive Delta

Modulation, Concept of Slope overload & Granular Noise, Introduction to Line coding techniques

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to,

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance
4. Analyze different digital modulation schemes and can compute the bit error performance
5. Analyzing and understanding several Pulse modulation techniques.

TEXT BOOKS;

1. **Taub&Schilling**, Principles of Communication, Tata McGraw Hill Publication, 1990.
2. **Simon Haykins**, Principles of Communication, PHI, 1990.

REFERENCE BOOKSL:

1. **B. P. Lathi,** Analog and Digital Communication Systems, PHI, 1992.
2. **Proakis,** Digital Communication, McGraw Hill, 1992.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

SEMESTER-VII

Course Title: Optical Communication **Max Marks: 100**
Course Code: OEC-ITE-703/PEC-ECE-704 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The course has been designed for explaining the basic concepts and principles of Optical Communication to the students. Applied and Industrial Aspects of optical communication have been taken care of in an appropriate manner.

UNIT-I

Overview of Optical Fiber Communication**:** Brief Overview of Optical Communication, Basic concepts, light wave components, principle of light transmission, channel capacity etc. Nature of light, polarization, basic laws and definition, mode theory analysis for optical communication, optical fiber modes and configuration, wave propagation in optical fiber, operating wavelength, single mode and multimode fibers, V–numbers, mode field diameter, numerical aperture, refractive index profiles.

UNIT-II

Signal Degradation in Optical Fibers**:** Attenuation, absorption, scattering losses, bending losses in optical fibers. Dispersion in optical waveguides, group delay, material dispersion, waveguide dispersion, intermodal dispersion and chromatic dispersion in single mode fibers, Non linearities in Fibers

UNIT-III

Optical Sources:Basic concepts from semiconductor electronics, energy bands, Concept of Direct and indirect Band Devices. Light emitting diodes: Structure, principle, material, modulation response, transient response. Laser diodes: Principle of action, structure, efficiency and characteristics of laser diodes, modulation He–Ne lasers, DFB lasers.

UNIT-V

Optical Detectors:Basic Information in light detectors, Role of an optical detector, Detector Characteristics: Responsivity, Noise Equivalent Power, Detectivity, Quantum efficiency, Detector response time, Linearity, Spectral response, Noise Considerations: Johnson noise, Shot noise, 1/f noise, Photon noise. The PH junction photo diode – PIN photodetectors – Avalanche photo diode construction characteristics and properties, APD Specifications,ApplicationsofAPD–comparisonofperformancenoisesources– simplemodelofphotoreceiver– its equivalent for circulation of noise SNR, Optical Receivers..

UNIT-V

TransmissionSystemsandAdvancedMultiplexingStrategies:PowerLaunchingandcoupling.Poin ttopoint link system consideration, Optical TDM, subscriber multiplexing (SCM), WDM and Hybrid multiplexing methods.

COURSE OUTCOMES: After completion of the course student will be able to:

1. Recognize and classify the structures of Optical fiber networks and their types.
2. Discuss the channel impediments like losses, interference and dispersion.
3. Describe the Optical sources and detectors and thus able to illustrate their working principle.
4. Familiar with Design considerations of fiber optic systems.
5. Perform characteristics of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware, analyse the results to provide valid conclusions.

TEXT BOOKS:

1. **John M Senior** -Optical Comm Techniques–PHI
2. **Keiser G**- Optical Fiber Communication, 3rd Edition, McGraw HillInternational

REFERENCE BOOK:

1. **Ghatak & Thyangarajan K**- Introduction to fiber optics, Cambridge university press,1998

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

PROFESSIONAL ELECTIVE COURSES-IV

SEMESTER-VII

Course Title: Software Project Management **Max Marks: 100**
Course Code: PEC-ITE-701 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The objective of the subject is to impart an understand of software project management.

UNIT-I

INTRODUCTION AND SOFTWARE PROJECT PLANNING**:** Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

UNIT-II

PROJECT ORGANIZATION AND SCHEDULING**:** Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

UNIT-III

PROJECT MONITORING AND CONTROL: Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Desk- checks, Walkthroughs, Code Reviews, Pair Programming.

UNIT-IV

SOFTWARE QUALITY ASSURANCE AND TESTING**:** Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Clean-room process.

UNIT-V

PROJECT MANAGEMENT AND PROJECT MANAGEMENT TOOLS: Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for

Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

COURSE OUTCOMES:

1. To have an understanding of how Software Project Management is done.
2. How to Build the project schedules.
3. Understand how budgeting is done.
4. How to assure quality in a software through testing.
5. To have understanding of Planning and Scheduling Tools.

TEXT BOOKS\ REFERENCE BOOKS:

1. **M. Cotterell,** Software Project Management, Tata McGraw-Hill Publication.
2. **Royce,** Software Project Management, Pearson Education

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

SEMESTER-VII

Course Title: Computer Based Numerical Techniques **Max Marks: 100**
Course Code: PEC-ITE-702 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: The objective of this course is to introduce students to the various numerical techniques which find their applications in almost every sphere of Science and Engineering.

UNIT-I
Introduction: Errors and Significant Digits. Algebraic Equations: Bisection Method, Secant Method, Newton Raphson Method, Graeffe's Root Squaring Method, Regula-Falsi Method.

UNIT-II
Solution for Systems of Equations: Gauss Elimination, Gauss Jordan and Partition Method for Linear System of Equations.

UNIT-III
Interpolation: Introduction. Forward, Backward, Central and Divided Differences, Newton`s Formula for Equal and Unequal Intervals. Lagrange`s Interpolation Formula.Sterling`s and Bessel`s Formula.

UNIT-IV
Numerical Integration and Differentiation: Introduction. Trapezoidal Rule,Simpson`s 1/3 Rule, Simpson`s 3/8 Rule. Gaussian Integration.

UNIT-V
Difference Equations and their Solutions: Numerical Methods, Taylor Series Methods, Euler`s Method, Range Kutta Method, Predictor Corrector Method, Adams Bashforth Method.

COURSE OUTCOMES:
At the end of this course, the students will able to do the following:

1. Understand Various Numerical Techniques and their applications.
2. Implement various numerical solution algorithms using c programming.
3. Be familiar with calculations and interpretation of errors in numerical method.
4. To learn various integration and differentiation formulas in the field of computer science and engineering.
5. Understanding the implications of approximations.

TEXT BOOKS:

1. **Balagurusamy**, Numerical Methods, TMH.
2. **V. Rajaraman,** Introduction to Numerical Methods, TMH.

REFERENCE BOOKS:

1. **Schilling**, Applied Numerical Methods for Engineers using MATLAB and C, Cengage India.
2. **Cheney**, Numerical Mathematics & Computing, Cengage India.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER-VII

Course Title: Bio-Metrics and Network Security **Max Marks: 100**
Course Code: PEC-ITE-703 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: To understand the principles of biometric systems.

UNIT I

INTRODUCTION- Biometric fundamentals-Biometric technologies – Biometrics Vs traditional techniques – Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes: verification, identification and biometric matching – Performance measures in biometric systems: FAR, FRR, FTE rate, EER and ATV rate. Introduction of biometric traits and its aim.

UNIT II

PHYSIOLOGICAL BIOMETRICS - Leading technologies: Finger-scan – Facial-scan – Iris-scan – Voice-scan – Hand Scan, Retina Scan - components, working principles, competing technologies, strengths and weaknesses. Selection of suitable biometric. Biometric attributes, zephyr charts, types of multi biometrics. Verifications on multimodal system, normalization strategy, fusion methods, multimodal identification.

UNIT III

AUTOMATED BIOMETRIC SYSTEM AND BEHAVIORAL BIOMETRICS - Automated fingerprint identification systems - Leading technologies: Signature-scan – Keystroke scan – components, working principles, strengths and weaknesses.

UNIT IV

BIOMETRIC SYSTEM SECURITY: Biometric system vulnerabilities, circumvention, covert acquisition, quality control, template generation, interoperability data storage. Recognition systems: face, signature, fingerprint, ear, iris, Palm etc.

UNIT V

PRIVACY AND STANDARDS IN BIOMETRICS- Assessing the Privacy Risks of Biometrics – Designing Privacy-Sympathetic Biometric Systems – Need for standards – different biometric standards.

COURSE OBJECTIVES:

1. To have an understanding of biometric traits
2. To have an understanding of various biometric traits.
3. To have an understanding of automated biometric systems.
4. To have an understanding about how to secure a biometric systems.

5. Understand privacy concerns and how to address them.

TEXTBOOKS:

1. **SamirNanavati, Michael Thieme, Raj Nanavati,** "Biometrics – Identity Verification in a
2. **Wiley-dreamtech,** Networked World, India Pvt Ltd, New Delhi, 2003

REFERENCE BOOKS:

1. **John R Vacca,** "Biometric Technologies and Verification Systems", Elsevier Inc, 2007
2. **Anil K Jain, Patrick Flynn, Arun A Ross**, "Handbook of Biometrics", Springer, 2008

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

PROFESSIONAL ELECTIVE COURSES-V

SEMESTER-VII

Course Title: Artificial Intelligence **Max Marks: 100**
Course Code: PEC-ITE-704 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The student should be made to Learn the various soft computing frame works Be familiar with design of various neural networks Be exposed to fuzzy logic Learn genetic programming

UNIT-I

ARTIFICIAL INTELLIGENCE SYSTEMS: Neural networks, fuzzy logic, genetic algorithms. Artificial neural networks: Biological neural networks, model of an artificial neuron, Activation functions, architectures, characteristics learning methods, brief history of ANN research- Early ANN architectures (basics only)-McCulloch & Pitts model, Perceptron, adaline, madaline.

UNIT-II

BACK PROPAGATION NETWORKS: architecture, multilayer perceptron, back propagation learning-input layer, hidden layer, output layer computations, calculation of error, training of ANN, BP algorithm, momentum and learning rate, Selection of various parameters in BP networks. Variations in standard BP algorithms- Adaptive learning rate BP, resilient BP, Levenberg-Marquardt, and conjugate gradient BP algorithms (basic principle only)-Applications of ANN.

UNIT-III

FUZZY LOGIC: Crisp & fuzzy sets fuzzy relations fuzzy conditional statements fuzzy rules fuzzy algorithm. Fuzzy logic controller fuzzification interface knowledge base decision making logic defuzzification interface design of fuzzy logic controller case studies.

UNIT-IV

GENETIC ALGORITHMS: Basic concepts, encoding, fitness function, Reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Elitism. Inheritance operators, Crossover-different types, Mutation, Bit-wise operators, Generational cycle, Convergence of GA, Applications of GA case studies. Introduction to genetic programming-basic concepts.

UNIT-V

HYBRID SOFT COMPUTING TECHNIQUES & APPLICATIONS: Neuro-fuzzy hybrid systems – genetic neuro hybrid systems – genetic fuzzy hybrid and fuzzy genetic hybrid systems simplified fuzzy ARTMAP, Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

COURSE OUTCOMES:

1. Understand basics of artificial intelligence.
2. Apply various soft computing frameworks.
3. Design of various neural networks
4. Use fuzzy logic to solve non crisp problems.
5. Understand genetic programming.
6. Apply and understand how to use hybrid technologies to solve problems.

TEXT BOOKS

1. **J.S.R.Jang, C.T. Sun and E.Mizutani**, "Neuro-Fuzzy and Soft Computing", PHI / Pearson Education 2004.
2. **S.N.Sivanandam and S.N.Deepa**, "Principles of Soft Computing", Wiley India Pvt Ltd, 2011.

REFERENCE BOOKS

1. **Rajasekaran and G.A.VijayalakshmiPai,** "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis &Applications", Prentice-Hall of India Pvt. Ltd., 2006.
2. **George J. Klir, Ute St. Clair, Bo Yuan,** "Fuzzy Set Theory: Foundations and Applications" Prentice Hall, 1997.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

SEMESTER-VII

Course Title: Linux Administration **Max Marks: 100**
Course Code: PEC-ITE-705 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The objective of the subject is to introduce students to Linux administrations

UNIT-I
INTRODUCTION: Duties of the Administrator, Administration tools, Overview of permissions. Processes: Process status, Killing processes, process priority. Starting up and Shut down: Peripherals, Kernel loading, Console, The scheduler, init and the inittab file, Run-levels, Run level scripts. Managing User Accounts: Principles, password file, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users..

UNIT-II
MANAGING UNIX FILE SYSTEMS: Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Makingfiles ystems, Superblock, I-nodes, Filesystem checker, Mounting filesystems, Logical Volumes, Network File systems, Boot disks.
CONFIGURING THE TCP/IP Networking : Kernel Configuration; Mounting the /procFilesystem, Installing the Binaries, Setting the Hostname, Assigning IP Addresses, Creating Subnets, Writing hosts and networks Files, Interface Configuration for IP, ifconfig, netstat command, Checking the ARP Tables; Name service and resolver configuration.

UNIT-III
TCP/IP FIREWALL : Methods of Attack, What Is a Firewall? What Is IP Filtering? Setting Up Linux for Firewalling Testing a Firewall Configuration; A Sample Firewall Configuration: IP Accounting, Configuring the Kernel for IP Accounting, Configuring IP Accounting, Using IP Accounting Results

UNIT-IV
IP MASQUERADE AND NETWORK ADDRESS TRANSLATION: Side Effects and Fringe Benefits, Configuring the Kernel for IP Masquerade, Configuring IP Masquerade. The Network Information System: Getting Acquainted with NIS, NIS Versus NIS+ , The Client Side of NIS, Running an NIS Server, NIS Server Security

UNIT-V
NETWORK FILE SYSTEM: Preparing NFS, Mounting an NFS Volume, The NFS Daemons, The exports File.System Backup & Recovery: Log files for system and applications; Backup

COURSE OUTCOMES: At the end of course students are expected to

1. Install, configure and manage enterprise systems/neworks, including hardware/software.

2. Improve Linux thinking skills
3. Have an understanding of Linux basics.
4. Have an understanding of administrator duties and role.
5. Maintain and troubleshoot enterprise networks.
6. Able to deploy Linux for commercial environmental need in industry

TEXTBOOKS:

1. **Palmer:** Hands-On Networking Fundamentals| | Edition: 2nd | Copyright Year: 2013 ISBN: 9781111306748
2. **Boyle**, Applied Networking Labs: A Hands-On Guide to Networking and Server Management | | Edition: 1st | Copyright Year: 2011 | ISBN: 9780132310345

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

SEMESTER-VII

Course Title: Simulation and Modeling **Max Marks: 100**
Course Code: PEC-ITE-706 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVES: The objectives of this course are

1. To introduce students to the simulation and modeling techniques
2. Provide students with opportunities to develop basic simulation and modeling skills with respect to carrying out research projects using any simulation method on the computer.

UNIT I

DEFINITION OF SYSTEMS: Types of system, continuous and discrete modeling process and definition of model. Common type of mathematical models used for engineering and non-engineering system (such as differential and partial differential equation models).

UNIT II

SIMULATION PROCESS: Discrete and continuous simulation procedures, random number generation and its testing discrete and continuous random variables, density and distributive functions, study of few distributions such as Poisson, Normal.

UNIT III

SIMULATION OF QUEUING SYSTEMS: Specification and measures of queuing system, Structure of basic queuing system, simulation, Example of time sharing computer system, Elementary idea about networks of Queuing with particular emphasis to computer system, environment.

UNIT IV

VERIFICATION AND VALIDATION: Design of simulation experiments and validation of simulation experiments comparing model data UNITs and real system data.

UNIT V

SIMULATION LANGUAGES**:** A brief introduction to important discrete and continuous languages such as GPSS (Study & use of the language), Use of data base & AI techniques in the area of modeling and simulation.

COURSE OUTCOMES:

1. Describe the role of important elements of discrete event simulation and modeling paradigm.

2. Conceptualize real world situations related to systems development decisions, originating from source requirements and goals.
3. Develop skills to apply simulation software to construct and execute goal-driven system models.
4. Interpret the model and apply the results to resolve critical issues in a real world environment.

TEXT BOOKS:

1. **NarsingDeo:** System Simulation with Digital Computers.
2. **Gorden G.:** System Simulation, Prentice Hall.

REFERENCE BOOKS:

1. **Kishore Shridhar Bhai Trevide**: Probability & Statistics with reliability Queuing, Computer Science Application.
2. **Payer, T.A**.: Introduction to System Simulation McGraw Hill.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

PROFESSIONAL ELECTIVE COURSES-VI

SEMESTER-VIII

Course Title: Real Time Operating System **Max Marks: 100**
Course Code: PEC-ITE-801 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: The aim of the subject is to provide basic and necessary information about the working of RTOS and Embedded Systems.

UNIT-I
Introduction to RTOS and Embedded System
Brief History of Operating system, Introduction to real time operating system, Introduction to Embedded Systems, Definition of RTOS, Characteristics and Features Real Time Kernels, Scheduler, Objects, Services

UNIT-II:
Tasks & Memory Management
Tasks and memory management: Introduction, Defining Tasks, Task state and scheduling, Task operation, Task structures, Synchronization, communication and concurrency. Memory management concepts in RTOS

UNIT-III:
IPC Mechanism
Defining Semaphore, Semaphore operation, use of semaphore. Defining Message queues, Message queue states, Message queue contents, use Pipes, Signals, and Condition variables.

UNIT-IV
Exceptions & Interrupts
Defining exceptions and interrupts. How they are implemented. Applications of exceptions and interrupts, Types of interrupts, Handling interrupts

UNIT-V
Timer & Timer Services
Real Time clocks and system clocks, Programmable interval timers, Timer interrupt, Service routines. Basic I/O concepts, The I/O Subsystem.

COURSE OUTCOMES:
At the end of this course, the students will able to do the following:

1. Understand the basic concept of RTOS and its usefulness for embedded systems
2. Understand Theoretical background and practical knowledge of real-time operating systems.
3. Understand multitasking techniques in real-time systems.
4. Understand the impact of real time operating systems on application area.
5. Understanding Several Timing services

TEXT BOOKS:

1. **Qing Li**, Real Time concepts in Embedded Systems, CMP Publications.
2. **V. Penumchu,** Simple RTOS, Trafford Publications.

REFERNCE BOOKS:

1. **Mall Rajib**, Real Time Systems: Theory & Practice.
2. **C.M. Krishna,Kang,G.Shin**, Real Time Systems',TataMcgrawhill 1997

Note for paper setter: The question paper shall comprise of 10 questions. Twoquestions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER-VIII

Course Title: Big Data Anaytics **Max Marks: 100**
Course Code: PEC-ITE-802 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: This course provides practical foundation level training and grounding in basic and advanced methods to big data technology and tools, including Map Reduce and Hadoop and its ecosystem.

UNIT-I
Big Data: Introduction, Characteristics, 5Vs, Sources of Big Data, Big Data technology and trends, Big Data Applications, Big Data Tools, Map Reduce Concept, Hadoop Introduction, Traditional Software Vs Hadoop, Distributed File System.

UNIT-II
Hadoop Architecture: Introduction, Hadoop Storage- HDFS, Block Size, Replication, Common Hadoop Shell Commands, Hadoop versions. Hadoop Components:-Namenode, Secondary Namenode, Node Manager, YarnResource Scheduler, Map Reduce Paradigm, Hadoop Programming. Cluster Setup:- SSH, Hadoop Configurations, Administration.

UNIT-III
Hadoop Ecosystem: Big data pipeline, Difference between ETL & Big Data Streaming, Introduction to Hive, Hive Architecture & its installation, Hive Vs RDBMS, Kafka, Flume, Pig, Sqoop, Flume, Zookeeper, MapR, Cloudera, HadoopVs Spark, Introduction to Scala Programming.

UNIT-IV
Data Analytics with R: Supervised Vs Unsupervised Learning, Clustering, Regression and Classification, Data Visualization (ggplot2 package), Rhadoop, Text Mining with R, Data Analytics Case Study.

UNIT-V
Data Visualization, Business Intelligence (BI), Tools of BI, Functional and Technical Value of BI, Architecture of BI, Data Lake and BI, Introduction to Python Programming and its Libraries, Visualization using Python and Matlab.

COURSE OUTCOMES:
After completing this course, the student should be able to:

1. Understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data
2. Gain hands-on experience on large-scale analytics tools
3. Understand and study Hadoop ecosystem
4. Study R for text mining and to analyze data
5. Understand data visualization and to study python programming

TEXT BOOKS:

1. **Tom White**, "HADOOP: The definitive Guide" , O Reilly 2012.
2. **VigneshPrajapati**, "Big Data Analytics with R and Haoop", Packet Publishing 2013.

REFERNCE BOOKS:

1. **Borislublinsky, Kevin t. Smith, Alexey Yakubovich,** "ProfessionalHadoop Solutions",Wiley, 2015.
2. **Chris Eaton, Dirk deroos et al**., "Understanding Big data ", McGraw Hill, 2012.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER-VIII

Course Title: Distributed Systems **Max Marks: 100**
Course Code: PEC-ITE-803 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The objective of this course is to introduce students to the fundamentals and techniques of distributed computing. Students are expected to develop distributed applications using latest technologies.

UNIT-I

INTRODUCTION: Introduction to Distributed System; Goals, Hardware Concepts, Software Concepts and Client-Server Model. Examples of Distributed Systems.

UNIT-II

PROCESS AND INTER PROCESS COMMUNICATION: Communication: Layered Protocols, Remote Procedures Call, Remote Object Invocation, Message-Oriented Communication. Processes: Threads, Code Migration, Software Agent.

UNIT-III

NAMING & SYNCHRONIZATION: Naming: Naming Entities, Locating Mobile Entities, Removing Un-Referenced Entities. Synchronization: Election Algorithms, Mutual Exclusion, Distributed Transactions.

UNIT-IV

CONSISTENCY AND REPLICATION: Consistency and Replication: Introduction, Data Centric Consistency Models, Client Centric Consistency Models, Distribution Protocols.

Fault Tolerance; Introduction, Process Resilience, Reliable Group Communication. Distributed Commit.

UNIT-V

SECURITY POLICIES: Security: Introduction, Secure Channels, Access Control, Security Management.

COURSE OUTCOMES:

1. Study software components of distributed computing systems.
2. Know about the communication and interconnection architecture of multiple computer systems.
3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources.

4. Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.

5. To be familiar with the design, implementation and security issues of distributed system.

TEXT BOOKS:

1. **Tannenbaum A. S**., "Distributed Systems: Principles and Paradigms", PHI.
2. **G. Coulouris, J. Dollimore, and T. Kindberg,** Distributed Systems: Concepts and Design, Pearson Education.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

PROFESSIONAL ELECTIVE COURSES-VII

SEMESTER-VIII

Course Title: Wireless Networks **Max Marks: 100**
Course Code: PEC-ITE-804 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

COURSE OBJECTIVE: The aim of the subject is to make the students aware of the latest technologies in the field of Wireless Networks.

UNIT-I
Cellular wireless Networks: Introduction: Applications, Replacement of wired Networks, principles of cellular networks, first generation analog, second generation TDMA, second generation CDMA and third generation systems.

UNIT-II
Satellite communications: History, Applications, satellite parameters & configurations-GEO, LEO, MEO, capacity allocation (frequency division, time division), routing, localization, Handover.

UNIT-III
Wireless LANS: Infrared LANS, spread spectrum LANS, narrowband microwave LANS, IEEE 802.11 wireless LAN standard, Bluetooth and IEEE 802.15, wireless local loop.

UNIT-IV
Mobile Network Layer: Mobile IP, Entities and terminology, IP packet delivery, Agent advertisement and discovery, Registration, tunneling and encapsulation, optimizations.

UNIT-V
Ad Hoc wireless Networks: Ad Hoc networks, Difference between cellular and Ad Hoc wireless networks, applications, technical & research challenges, Important issues in Ad Hoc wireless networks, the need for MAC, MAC layer protocols for Ad Hoc wireless Networks, introduction to quality of service (QoS) in Ad Hoc wireless networks.

COURSE OUTCOMES:
On successful completion of this unit students will be able to:

1. Identify the basic concept of wireless networks, channel coding, and cellular concepts;
2. Compare and contrast LEO, MEO and GEO. Routing and handover in satellite communication
3. Understand various wireless LAN technologies
4. Understand the terminologies in mobile network layers and the process of packet discovery and registration in network layer.
5. Compare and contrast between cellular and Ad Hoc wireless networks, areas of its applications and challenges

TEXT BOOKS:

1. **Stallings William**, Wireless Communications & Networking, PHI.
2. **PahlavanKaven,** Principles of Wireless Networks,, Pearson Education India.

REFERNCE BOOKS:

1. **Nicopolitidis, H. S. Obaidat**, Wireless Networks, John Wiley.
2. **Stoimenovic Ivan**, Handbook of Wireless Networks & Mobile Computing, CRS Presss.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

SEMESTER-VIII

Course Title: Deep Learning **Max Marks: 100**
Course Code: PEC-ITE-805 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: This course will explore applications and theory relevant to problem solving using deep learning. By the end of this course, students will gain intuition about how to apply various techniques judiciously and how to evaluate success. Students will also gain deeper insight into why certain techniques may work or fail for certain kinds of problems.

UNIT-I

MACHINE LEARNING BASICS: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance. Maximum Likelihood Estimation. Bayesian Statistics. Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent.Building a Machine Learning Algorithm.Challenges Motivating Deep Learning.

UNIT-II

INTRODUCTION TO DEEP LEARNING: Neural Network Basics, feedback and Feed forward Neural networks, Shallow Neural Network, Deep Neural Networks Convolution Neural Networks, Gradient descent and the back propagation algorithm. Unit saturation, vanishing gradient problem, and ways to mitigate it.RelU Heuristics for avoiding bad local minima.Heuristics for faster training.Nestors accelerated gradient descent. Regularization. Dropout.

UNIT-III

CONVOLUTIONAL NEURAL NETWORKS: Architectures, convolution / pooling layers, Recurrent Neural Networks LSTM, GRU, Encoder Decoder architectures.

UNIT-IV

DEEP UNSUPERVISED LEARNING: Autoencoders (standard, sparse, denoising, contractive, etc), Variational Autoen coders, Adversarial Generative Networks, Autoencoder and DBM Attention and memory models, Dynamic memory networks

UNIT-V

APPLICATIONS: application of deep learning to computer vision: Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks, video to text with LSTM models. Attention models for computer vision tasks.

COURSE OUTCOMES: Upon successful completion of the course, students should be able to:

1. Understand key concepts related to Deep Learning.
2. Derive a simple Feedforward Neural Network (DNN).
3. Understand DNN architecture and parameters.
4. Intuitively understand theory on why DNN works.
5. Be able to compare DNN to other Machine Learning techniques
6. Apply DNN to real-life problems.

TEXT\REFERENCE BOOKS:

1. **Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville.** "Deep learning." An MIT Press book in preparation. (2015).
2. **Bengio, Yoshua**. "Learning deep architectures for AI." Foundations and trends in Machine Learning 2.1 (2009): 1127.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit

SEMESTER-VIII

Course Title: Embedded Systems **Max Marks: 100**
Course Code: PEC-ITE-806 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

OBJECTIVE: The aim of the subject is to help the learners to understand the fundamentals of Embedded Systems.

UNIT-I

INTRODUCTION TO EMBEDDED SYSTEMS: Hardware and Software Components: Types, Examples, Characteristics and Challenges in Embedded Computing System Design, Embedded System Design Processes.

UNIT-II

ARCHITECTURE OF EMBEDDED SYSTEM: Hardware Components: SOC, Processors, CPU, Types of Memory, Memory Management, I/O Devices and Interfacing. Software Components: Interpreter, Compiler, Assembler, Cross Assembler, RTOS, Languages for Embedded Applications, Hardware and Software Architecture. Examples: Cell Phone, Smart card, Digital Thermometer.

UNIT-III

OS FOR EMBEDDED SYSTEMS: Introduction to Real Time Theory. Operating System Services. Real Time Operating System Concepts. Basic Design using an RTOS. Underground Tank Monitoring System, case study of Tiny OS.

UNIT-IV

PERFORMANCE ISSUES OF AN EMBEDDED SYSTEM: CPU Performance. CPU Power Consumption. Analysis and Optimization of CPU Power Consumption Program Execution Time. Analysis and Optimization of Energy and Power. Analysis of Program Size. Hardware Accelerators.

UNIT -V

DESIGN EXAMPLES: Personal Digital Assistants. Set Top Boxes. Ink Jet Printers. Telephone PBX. Introduction to Micro C/OS-II Operating System and Its Uses.

COURSE OUTCOMES:

1. Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.

2. Become aware of the architecture of the ATOM processor and its programming aspects (assembly Level)
3. Become aware of interrupts, hyper threading and software optimization.
4. Design real time embedded systems using the concepts of RTOS.
5. Analyze various examples of embedded systems based on ATOM processor

TEXT BOOKS:

1. **Wayne Wolf,** Computer as Components, Principles of Embedded Computing System Design, Harcourt India Pvt. Ltd.,
2. **David E Simon,** An Embedded Software Primer, Pearson Education,

REFERENCE BOOKS:

1. **RajKamal**, Embedded Systems, Architecture, Programming and Design, TMH.
2. **Sriram V Iyer, Pankaj Gupta**, Embedded Real Time Systems Programming, TMH.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit