FIRST YEAR ENGINEERING COMMON TO ALL BRANCHES

SCHEME OF INSTRUCTION AND EXAMINATION
(RC 2016-17)

SEMESTER - I

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P#	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
FE 1.1	Engineering Mathematics - I	4	--	--	3	100	25	--	--	--	**125**
FE 1.2	Applied Science (Physics / Chemistry)	3	--	2	3	100	25	25	--	--	**150**
FE 1.3	Engineering Mechanics	3	--	2	3	100	25	25	--	--	**150**
FE 1.4	Fundamentals of Electrical Engineering	3	--	2	3	100	25	--	--	--	**125**
FE 1.5	Fundamentals of Computer Engineering	3	--	2	3	100	25	--	--	--	**125**
FE 1.6	Technical English	3	--	--	3	100	25	--	--	--	**125**
FE 1.7	Workshop Practice – I*	--	--	4	--	--	--	50	--	--	**50**
TOTAL		**19**	**--**	**12**	**--**	**600**	**150**	**100**	**--**	**--**	**850**

* Term Work in Workshop Practice – I is a separate Head of Passing.

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/ she submits to the department a certified journal reporting the experiments conducted during the semester.

LEGEND

Abbreviation	Description
L	Lecture
T	Tutorial
P	Practical
Th	Theory
S	Sessional
TW	Term Work
O	Oral

FIRST YEAR ENGINEERING COMMON TO ALL BRANCHES

SCHEME OF INSTRUCTION AND EXAMINATION
(RC 2016-17)

SEMESTER - II

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P#	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
FE 2.1	Engineering Mathematics - II	4	--	--	3	100	25	--	--	--	**125**
FE 2.2	Applied Science Physics / Chemistry)	3	--	2	3	100	25	25	--	--	**150**
FE 2.3	Programming Languages	3	--	2	3	100	25	--	--	--	**125**
FE 2.4	Fundamentals of Electronics and Telecommunication Engineering	3	--	2	3	100	25	--	--	--	**125**
FE 2.5	Environmental Sciences and Social Sciences	3	--	--	3	100	25	--	--	--	**125**
FE 2.6	Engineering Graphics	2	--	4	4	100	25	25	--	--	**150**
FE 2.7	Workshop Practice - II*	--	--	4	--	--	--	50	--	--	**50**
TOTAL		**18**	**--**	**14**	**--**	**600**	**150**	**100**	**--**	**--**	**850**

* Term Work in Workshop Practice – II is a separate Head of Passing.

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/ she submits to the department a certified journal reporting the experiments conducted during the semester.

FE 1.1 ENGINEERING MATHEMATICS-I

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
FE 1.1	Engineering Mathematics-I	4	--	--	3	100	25	--	--	--	**125**

Course Objectives: To enhance their knowledge of Mathematics specifically in the field of function of more than one variable and their analytic properties, expansion of function as a power series, complex functions and its analytic properties.

Course Outcomes: After successful completion of this course the student will

1. Have knowledge of an infinite series.
2. Evaluate integrals using Beta and Gamma functions.
3. Express a function in the form of a power series.
4. Understand various operations on complex numbers & analytic properties of functions of complex variables.
5. Have knowledge of indeterminate forms.
6. Understand partial differentiation & its applications.
7. Solve first order partial differential equations.

UNIT - 1 (16 Hours)

Beta and Gamma Functions: Various forms and properties, relation between Beta and Gamma functions, Legendre's duplication formula, Error function.

Infinite Sequence and Infinite Series: Convergence and Divergence of sequences and series, tests for Convergence and Divergence of infinite series such as Integral test, Comparison test, D'Alembert's ratio test, Cauchy's root test and Leibnitz test for Alternating series, Power series and Radius of Convergence.

UNIT - 2 (16 Hours)

Complex Variables: Complex numbers and their properties, Modulus and Argument of a Complex number, Polar and Exponential form of Complex number, Geometric interpretation of Complex numbers, De Moivre's theorem and its applications, Exponential, Trigonometric, Hyperbolic and Logarithmic functions, Inverse Trigonometric and Hyperbolic functions, Continuity, Differentiability and Analytic functions. Cauchy-Riemann equations, Harmonic functions.

UNIT - 3 (16 Hours)

Differential Calculus: Leibnitz theorem, Taylor's theorem (without proof), Taylor's and Maclaurin's series expansion. Indeterminate forms, Partial Differentiation, Total Differentiation.

UNIT - 4 (16 Hours)

Partial Differential Equations and Extreme Values of Functions: Formation of first order Partial Differential Equations, Methods to solve first order Partial Differential Equations, Euler's theorem on Homogenous functions, Extreme values of functions of two and three variables, Lagrange's method of Undetermined Multipliers.

Recommended Readings:

1. G.V. Kumbhojkar; Applied Mathematics-I for F.E. Semester-1; C Jamnadas & Company.
2. Erwin Kreysig; Advanced Engineering Mathematics; Wiley International Edition.
3. Ch. V. Ramana Murthy and N. C. Srinivas; Applied Mathematics; S. Chand Publishing.
4. Dr. B. S. Grewal; Higher Engineering Mathematics; Khanna Publishers.
5. Srimanta Pal, Subodh C. Bhunia; Engineering Mathematics; Oxford University Press.
6. Thomas/Finney; Calculus and Analytic Geometry; Addison Wesley.

FE 1.2/2.2 APPLIED SCIENCE (PHYSICS)

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
FE 1.2/2.2	Applied Science (Physics)	3	--	2	3	100	25	25	--	--	**150**

Course Objectives:

1. To familiarize the students with the concept of applied science like interference, semiconductors, ultrasonics, Electron Ballistics and the various topics of modern Physics.
2. The knowledge gained will be useful in learning the various concepts from different branches of Engineering. It gives the basic ideas of all the topics.

Course Outcomes:

The student after undergoing this course will be able to:

1. Gain the knowledge of the application of certain concepts like Ultrasonics, X-rays, Superconductivity and Lasers in the different fields in daily life.
2. Gain the skill of using various apparatus like Cathode ray Oscilloscope and CRT tube.

UNIT - 1 (12 Hours)

Interference of Light:

Interference based on division of amplitude, Phase change at reflection, Geometric and optical path, Interference due to reflected and transmitted light in thin parallel film, Interference in wedge shaped film, Newton's rings for reflected and transmitted light, Determination of radius of curvature of plano convex lens, Wavelength of light used and R. I. of liquid using Newton's ring expt.

Semiconductors: Mobility, Drift velocity, Conductivity of charge carriers, Generation and recombination of charges, Diffusion, Continuity equation, Hall effect.

UNIT - 2 (12 Hours)

Magnetic Materials: Introduction, Origin of magnetization, Classification of magnetic materials, Magnetic hysteresis, Soft and hard magnetic materials, Ferrites, Applications of magnetic materials.

Ultrasonics: Production of ultrasonic waves, Magnetostriction, Piezoelectric oscillator, detection of ultrasonic waves, Properties, Cavitation, Application of ultrasonics in various fields, Measurement of wavelength, Velocity by acoustic diffraction grating.

Electron Ballistics: Thomson's method to determine the specific charge of an electron(qualitative),Electrostatic and magnetic focusing, CRO and applications.

UNIT - 3 (12Hours)

LASERS: Interaction of radiation with matter from quantum mechanical point of view, Absorption, Stimulated and spontaneous emission of radiation, Active medium, Metastable state, Population inversion, Non equilibrium state, Pumping, Condition for light amplification, Einstein's theory of stimulated emission, Operating principle of a laser, Pumping schemes, Optical resonator, Properties of laser, He-Ne laser, Ruby laser, Applications.

Fiber Optics: Total internal reflection, Propagation of light in optical fiber, Structure of an optical fiber and fiber cable, Acceptance angle and cone, Numerical aperture, Types of optical fibers, Modes of propagation, Single and multimode fibers, Frequency or v - number of a fiber, Applications- fiber optic communication and fiberscope, Losses of optical fibres- attenuation (Qualitative study).

UNIT - 4 (12 Hours)

X-rays: Origin of X rays, Continuous and characteristic x-ray spectra, Mosleys law, X-ray diffraction and Bragg's spectrometer.

Compton Effect: Wave nature of particle, de Broglie hypothesis, Davisson Germer expt, Velocity of De Broglie waves, Group and phase velocity.

Super Conductors: Meissner effect, Isotope effect, type-I and type –II superconductors, BCS theory (qualitative analysis only), High temperature superconductors, Properties and applications.

Recommended Readings:

1. M. N. Avadhanulu & P. G. Kshirsagar; A text book of engineering Physics; S. Chand & company Pvt. Ltd. Revised edition 2015.
2. A. S. Vasudeva; Modern Engineering Physics; S. Chand & Company Pvt. Ltd. Revised Edition.
3. Uma Mukherji; Engineering Physics; Narosa Publications.
4. R. K. Gaur & S. L. Gupta; Engineering Physics; Dhanpat Rai Publications Pvt. Ltd. Reprint 2013.
5. K. Rajagopal**;** Engineering Physics**;** PHI Learning Pvt. Ltd. Third Printing 2009.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments. Term Work marks to be awarded based on the assessment of the experiments conducted.)

1. Newton's rings
2. Air-wedge
3. Zener diode characteristics
4. Voltage regulator
5. Rectifiers
6. Use of CRO
7. Thermister characteristics
8. Hall effect
9. e/m by Thomsons method
10. Velocity of ultrasonic wave
11. Energy gap of a semiconductor
12. Planck's constant by Photocell
13. He/Ne laser/ diode laser

FE 1.2/2.2 APPLIED SCIENCE (CHEMISTRY)

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
FE 1.2/2.2	Applied Science (Chemistry)	3	--	2	3	100	25	25	--	--	**150**

Course Objectives:

1. To deal with industrial technologies and applications related to chemistry, which would help to meet the basic need of an individual, society & environment.

Course Outcomes:

The students will acquire knowledge to:

1. Understand the basic concept of electrochemical system involving different types of energy systems and components involved therein. This knowledge will help students to understand/develop present technologies like batteries and fuel cells.
2. Understand the classification and grading of Hydrocarbon fuels and non-conventional energy systems like solar and Biogas.
3. Differentiate various types of corrosion and gain knowledge on control measures associated with corrosion.
4. Understand the concept of Green Chemistry and its importance towards environment friendly chemical processes.
5. Identify polymeric materials, methods and properties associated with these materials.
6. Understand the principles of some commonly used analyticaltools in the field of chemistry.
7. Understand the Impurities involved in Water, methods for large scale treatment of river and saline water including treatment of sewage water.
8. Understand the classification, constitution, properties and application of composite materials.

UNIT - 1 (12 Hours)

Electrochemical Energy Systems:

Single electrode potential: concept, sign convention, Determination of standard electrode potential, Nernst equation and related numerical.

Electrochemical cells: Galvanic and Concentration cells- Construction, Representation, Determination of EMF, Role of Electrochemical series and numerical.

Electrodes: Reference Electrodes –Calomel and Silver/Silver chloride electrodes; Ion Selective electrodes, glass electrode; Construction, representation, pH determination using the electrodes.

Batteries: Basic concepts, Characteristics, classification. Construction, working and applications of Zn-Air Battery and Li-ion polymer battery.

Fuel Cells: Basic construction and working with reference to Hydrogen–Oxygen Fuel cell with KOH as electrolyte.

Fuels:

Definition, Classification with reference to combustible fuels; Important terms-Calorific value, GCV, NCV.

Crude oil- Mining and purification, grading of Gasoline and Diesel. Blending of gasoline with ethanol.

Non-Conventional Sources of Energy: Solar and Biogas- working principles and constructions involved therein.

UNIT - 2 (12 Hours)

Corrosion:

Definition and Mechanism of corrosion- Direct chemical corrosion &Electrochemical corrosion. Types of Corrosion: Galvanic corrosion, differential aeration corrosion(with reference to waterline and Pitting corrosion), Inter-granular and stress corrosion. Factors Influencing corrosion: Nature of metal and Environment; Corrosion Control Measures: Proper design, Purity and alloying, Cathodic protection, Modifying environment, Metal cladding, Inorganic coatings(phosphate and anodized) and Protective Metal coatings e.g. (Hot metal coatings(Galvanization & Tinning), Electroless (PCB preparation) and Electroplating (Chromium Plating).

Green Chemistry:

Objectives and significance of Green Chemistry; Basic components of green chemistry: Alternative feedstocks (adipic acid preparation), reagents (methylation by use of DMC),reaction conditions(Use of aqueous solvent) and final products(Synthesis of acetyl acetate esters); Concept of atom Economy. Industrial application of Green Chemistry(with reference to Products from natural materials, Green Solvents and Green fuels).

UNIT - 3 (12 Hours)

Polymers:
Definition, Classification-based on source of availability, structure, number of monomers and their arrangement, type of polymerization and response to heat, Basic concepts- monomers, Degree of polymerization, Functionality. Methods of Polymerization- Bulk, Suspension, Emulsion and solution. Structure-Property relationships in Polymers- chemical, Electrical(conducting polymer e.g. polyacetylene), optical, Mechanical and Crystallinity in Polymers (Tg and Tm).Degradation of Polymers-Oxidation, weathering, Environmental stress cracking and thermal. Compounding of polymers to yield plastics: ingredients involved. Elastomers: Processing of natural rubber, comparison between natural and synthetic rubber.

Instrumental Techniques: covering Principles, working and applications of UV-visible, Gas Chromatography and Differential Scanning Calorimeter (DSC).

UNIT - 4 (12 Hours)

Water Technology:
Impurities in water, water analysis-Determination of pH, Turbidity, Dissolved solids, Hardness, Alkalinity, BOD and COD including numericals. Specifications for drinking water; BIS and WHO standards. Municipal treatment for large scale production of potable water.
Large scale production of potable water using saline water- Flash Evaporation, Electro dialysis and reverse Osmosis method. Sewage treatment.

Composites:
Definition, constituents of composites, Types of composites-Fibre, particulate and layered. Applications of composites.

Recommended Readings:

1. Shashi Chawla; A Text Book of Engineering Chemistry; Dhanpat Rai Publishing Co.; 2011.
2. S. S. Dara; Engineering Chemistry; Chand & Co.; 2011.
3. Jain and Jain; Engineering Chemistry; Dhanpat Rai Publishing Co.; 2013.
4. M.G. Fontana; Corrosion Engineering; McGraw Hill Publication.
5. M.M. Uppal; Engineering Chemistry; Khanna Publication.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments. Term Work marks to be awarded based on the assessment of the experiments conducted.)

1. Introduction to the Chemistry laboratory session: Discussion on basic aspects like calculation of normality & Molarity, preparations of solutions, Acquaintance with glassware and other laboratory facilities
2. Determination of Standard Electrode potential and verification of Nernst Equation
3. Study of corrosion activity of Aluminum metal in Acid and Base Solution
4. Study of deposition of Ni metal on Aluminium by Electroless plating
5. Determination of Viscosity by using Ostwald Viscometer
6. Elemental analysis using Colorimeter
7. Determination of pH, Turbidity and Dissolved solid content of water
8. Determination of Hardness of a given water sample
9. Determination of Alkalinity of a given water sample
10. Determination of Dissolved oxygen content in water
11. Determination of COD of a water sample
12. Determination of molecular weight of polymer using Ostwald viscometer
13. Analysis of an ore using titrimetric method of analysis
14. Separation of miscible liquids using Fractional distillation method
15. Titrimetric analysis involving use of Conductometer
16. Synthesis of Polymer

Recommended Readings for practicals:

1. Vogels text book of quantitative chemical analysis; 6th edition.
2. Sunita Rattan; Experiments in applied chemistry; S.K. Kataria & Sons.

FE 1.3 ENGINEERING MECHANICS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
FE 1.3	Engineering Mechanics	3	--	2	3	100	25	25	--	--	**150**

Course Objectives:

1. To apply principles of statics and dynamics to a rigid body.
2. To impart knowledge of different types of simple lifting Machines.

Course Outcomes:

The student after undergoing this course will be able to:

1. Find resultant and understand the concept of equilibrium of coplanar concurrent and non-concurrent force systems
2. Understand the concept of centroid, area moment of inertia and mass moment of Inertia
3. Understand the basic principles of Engineering Mechanics and applications to beams and trusses
4. Understand the principle of virtual work, application of Work Energy principle, Impulse Momentum equation, and principle to rigid bodies.
5. Study the working principle of some simple lifting machines

UNIT-1 **(12 Hours)**

Basic Concepts: Concept of a rigid body, Laws of motion, Force systems, Principle of Transmissibility of forces, concurrent and non-concurrent Forces, Resultant of a forces, Composition and resolution of forces, moment of a force, Principle of moments, Equilibrium of forces, Lami's theorem, Free body diagrams, Applications. Types of beams, determinate and indeterminate beams, Types of loads, Types of supports and support reactions of determinate beams.

Graphic Statics: Concept of vector and space diagram, Bow's notation, force polygon and funicular polygon.

UNIT-2 (12 Hours)

Centroid and Moment of Inertia: First moment of an area and Centroid, Locating the centroid of built – up sections. Second moment of area , radius of gyration, Parallel Axes Theorem, Perpendicular axes Theorem, polar moment of inertia, Finding moment of inertia of built up sections. Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis.

Virtual Work Method: Principle and concept of virtual work. Application to determinate beams

UNIT-3 (12 Hours)

Trusses: Introduction, Simple Truss and Solution of Simple truss by Method of Joints and Method of Sections.

Friction: Theory of friction, Types of friction, Static and kinetic friction, angle of friction, Limiting Friction, Laws of friction, Coefficient of friction, Angle of repose, Applications involving rigid body on a horizontal or an inclined plane, ladder and wedge friction.

UNIT-4 (12 Hours)

Simple Lifting Machines: Mechanical advantage, velocity ratio, efficiency of machine, law of machine. Study of simple machines:- Simple wheel and axle, differential wheel and axle, single and double purchase crab and worm and worm wheel.

Kinetics of Rigid Body: Work Energy principle, Impulse Momentum equation, D'Alembert's Principle and related applications.

Recommended readings:

1. S. S. Bhavikatti and K. G. Rajshekarappa; Engineering Mechanics; New Age International Publication.
2. F. P. Beer and Johnson; Vector Mechanics for Engineers: Statics and Dynamics; Tata McGraw Hill Publication.
3. R. C. Hibbeler; Engineering Mechanics: Statics and dynamics; Prentice Hill Publication.
4. I. H. Shames andG. K. RaoMohana; Engineering Mechanics: Statics and dynamics; Pearson Education Publication.
5. A. K. Tayal; Engineering Mechanics; Umesh Publications.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments. The Term Work Marks to be awarded based on the assessment of experiments conducted)

1. To determine support reactions of simply supported beam.
2. To verify parallelogram law of forces.
3. To verify polygon law of forces for concurrent system.
4. To determine coefficient of friction and angle of friction using inclined plane.
5. To verify the principle of moments.
6. To determine law of machine for simple wheel and axle.
7. To determine law of machine for differential wheel and axle.
8. To determination law of machine for single purchase crab.
9. To determine law of machine for double purchase crab.
10. To determine law of machine for worm and worm wheel.

FE 1.4 FUNDAMENTALS OF ELECTRICAL ENGINEERING

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
FE 1.4	Fundamentals of Electrical Engineering	3	--	2	3	100	25	--	--	--	**125**

Course Objectives:

1. To develop an understanding of important concepts of Electricity & Magnetism.
2. To be able to analyze AC & DC circuits
3. To understand concept of DC and AC power, Reactive power and power factor
4. To develop conceptual understanding of three phase AC circuits.
5. To understand basics of Transformer.

Course Outcomes:

On completion of this course, the students will have a thorough understanding of various electrical and magnetism concepts. They will have an ability to work on DC and AC circuits. They will have knowledge of Transformers.

UNIT - 1 (12 Hours)

Introduction to Generation of Electrical Energy: Different sources of generation of electrical energy - conventional sources of energy- Thermal, hydro & nuclear. Non conventional sources - solar & wind. Single line representation of a power system indicating generation, transmission & distribution of electrical power.

Magnetism: Concept of magnetic field. Definitions of terms related to magnetic field- flux density, permeability, reluctance, m.m.f, Ampere law, Faraday's laws , Lenz's Law . Fleming's rules - their significance & application. Electromagnetic induction, induced emf and its types, magnetic circuits, analogy between electric circuit & magnetic circuit. Energy stored in magnetic circuit.

UNIT - 2 (12 Hours)

Electrical Circuits & Analysis of DC circuits: Introduction to Electric circuit, circuit elements- passive & active – their definition from circuit & energy view point, ohm's law, Kirchhoff's laws- KCL & KVL, series & parallel connection, star & delta transformation . Basic principles of voltage divider & current divider. Concept of voltage & current sources. Analysis of D.C. circuits involving independent sources: Loop analysis/mesh analysis & nodal analysis. Superposition Theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Millman's Theorem.

UNIT - 3 (12 Hours)

A.C. Fundamentals, AC Circuit Analysis: Generation of sinusoidal voltage - frequency, time period, average value, r.m.s. value, maximum value , form factor, peak factor, phase, concept of phasor diagram, phase angle. Active, reactive & apparent power. Power factor. Analysis of R, L, C, series and parallel circuits, phasor diagram.

UNIT - 4 (12 Hours)

Three phase A.C Circuits : Representation of three phase system, concept of phase sequence & its significance. Balanced & unbalanced three phase supply system. Relationship between line and phase quantities for star & delta connections. Three phase power. Three phase power measurement.
Introduction to Single Phase Transformer: Working principle, construction, equivalent circuit, phasor diagram, voltage regulation, losses in transformer and their measurements using O.C. & S.C. test & efficiency.

Recommended Readings:

1. Vincent Del Tero; Principles of Electrical Engineeringby; PHI Publication.
2. Joseph Administer; Electrical Circuits; Schaum Series Publication.
3. Hayt, Kemmerly, Durbin ;Engineering Circuit Analysis; Tata McGraw Hill Publication.
4. G. D. Rai; Non conventional Energy Sources; Khanna Publications.
5. J B Gupta; Electrical power; Khanna Publication.
6. Rajendra Prasad; Fundamentals of Electrical Engineering; PHI Publication.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. Ohm's law and its application
2. Verification of Kirchhoff's laws
3. Verification of Thevenin's theorem
4. Verification of Norton's theorem
5. Verification of Superposition theorem
6. Verification of Maximum power transfer theorem
7. Study of single phase domestic wiring system

8. Brightness control of 2 bulbs using series and parallel connection
9. Measurement of power in single phase circuit
10. Open circuit and short circuit test on single phase transformer
11. Load test on single phase transformer.

FE 1.5 FUNDAMENTALS OF COMPUTER ENGINEERING

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
FE 1.5	Fundamentals of Computer Engineering	3	--	2	3	100	25	--	--	--	**125**

Course Objectives:

The subject aims to provide the student with:

1. An understanding of basic concepts of computer science and engineering.
2. An introduction to the fundamentals of hardware, software and programming.
3. An introduction to mathematical software.
4. An understanding of cyber laws and computer security.

Course Outcomes:

The student after undergoing this course will be able to:

1. Demonstrate the use of mathematical software and solve simple mathematical problems.
2. Explain the needs of hardware and software required for a computation task.
3. State typical provisions of cyber law that govern the proper usage of Internet and computing resources.
4. Explain the working of important application software and their use to perform any engineering activity.
5. Demonstrate the use of Operating system commands and shell script.

UNIT -1 (12 hours)

Overview, Introduction to computers: Generation of Computers. Software and hardware, Types of Computers, Computer Networks and Internet. Data and program representation. Working of CPU, Making computers faster and better now and in the future. Storage systems characteristics, types of storage systems, Magnetic disk systems, Optical disk systems and Flash Memory systems. Keyboards, Pointing devices, Scanners, Readers and Digital cameras, Audio input, Display devices, Printers, Audio output.

UNIT- 2 (12 hours)

Introduction to System software and Application software, the operating system (OS). OS for Desktop PCs, servers, handheld PCs, Smartphone and larger computers. Linux and Windows Operating system commands and shell scripts. Concepts of Word processing, Spreadsheet, Database, Presentation graphics and multimedia. Introduction to Assemblers, Interpreters, Compilers and Debuggers.

UNIT-3 (12 hours)

Basic Concepts of Technology and Law, Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence, Encryption, Science of Cryptography, Symmetric and Asymmetric Cryptography. Electronic Banking: Banking and Bookkeeping, Legal Recognition of Digital Signature. The Cyber Crime, Tampering with Computer Source Document, Hacking with Computer System.

UNIT-4 (12 hours)

MATLAB and Its family, Menus and toolbars, Types of windows and types of files, MATLAB Help system, Basic calculations in MATLAB, Vectors and arrays, Multi-dimensional arrays, Element by element operations, Polynomial operations using arrays, X-Y Plotting functions, Subplots, 3-D Plots and Contour plots.

Recommended Readings:

1. Deborah Morley and Charles S. Parker; Fundamentals of Computers; Cengage Learning, India edition; 2009.
2. Alexis Leon and Mathews Leon; Fundamentals of Information Technology; Vikas Publication, Chennai.
3. Francis Scheid; Theory and Problems of Introduction to Computer Science Schaum's Outline Series; Tata McGraw Hill publication.
4. Information Technology: Tools and Application, Ed. UPTEC Computer Consultancy Limited, Elsevier Publication, 2004.
5. Rudra Pratap ;Getting started with MATLAB: A quick introduction for scientists and engineers; Oxford University press; 2003.
6. W. L. Palm III ; Introduction to MATLAB 7 for Engineers; McGraw Hill ;2005.
7. Rajeshree R Khande and Manisha Maddel ; Internet Programming & Industrial Law; Vision Publications, Pune.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1) Five programs using MATLAB (Programs will be on Basic Calculation, Calling Data file and Sending results to Data file, Control structure, Plots and Subplots, creating and using built in functions)
2) Five programs using linux shell scripting. (Using any scripting language like PERL or PYTHON)
3) Five experiments involving packages for Word Processing, Spread Sheet, Presentation, Graphics and Database.

FE 1.6 TECHNICAL ENGLISH

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Instruction						
		L	T	P	Th. Duration (Hrs)	Marks					
						TH	S	TW	P	O	Total
FE 1.6	Technical English	3	--	--	3	100	25	--	--	--	**125**

Course Objective:

1. To ensure understanding of the basics of communication through English, aspects of verbal & non-verbal communication.
2. To speak a neutral & correct form of English.
3. To appreciate the nuances of language & develop skills required for the competitive world.
4. To enhance their soft skills.
5. To develop skills in technical writing like project/training reports, and effective presentation.
6. To develop writing skills in English grammatically correct and smooth flowing.

Course Outcomes:

The student after undergoing this course will be able to:

1. To read, write and speak effectively in English.
2. To participate in debate, paper presentation, quiz etc. at state and national level.
3. To participate effectively in a job interview, group discussion needed for the job market.
4. Write reports and assignments in fairly understandable manner.

UNIT - 1 **(12 Hours)**

Communication: Relevance and importance of communication, Characteristics of effective communication, Communication basics, Benefits of communicating effectively. Communication cycle; barriers Types of communication Verbal Non-verbal: oculesics, proxemics, vocalic, haptics, Body language, gestures. Liasioning. Cross cultural communication- factors to be taken into consideration while communicating to members of other cultures. Communication in the social media- reach, responsibility and ethics.

UNIT - 2 (12 Hours)

Job Interviews: techniques interview preparations, conducting interviews, types. Group Discussions: Qualities of a GD member, do and don'ts of a GD. Listening Skills: Concepts of listening, barriers to listening, types of listening. Oral Presentations: Debates, One minute speaks and topics among groups in class. Soft Skills: Concepts and relevance of soft skills, practicing soft skills. Specific Soft skills: 1) Inter Personal skills. 2) Leadership, 3) Decision making 4) Emotional intelligence. Ergonomics: Definitions, Purpose, ergonomics at workplace, Safety measures.

UNIT - 3 (12 Hours)

Technical communication: Concept and introduction, Preparing resume and cover letter Drafting notice agenda, minutes of the meeting, drafting memorandum, formal letters, report writing. Concepts and methodology for writing thesis or assignment: Defining the problem, limiting it, consulting course material, preparing bibliography, foot notes. Use of quotations tables and figures, Assignments on allotted topics.

UNIT - 4 (12 Hours)

Grammar: Active passive voice, tenses, prepositions, Degrees of comparison- positive, comparative, superlative. Question tag: Affirmative negative sentences, sentence constructions using 'No Sooner'; 'So that'. Comprehension, question based on passage and vocabulary questions. Vocabulary: phrasal verbs, idioms, antonyms, synonyms, sentence errors.

Prose Pieces: ChetanBhagat's Talk on "sparks" delivered in symbiosis Pune and an extract from Kalam's "My Journey"- 'Three great heroes resolve a problem'.

Recommended Readings:

1. Meenakshi Raman; Technical communication; 2nd ed.; Oxford University Press.
2. Meenakshi Raman, Prakash Singh; Business communication; 2nd ed.; Oxford University Press.
3. R. C. Sharma, Krishna Mohan; Business Correspondence& Report Writing; 3rd ed.; Tata McGraw – Hill Publishing Company Limited , New Delhi.
4. Krishna Mohan, Meenakshi Raman; Effective English Communication; Tata McGraw – Hill Pvt. Ltd, New Delhi.
5. K. Alex; Soft Skills; S. Chand Publication.

FE 1.7 WORKSHOP PRACTICE - I

Subject Code	Nomenclature of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
FE 1.7	Workshop Practice - I	--	--	4	--	--	--	50	--	--	**50**

Course Objectives:

1. Understand the basic workshop skills from raw material stage to finished product.
2. Develop the skills required for fitting, forging, welding and carpentry jobs.
3. Understand the use of tools, machines and effort required to complete the job.

Course Outcomes:

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

1. Achieve the skills required to complete fitting, forging, welding and carpentry jobs.
2. Understand the concepts of forming and joining methods.

(I) Fitting

i) Demonstration of various tools and equipments used in Fitting shop.

ii) Practical: At least one job covering simple fitting practice.

(II) Forging

i) Demonstration of various tools and equipments used in Forging shop.

ii) Practical: At least two different jobs covering forging practice.

(III) Welding

i) Demonstration of various welding machines, tools and equipments used by a Welder.

ii) Practical: At least one job on electric arc welding.

(IV) Carpentry

i) Demonstration of wood cutting machines, various tools & equipments used by a Carpenter.

ii) Practical: At least two jobs as follows:-

1) Wooden Joint ----------one job

2) Wood Turning ----------one job

Practicals mentioned above are to be conducted in the workshop and the jobs are to be submitted for assessment at the end of the course. The Term Work marks are to be awarded based on the assessment of the jobs completed.

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/she submits to the workshop jobs completed in all trades during the semester.

FE 2.1 ENGINEERING MATHEMATICS-II

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
FE 2.1	Engineering Mathematics-II	4	--	--	3	100	25	--	--	--	**125**

Course Objectives:

Primary objective of this subject is to familiarize students with multiple integrals, vector calculus, solve ordinary differential equations.

Course Outcomes:

After successful completion of this course the student will

1. Evaluate double & triple integrals & learn its various Engineering applications.
2. Understand analytic properties of vector valued functions & the associated results used in engineering.
3. Solve first order differential equation & higher order linear differential equations.

UNIT - 1 (16 Hours)

Differentiation under the Integral Sign: Integral with its limit as constant and as a function of the parameter.

Curve Tracing and Rectification of Plane Curves: Tracing of Plane Curves in two dimensions, Polar and Parametric forms of Plane Curves such as Cardiod, Asteroid, Cycloid, Leminiscate etc., Rectification of Plane Curves in Polar, Cartesian and Parametric form, Vector Differentiation, Curves in space, Tangent, Normal and Binormal vectors, Torsion and Curvature, Serret- Frenet formulas.

.

UNIT - 2 (16 Hours)

Multiple Integrals: Double Integration in Polar and Cartesian co-ordinates, change of order in Double Integration, application of Double Integration to computation of Centre of Gravity; Triple Integration in Cartesian , Spherical and Cylindrical co-ordinate systems, Geometrical interpretation of Triple Integration and applications to surface area and volume.

UNIT - 3 (16 Hours)

Vector Calculus: Scalar and Vector fields, Directional Derivatives, Divergence and Curl of Vector fields, Gradient of a Scalar field, Line Integrals and their applications, Greens theorem in a Plane, Surface and Volume Integrals, Divergence theorem and Stroke's theorem(both without proof) and their applications.

.

UNIT - 4 (16 Hours)

Ordinary Differential Equations: First order and first degree Ordinary Differential Equations, Method of separation of variables, Homogeneous and Non- Homogeneous differential equations, Equations reducible to Homogeneous form, Linear Differential Equations, Bernoulli's Differential Equation, Exact and Non- Exact Differential Equations; Higher order Differential Equation with constant coefficients and with right hand side of the form e^{ax}, sin ax, cos ax, e^{ax} f(x), x^n f(x) etc., Linear equations with variable coefficients such as Cauchy's Equation and Lagrange's Equation, D- operator and Inverse D- operators, method of Variation of Parameters.

Recommended Readings:

1. G. Shanker Rao; Engineering Mathematics Volume I; I.K. International Publishing House.
2. A textbook of Vector Calculus; Shanti Narayan; S. Chand Publishing.
3. Ch. V. Ramana Murthy and N. C. Srinivas; Applied Mathematics; S. Chand Publishing.
4. Dr. B. S. Grewal; Higher Engineering Mathematics; Khanna Publishers.
5. Erwin Kreysig; Advanced Engineering Mathematics; Wiley International Edition.
6. Thomas/Finney; Calculus and Analytic Geometry; Addison Wesley.

FE 2.3 PROGRAMMING LANGUAGES

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
FE 2.3	Programming Languages	3	--	2	3	100	25	--	--	--	**125**

Course Objectives:

The subject aims to provide the student with:

1. An understanding of basic concepts of computer programming and developer tools.
2. An introduction to the syntax and semantics of the "C" language as well as data types offered by the language.
3. An introduction to write programs using standard language infrastructure regardless of the hardware or software platform.

Course Outcomes:

The student after undergoing this course will be able to:

1. Demonstrate the use of algorithms and flowcharts to plan the solution of a computing problem.
2. Explain the use of formatted and unformatted input and output statements in "C".
3. State typical usage of sequence control statements of "C'.
4. Enlist the fundamental data types and data structures of "C".
5. Explain the usage of arrays and pointers in "C".
6. Differentiate between a structure and a union.
7. Explain the commands of File Management in "C".

UNIT - 1 (12 Hours)

Programming Basics: Notions of algorithms, flowcharts and programming, iteration and recursion. Imperative style of programming, Functional style of programming, correctness and efficiency issues. Features of block-structured languages, Functions and procedures, Parameter passing, Top-down style and stepwise-refinement with concrete examples Fundamental algorithms: Exchanging values of two variables, counting, summation of a set of numbers , generation of prime numbers , reversal ,series.

UNIT - 2 (12 Hours)

Overview of Programming language C, constants variables and data types, operators and expressions, data input output, decision making and looping: If, If-else, while, do-while, for, switch. Function declarations and prototypes, pass by value, and pass by reference. User defined function in C, iterative function and recursive functions.

UNIT - 3 (12 Hours)

Arrays: One dimension array, array initialization, Searching, Insertion, deletion of an element from an array; finding the largest/smallest element in an array, two dimension array, addition/multiplication of two matrices, transpose of a square matrix; passing array to function , character array and string. Pointers: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, arrays and pointers, pointer arrays.

UNIT - 4 (12 Hours)

Structure & Unions: Defining a structure, declaring structure variables, Accessing structure members, structure initialization, copying & comparing structure variables, operation on individual members, Array of structures, structure & functions, Unions, Size of Structure.

Files management in C: Defining & opening a file, closing a file, I/O operations on files, Error handling during I/O files, Random Access to files. Introduction to Dynamic Memory Allocation

Recommended Readings:

1. Herbert Schildt ; C: The Complete Reference, 4th Edition; Tata McGraw Hill; 2000.
2. Stephen Prata ; C Primer Plus 5th Edition; SAMS Publishing; 2005.
3. Brian W. Kernighan and Dennis M. Ritchi; C Programming Language 2nd Edition; Pearson Education; 2006.
4. Samuel P. Harbison and Guy L. Steele; C: A Reference Manual , 5th Edition; Prentice Hall; 2003.
5. Yashwant Kanetkar; Let Us C; BPB Publications, 9th Edition; 2008.
6. King K.N; C Programming: A Modern Approach, 2nd Edition; W. W. Norton and Company; 2008.
7. Dromey R.J ; How to Solve it by Computer, Prentice Hall India Series; 2000.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. Program to find area and circumference of circle.
2. Program to convert temperature from degree centigrade to Fahrenheit.
3. Program to calculate sum of 5 subjects & find percentage.
4. Program to show swap of two no's without using third variable.
5. Program to print a table of any number.
6. Program to find greatest in 3 numbers.
7. Program to show the use of conditional operator.
8. Program to find whether given no is even or odd.
9. Program to shift inputed data by two bits to the left.
10. Program to use switch statement. Display Monday to Sunday.
11. Program to display first 10 natural no & their sum.
12. Program to print Fibonacci series up to 100.
13. Program to find factorial of a number.
14. Program to find whether given no is a prime no or not.
15. Program to display series and find sum of 1+3+5+……..+n.
16. Program to use bitwise AND operator between the two integers.
17. Program to add two number using pointer.
18. Program to show sum of 10 elements of array & show the average.
19. Program to find sum of two matrices.
20. Program to find multiplication of two matrices.
21. Program to find transpose of a matrix.
22. Program to find the maximum number in array using pointer.
23. Program to reverse a number using pointer.
24. Program to show input and output of a string.
25. Program to find square of a number using functions.
26. Program to show call by value.
27. Program to show call by reference.
28. Program to find factorial of a number using recursion.
29. Program to find whether a string is palindrome or not.

FE 2.4: FUNDAMENTALS OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	O	P	Total
FE 2.4	Fundamentals of Electronics and Telecommunication Engineering	3	--	2	3	100	25	--	--	--	125

Course Objectives:

The subject aims to provide the student with:

1. An understanding of discrete semiconductor devices and their applications.
2. An introduction to operational amplifier and its basic configurations.
3. An introduction to Boolean algebra and logic gates.
4. An introduction to SCR, transducers, PLC, and basic communication system.
5. The basic understanding of PCB fabrication process.

Course Outcomes:

The student after undergoing this course will be able to:

1. Demonstrate the use of diode and Zener diode in simple circuits and compare their performance.
2. Explain the working of a BJT, JFET and MOSFET and compare basic BJT configurations.
3. State typical parameters of an op-amp, and design basic amplifier circuits using op-amps.
4. Enlist the fundamental logic gates, Boolean laws and justify the use of NAND and NOR gates as Universal gates.
5. Explain the working of SCR, simple transducers and PLC.
6. Differentiate between PLC, microprocessor and microcontroller.
7. Distinguish between AM and FM communication system.
8. Explain the PCB fabrication process.

UNIT - 1 (12 Hours)

Diodes and Circuits: Structure of Atom, classifications of solid materials on the basis of conductivity, atomic bonds, energy band theory, semiconductors, p-n junction basics, p-n junction diode, Zener diode, breakdown mechanism in diodes, light emitting diode.

Diode Applications: Half-wave, Full-wave and Bridge Rectifiers; PIV; DC and r.m.s voltages, Derivation of Ripple Factor. Voltage Regulation using Zener diodes.

UNIT - 2 (12 Hours)

Bipolar Junction Transistor (BJT): Transistor Construction; Transistor Operation; Common-Base Configuration; Transistor Amplifying Action; Common-Emitter Configuration; Common-Collector Configuration; Limits of Operation.

DC Biasing: Operating Point; Fixed-Bias Circuit; Emitter-Stabilized Bias Circuit; Voltage-Divider Biasing.

Field Effect Transistors: Construction and Characteristics of JFETs; Transfer Characteristics; Depletion-Type MOSFET; Enhancement- Type MOSFET; CMOS.

UNIT - 3 (12 Hours)

OP-AMP (741): Pin diagram, ideal op-amp, practical op-amp, equivalent circuit of op-amp, open loop configuration of op-amp, closed loop configuration of op-amp (basic concept of voltage gain and bandwidth - inverting and non inverting amplifiers).

Digital Electronics: Introduction, Positive and negative logic, logic operations and operators, logic gates, universal gates, Boolean algebra.

Power Semiconductor Device: SCR basic symbol, construction and operation.

UNIT - 4 (12 Hours)

Transducer: Basic concept of Thermistor, LVDT, strain gauge, LDR,
Block diagram of programmable logic controller (PLC). PCB fabrication procedure
Definitions and difference between, microprocessor and microcontroller.

Communication Systems: Block Diagram of basic communication system, Need for modulation, basic concepts of amplitude modulation and frequency modulation.

Recommended Reading:

1. Boylestad and L. Nashelsky; Electronic Devices and Circuits; PHI.
2. A. Mottershead; Electronic Devices and Circuits; PHI.
3. Ramakant A. Gayakwad; Op-Amps and Linear Integrated Circuits; PHI.
4. George Kennedy; Electronic Communication Systems; Tata McGraw Hill.
5. David Bates and Albert Malvino; Electronic Principles; McGraw-Hill Higher Education.
6. N.N.Bhargava; Basic Electronics and Linear Circuits; Tata McGraw-Hill.
7. Vijay Baru, Rajendra Kaduskar, Sunil Gaikwad; Basic Electronics Engineering; Dreamtech Textbooks.
8. Walter C. Bosshart; Printed Circuit Boards; Tata Mcgraw Hill.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. P-N Junction Diode Characteristics
2. Half-wave, Full-wave and Bridge Rectifiers
3. Zener diode characteristics and Zener diode as a voltage regulator
4. Transistor Common - Emitter Configuration Characteristics
5. FET Characteristics
6. Inverting configuration of OPAMP using 741 IC
7. Non-Inverting configuration of OPAMP using 741 IC
8. Verification of truth-tables of basic logic gates
9. Verification of De' Morgan's laws
10. NAND and NOR as Universal gates
11. Silicon-Controlled Rectifier (SCR) Characteristics
12. Transducer Characteristics
13. PCB fabrication
14. AM System
15. FM System

FE 2.5 ENVIRONMENTAL SCIENCES AND SOCIAL SCIENCES

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
FE 2.5	Environmental Sciences and Social Sciences	3	--	--	3	100	25	--	--	--	**125**

Course Objectives:

1. To study the concept of various environmental aspects on scientific basis in the functional area of Engineering and technology.
2. To study and critically assess the approaches to pollution control, environmental and resource management, sustainable development, cleaner technologies, Environmental Legislation based on an understanding of the fundamental, environmental, social and economic dimensions.
3. To know the various types of probable disaster and its mitigation measures.
4. To have the knowledge of ethics and emotional intelligence.

Course Outcomes:

The student after undergoing this course will be able to:

1. Understand the Present, past and future status of the Environment.
2. Demonstrate the knowledge of core concepts and components in Environmental Science.
3. Explain environment management by equitable handling of natural resources, pollution control technologies, biodiversity and ecosystem protection.
4. Identify environmental issues and problems arising due to human activities at local, national and global level and acquire knowledge of mitigation measures and explain the importance of Environmental Legislation and its implementation.
5. Get acquainted for preparedness towards natural disaster.
6. Released the importance of ethics for engineers, emotional intelligence etc.

SECTION I: ENVIRONMENTAL SCIENCES

UNIT-1 (12 Hours)

The Environment: Definition, Objectives, Principles, Importance, ethics and Scope of Environmental education, Need for public awareness. Role of an individual in conservation of natural resources.

Natural Resources: Renewable and non-renewable resources, Natural resources and associated problems.

Forest Resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.

Water Resources: Use and over-utilization of surface and ground water, conflicts over water, dams-benefits and problems.

Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food Resources: World food problem, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy Resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

UNIT-2 (12 Hours)

Environmental Pollution: Definition, Causes, effects and control measures of- Air Pollution, Water Pollution, Marine Pollution and Noise Pollution, Fire works - crackers effects and control measures.

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the Environment from Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, Rain water harvesting, Watershed management.

Disaster Management: Planning, Disaster Preparedness, Response and Recovery. Guidelines of national disaster management division. Rehabilitation policy: Objectives and guidelines.

SECTION II: SOCIAL SCIENCES

UNIT-3 (12 Hours)

Personality : Freudian & humanistic Theory, Personality Development, Notion of successful personality, Emotional Intelligence.

Motivation: Theories of motivation.

Stress Management: cause & effect. Coping mechanisms. Prayer, Meditation, Yoga.

Professional work ethic for the engineer.

Team: Leadership ,Team culture. Team Attitudes, Interpersonal skills.

Engineer's Responsibility: individual & social level.

Positivity: Attitudes, lifestyle, living.

UNIT-4 (12 Hours)

Education: Nature. Scope, Limitations.

Concept of Culture: Identity, Conflict, Changes in culture, Acculturation, Enculturation, Cultural diffusion, Globalisation.

Social Issues : Women empowerment, Religious Tolerance.

Business Etiquettes: Policies, Implications.

Civil Society Groups: An emergent social phenomenon.

Recommended readings:

1. S. Deswal, A. Deswal; A Basic Course in Environmental Studies; Dhanpat Rai & Co Publication.
2. N.K. Uberoi; Environmental Studies, Excel Books Publications New Delhi, first edition; 2005.
3. D. K. Asthana and Meera Asthana; A Text Book Of Environmental Studies; S. Chand Publications New Delhi, 1st Edition; 2006.
4. Mrinalini Pandey; Disaster Management; Wiley Publication.
5. T. G. Miller; Environmental Science; Wadsworth Publication.
6. C. N. Shankar Rao; Principles of Sociology with an introduction to social thoughts; S. Chand and Co. Publication.
7. Robert A. Baron; Psychology; Pearson Pvt. Ltd.

NOTE: Section I and Section II to be answered on separate answer book

FE 2.6 ENGINEERING GRAPHICS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
FE 2.6	Engineering Graphics	2	--	4	4	100	25	25	--	--	**150**

Course Objectives:

1. Understand and appreciate the importance of Engineering Graphics in Engineering.
2. Develop the ability to visualize and communicate three-dimensional shapes.
3. Increase ability to communicate with people with engineering background.
4. Understand the basic principles of Technical/ Engineering Drawing.
5. Know how to create drawings which follow the engineering graphics conventions/standards.

Course Outcomes:

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

1. Enhance the imagination skills required in converting idea into drawing.
2. Understand projection systems in engineering drawing.
3. Analyze solids and their cut sections along with development of surfaces.
4. Understand Orthographic and Isometric projection of parts.

UNIT-1 (8 hours)

Introduction to engineering graphics, different types of lines used in engineering graphics, curves involving conic sections, cycloid and involute curves.

Projections of points, straight lines- when line is parallel to both the planes, parallel to one and perpendicular to other, line inclined to both the principal planes.

UNIT-2 (8 hours)

Projections of Planes: Circle, square, triangle, rectangle, pentagon, hexagon and combination of these.

Projections of Solids: Cube, tetrahedron, cylinder, cone, pyramid, prism.

UNIT-3 (8 hours)

Sections of Solids.

Developments of lateral surfaces of the objects like cube, tetrahedron, cylinder, cone, pyramid and prism.

UNIT-4 (8 hours)

Orthographic projection (using 1st angle projection only) of machine parts and castings etc.
Isometric projection.

Recommended Readings:

1. N. D. Bhatt; Engineering Drawing; Charotar Publishing House Pvt. Ltd.; 2015.
2. K. R. Gopalkrishna; Engineering Drawing; Subash Publishing House; 2012.
3. K. R. Mohan; Engineering Graphics; Dhanpat Rai Publishing Co.; 2015.
4. P. J. Shah; Engineering Drawing; Vol. 1 & 2 – Praveen Shah Publishers; 2003.
5. P. S. Gill; Engineering Drawing; S. K. Kataria & Sons; 2013.

List of Practicals:

During practicals, drawing sheets on following topics (one each) should be completed and submitted within given deadline. (The Term Work marks to be awarded based on the assessment of sheets completed)

1. Ellipse, parabola and hyperbola
2. Cycloid, involute
3. Projection of points
4. Projection of lines
5. Projection of planes
6. Projection of solids
7. Sections of solids
8. Development of surfaces
9. Orthographic projection
10. Isometric projection

FE 2.7 WORKSHOP PRACTICE - II

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
FE 2.7	Workshop Practice - II	--	--	4	--	--	--	50	--	--	**50**

Course Objectives:

1. Understand the basic workshop skills from raw material stage to finished product.
2. Develop the skills required for turning, plumbing, pattern making and foundry jobs.
3. Understand the use of tools, machines and effort required to complete the job.

Course Outcomes:

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

1. Achieve the skills required to complete turning, plumbing, pattern making and foundry jobs.
2. Understand the concepts of machining, joining and forming processes.

(I) Turning/Machining

i) Demonstration of lathes, drilling machines, grinding machines, milling machines and shapers, tools & equipments.

ii) Practical: At least one job on lathe covering operations such as facing, centre drilling, plain turning, step turning, taper turning, chamfering.

(II) Plumbing

i) Demonstration of various tools and equipments used by a Plumber.

ii) Demonstration of various plumbing fittings.

iii) Practical: At least one job on G.I. pipe or P.V.C. pipe fitting by threading.

(III) Pattern Making

i) Study of various pattern materials, pattern allowances and demonstration of pattern making tools.

ii) Practical: At least one simple pattern of wood.

(IV) Foundry

i) Demonstration of various tools, equipments, and furnaces used in Foundry shop.

ii) Practical: Preparation of at least four different types of sand moulds.

Practicals mentioned above are to be conducted in the workshop and the jobs are to be submitted for assessment at the end of the course. The Term Work marks are to be awarded based on the assessment of the jobs completed.

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/she submits to the workshop jobs completed in all trades during the semester.

SECOND YEAR: INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTION AND EXAMINATION

(RC 2016-17)

SEMESTER –III

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P#	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 3.1	Applied Mathematics-III	3	1	--	3	100	25	--	--	--	**125**
IT 3.2	Numerical Methods	3	1	2	3	100	25	25	--	--	**150**
IT 3.3	Signals and Systems	3	1	--	3	100	25	--	--	--	**125**
IT 3.4	Analog and Digital Circuits	3	1	2	3	100	25	--	--	25	**150**
IT 3.5	Data Structures	3	1	2	3	100	25	--	25	--	**150**
IT 3.6	Object-Oriented Programming System	3	1	2	3	100	25	--	25	--	**150**
TOTAL		**18**	**06**	**08**	**--**	**600**	**150**	**25**	**50**	**25**	**850**

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/ she submits to the department a certified journal reporting the experiments conducted during the semester.

SECOND YEAR: INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTION AND EXAMINATION

(RC 2016-17)

SEMESTER –IV

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P#	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 4.1	Discrete Mathematical Structures	3	1	--	3	100	25	--	--	--	**125**
IT 4.2	Entrepreneurship Development	3	--	--	3	100	25	--	--	--	**125**
IT 4.3	Computer Organization and Architecture	3	1	2	3	100	25	25	--	--	**150**
IT 4.4	Software Engineering	3	1	2	3	100	25	--	25	--	**150**
IT 4.5	Design and Analysis of Algorithms	3	1	2	3	100	25	--	--	25	**150**
IT 4.6	Microprocessors and Interfacing	3	1	2	3	100	25	--	25	--	**150**
TOTAL		**18**	**05**	**08**	**--**	**600**	**150**	**25**	**50**	**25**	**850**

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/ she submits to the department a certified journal reporting the experiments conducted during the semester.

IT 3.1 Applied Mathematics-III

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 3.1	Applied Mathematics-III	3	1	--	3	100	25	--	-	--	**125**

Course Objectives: The aim of learning this course is to provide students with the mathematical knowledge and skills necessary to support their concurrent and subsequent engineering studies.

Course Outcomes:

After successful completion of this course the student would be able to

1. Compute the rank and inverse of a matrix and solve system of linear equations.
2. Compute Eigen values and Eigen vectors of a given matrix, apply Cayley Hamilton theorem.
3. Understand the basic concepts of probability, random variables, mean, variance, standard deviation and probability distributions, correlation and regression.
4. Use tools like Laplace transforms and Fourier transforms in formulating and solving Engineering problems.
5. Understand Z- transforms and its properties and apply it in solving difference equations.

UNIT - 1 (12 Hours)

Linear Algebra: Types of matrices, adjoint, inverse. Elementary transformations.Rank of a matrix, normal form, echelon form. Linear system of equations AX = B and AX = 0. Linearly independent and dependent vectors, Eigen values and Eigen vectors, Cayley Hamilton Theorem, minimal equation, Diagonalization.

UNIT - 2 (14 Hours)

Probability and Probability distributions: Definition, properties, Axioms of probability, Conditional probability, Baye's theorem, Random Variables. Discrete probability distribution, Continuous probability distribution, Distribution function. Expectation and Variance, Moment generating function. Special distributions: Binomial, Poisson, Geometric, Normal, Uniform and exponential. Correlation and regression.

UNIT - 3 (10 Hours)

Laplace Transforms: Definition, Existence conditions, properties, inverse Laplace

transforms. Laplace transform of periodic functions, Convolution theorem, Laplace
transform of Dirac-Delta function, Application of Laplace transforms in solving linear
differential equations with initial conditions and system of linear simultaneous differential equations.

UNIT - 4 (12 Hours)

Fourier and Z-transforms: Definition, properties, inverse. Convolution theorem. Applications of Fourier and Z-transforms.

Recommended Readings:

1. Grewal B. S.; Higher Engineering Mathematics; Khanna Publications, New Delhi.
2. H. K. Dass; Advanced Engineering Mathematics; S. Chand &Co.
3. Erwin Kreyzing; Advanced Engineering Mathematic; Wiley.
4. Kandasamy, P.; Engineering Mathematics; Chand & Co., New Delhi.
5. Srimanta Pal, Subodh C. Bhunia; Engineering Mathematics; Oxford University Press.
6. Dr. D. S. C ; Engineering Mathematics- Part III ; Prism Books Pvt. Ltd.
7. Montgomery, D. C., Probability and Statistics for Engineers; Prentice Hall of India.

IT 3.2 NUMERICAL METHODS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 3.2	Numerical Methods	3	1	2	3	100	25	25	--	--	**150**

Course Objectives:

The subject aims to provide the student with:

1. An ability to understand the use of numerical methods in modern scientific computing,
2. An understanding of finite precision computation
3. An understanding to calculation and interpretation of errors in numerical method.

Course Outcomes:

The student after undergoing this course will be able to:

1. Apply numerical algorithms to solve Engineering problems.
2. Explain the use of numerical methods in modern scientific computing.
3. Design algorithms with finite precision.
4. Explain the calculation and interpretation of errors in numerical methods.
5. Illustrate the working of numerical algorithms using examples.

UNIT -1 (12 Hours)

Errors and Approximations: Introduction, sources of errors, problems in computations, safeguards against errors, floating point arithmetic, absolute error, relative error, percentage error – calculations. Solutions of Non-linear equations :Bisection Method, False Position Method, Newton Raphson, Secant methodDirect solution of Linear Equations: Solution by Elimination, Basic Gauss Elimination method, Gauss Elimination with pivoting, Gauss – Jordan method

UNIT -2 (12 Hours)

Iterative Solutions of Linear Equations: Jacobi iteration method, Gauss Seidel method, Method of relaxation, convergence of iteration methods. Interpolation: Linear Interpolation, Lagranges Interpolation Polynomial, Newton's Interpolation Polynomial, Divided difference table, Interpolation with Equidistant points. Extrapolation, Inverse interpolation. Regression: Fitting Linear Equations, Fitting transcendental equations, Fitting polynomial function

UNIT -3 (12 Hours)

Numerical Differentiation: Differentiating Continuous Functions, Differentiating Tabulated functions, difference tables, Richardson Extrapolation.
Numerical Integration: Trapezoidal Rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Romberg Integration

UNIT -4 (12 Hours)

Numerical Solution of Ordinary Differential equations: Taylor Series Method, Euler's methods, Heun's Method, Polygon Method, Runge-Kutta methods. Numerical Solution of Partial Differential Equations: Deriving differential Equations, Elliptic Equations, Parabolic Equations, Hyperbolic Equations .

Recommended Readings:

1. E. Balaguruswamy; Numerical Methods;Tata Mc Graw Hill.
2. S. S. Shastry ; Introductory Methods of Numerical Analysis; PHI.
3. E.V. Krishnamurthy and Sen; Numerical Algorithms; PHI.
4. Rajaraman; Computer Oriented Numerical Techniques; PHI.
5. B.S. Grewal ; Numerical Methods in Engineering and Science; Khanna Publications.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments. The Term Work Marks to be awarded based on the assessment of experiments conducted.)

1. To calculate absolute, relative and percentage relative error.
2. To implement Bisection method.
3. To implement Regula Falsi method.
4. To implement Newton Raphson method.
5. To implement Secant method.
6. To implement Gauss Seidal method.
7. To implement Lagranges interpolation.
8. To implement Trapezoidal rule.
9. To implement Simpson's rule.
10. To implement Euler's method.

IT 3.3 SIGNALS AND SYSTEMS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 3.3	Signals and Systems	3	1	--	3	100	25	--	--	--	**125**

Course Objectives:

The subject aims to provide the student with:

1. Understanding of time-domain representation and analysis of signals and systems.
2. An ability to perform frequency-domain representation and analysis using Fourier tools.
3. An ability to perform frequency-domain representation and analysis using Laplace transform and Z transforms.
4. An understanding of sampling, aliasing and Signal reconstruction.

Course Outcomes:

The student after undergoing this course will be able to:

1. Classify different types of signals and systems.
2. Illustrate the properties of continuous-time and discrete-time systems.
3. Analyze Continuous-time (CT) and discrete-time (DT) systems in time-domain using convolution.
4. Analyze CT and DT systems in Frequency domain using tools like CTFS, CTFT, DTFS and DTFT.
5. Explain the concepts of Sampling, aliasing and Signal reconstruction.
6. Analyze CT and DT systems using Laplace transforms and Z Transforms.

UNIT -1 **(12 Hours)**

Introduction to signals and systems. Overview of Specific Systems, Classification of Signals, Basic operations on Signals, Elementary Signals, Systems Viewed as Interconnection of operations, Properties of System.

Time-Domain Representation of Linear Time-Invariant Systems: Introduction, The Convolution Sum, Convolution Sum Evaluation Procedure, The Convolution Integral, Convolution Integral Evaluation Procedure, Interconnections of LTI systems, Relations between LTI system Properties and Impulse Response, Step Response.

UNIT -2 (12 Hours)

Fourier Representation of Signals and Linear Time-Invariant Systems – Complex Sinusoids and Frequency Response of LTI Systems, Fourier Representations for Four Classes of Signals. The Fourier Transform, Properties of Fourier Representations, Linearity, Symmetry, Convolution, Differentiation and Integration, Time and Frequency –Shift , Finding Inverse Fourier Transforms by Using Partial-Fraction Expansions, Multiplication Property, Scaling Properties, Parsevals Relationships, Time-Bandwidth Product, Duality.
Applications of Fourier Representations: a) Mixed Signal Classes - Fourier Transform Representations of Periodic Signals, Convolution and Multiplication with Mixtures of Periodic and Non periodic Signals, Fourier Transform Representation of Discrete-Time Signals, Sampling, Reconstruction of Continuous-Time Signals from b) Communication Systems –Type of Modulation, Benefits of Modulation, Full Amplitude Modulation.

UNIT -3 (12 Hours)

Representing Signals by Using Continuous-Time Complex Exponentials: the Laplace Transform – Introduction, The Laplace Transform, The Unilateral Laplace Transform, Properties of the Unilateral Laplace Transform, Inversion of the Unilateral Laplace Transform, Properties of the Bilateral Laplace Transform, Properties of the Region of Convergence, Inversion of the Bilateral Laplace Transform, The Transfer Function, Causality and Stability, Determining the Frequency Response from Poles and Zeros.

UNIT -4 (12 Hours)

Representing Signals by Using Discrete-Time Complex Exponentials: the z-Transform – Introduction, The z-Transform, Properties of the Region of Convergence, Properties of the z-Transform, Inversion of the z-Transform, The Transfer function, Causality and Stability, Determining the Frequency Response from Poles and Zeros, Computational Structures for Implementing Discrete-Time LTI Systems, The Unilateral z-Transform.

Recommended Readings:

1. Simon Haykin and Barry Van Veen; Signals and Systems; John Wiley &Sons (Asia)Pvt. Ltd; 2/e.
2. Oppenheim and Willskay with Hamid Nawab; Signals and Systems; Prentice Hall of India.
3. Linder; Introduction to Signals and Systems; McGraw Hill.
4. Nagrath, Sharan, Rajan and Kumar; Signals and Systems; McGraw Hill.
5. Zeimer, Tranter, Fannin, IE; Signals and Systems; Prentice Hall of India.

IT 3.4 ANALOG AND DIGITAL CIRCUITS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 3.4	Analog and Digital Circuits	3	1	2	3	100	25	--	--	25	**150**

Course Objectives:

The subject aims to provide the student with:

1. An understanding of various Number Systems & Codes along with Boolean algebra.
2. An ability to solve Boolean algebra problems.
3. An ability to design combinational and sequential circuits.
4. An understanding of integrated analog and digital circuits.
5. An understanding of amplifiers, voltage regulators and oscillators.

Course Outcomes:

The student after undergoing this course will be able to:

1. Convert the numbers from one radix to another and perform arithmetic operations using the 1's and 2's compliments.
2. Solve Boolean Expressions using Boolean algebra, K-maps and VEM and implement them using logic gates.
3. Design any given combinational circuits.
4. Explain different flip flops, registers and their applications.
5. Design sequential circuits and state machines.
6. Design synchronous and asynchronous counter circuits.
7. Explain arithmetic circuits like adders and multipliers and their applications.
8. Design timer and analog and digital circuits using op amps.

UNIT -1 **(12 Hours)**

Digital Logic: Binary Numbers, basic gates, Boolean algebra, Nor and Nand Gates, And or Invert Gates, De Morgan's theorem, Positive and Negative Logic.

Arithmetic Circuits Binary Addition & Subtraction, Unsigned binary numbers, 2's Complement Representation & Arithmetic, Adder-Subtracter.

Combination Logic Circuits Boolean laws/theorems, Sum of Products, Truth table, Pairs, Quads, and Octets, Karnagh mapping, Product of Sums Method and Simplification.

UNIT -2 (12 Hours)

Data Processing Circuits: Multiplexers, Demultiplexers, decoder, BCD to decimal decoder, 7-segmant decoder, encoders. Flip-Flops: RS Flip-Flops , D and JK Flip-Flops, Flip-Flop timing, JK Master-Slave Flip-Flops. Timing Circuits: Schmitt Trigger, 555 Timers Astable, Monostables with input logic.

UNIT -3 (12 Hours)

Registers: Types of Registers, Serial in-serial out, Serial in-parallel out, Parallel in-serial out, Parallel in-parallel out, Ring counters.

Counters: Asynchronous counters, Synchronous counters, changing the counter modulus, decade, and shift counters, A MOD-10 shift counter with decoding. D/A and A/D conversion and its Specifications.

UNIT -4 (12 Hours)

Op-amp: ideal characteristics ,op-amp-as inverting amplifier – op-amp as non-inverting amplifier.
Application: Adder, Subtractor, Integrator, Differentiator, Comparator
Oscillators: Barkhansen criterion for oscillation – Hartley oscillator – Colpits' oscillator phase shift oscillator Piezoelectric crystals – crystal oscillator.
Voltage Regulators: Definition, design and letter using IC 723.

Recommended Readings:

1. R.P. Jain; Modern Digital Electronics; TMH; 2/e.
2. Ramakant A. Gayakwad ; OpAmps& Linear Integrated Circuits; PHI; 2/e.
3. N NBhargava, D C Kulshreshtha, S C Gupta ; Basic Electronics and Linear Circuits; McGraw Hill Education (India) Private Limited;2/e.
4. A.P. Malvino, Donald P. Leach ; Digital Principles and Applications; TMH; 4/e.
5. Malvino ; Digital Computer Electronics; TMH; 2/e.
6. MIllman and Halkias ; Integrated Electronics: Analog and Digital Electronic Circuits and Systems; TMH.
7. Vishwanathan, Mehta and Rajaraman ; Electronics for Scientist & Engineer; PHI.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. Verification of Logic Gates.
2. Boolean Algebra.
3. BCD to Excess 3 & Excess 3 to BCS Conversion.
4. Binary to Gray code and Gray code to Binary Conversion.

5. Encoder and Decoder.
6. Mux and De-mux using only NAND gates.
7. Flip Flops.
8. Johnson Counter / Ring Counter.
9. Sequence Generator.
10. Multivibrator.

IT 3.5 DATA STRUCTURES

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 3.5	Data Structures	3	1	2	3	100	25	--	25	--	**150**

Course Objectives:

1. Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs
2. Use various data structures effectively in application programs.
3. Demonstrate understanding of various sorting algorithms
4. Understand and apply fundamental algorithmic problems including Tree traversals, Graph traversals, and shortest paths.
5. Demonstrate understanding of various searching algorithms.

Course Outcomes:

The student after undergoing this course will be able to:

1. Use different data structures.
2. Describe common applications for arrays, linked lists, stacks, queues, trees, and graphs.

UNIT -1 (12 Hours)

Introduction to data representation and data structures. Representation of arrays and their applications. Stacks: representation of stacks and its applications, Recursion, Tower of Hanoi, Implementation of recursive procedures by stacks
Queues: representation of queues and its applications, circular queues, priority queues, dequeue.

UNIT -2 (12 Hours)

Lists: Singly linked list, doubly linked list, circular linked list, linked stacks and queues and its applications.
Trees: Basic terminology, binary trees and their representations, traversals of trees, applications of trees – infix/postfix representation if expressions and inter-conversion, etc. B-tree, AVL.

UNIT -3 (12 Hours)

Sorting: Basic concept, Exchange sort, Selection sort, Insertion sort, Quick sort, Tree sort, Merge sort, Radix sort, Heaps and Heap sort.
Searching: Basic searching techniques, sequential and binary search, tree searching

Hashing: Hash function, collision handling mechanisms.

UNIT -4 (12 Hours)

Graphs: Basic terminology, representation of graphs, directed and undirected graphs and their traversals, depth first and breadth first search, spanning trees Applications of graphs: shortest path problem, topological sorting, matching.

Recommended Readings:

1. Alfred V. Aho, John E. Hopcroft & J. D. Ullman; Data Structures and Algorithms; Addison Wesley.
2. Yedidyah Langson, Moshej Augenstein, Aaron M. Tenenbaum; Data Structures using C & C++; Prentice Hall of India.
3. Robert L. Kruse; Data Structures and Program Design in ; PHI.
4. Sahni; Data Structures, Algorithms and Applications in C++; MGH.
5. Ellis Horowitz and Sartaj Sahni ; Fundamentals of Data Structures; Galgotia Publications.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. Implement stack and use it to convert infix to postfix expression.
2. Linked implementation of stack.
3. Array implementation of queue.
4. Linked implementation of queue.
5. Array based circular queue.
6. Implement dequeue using array.
7. Implement singly linked lists.
8. Implement doubly linked lists.
9. Implement an binary tree. Produce its pre-order, in-order, and post-order traversals.
10. Implement binary search tree.
11. Implement hashing techniques.
12. Implement the following sorting algorithms:
    Bubble Sort, insertion sort, selection sort, heap sort, quick sort, merge sort.
13. Implement linear search and binary search.
14. Breadth first search and Depth first search.

IT 3.6 OBJECT ORIENTED PROGRAMMING SYSTEM

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 3.6	Object Oriented Programming Systems	3	1	2	3	100	25	--	25	--	**150**

Course Objectives:

The subject aims to provide the student with:

1. An understanding of the concept of object oriented programming.
2. An understanding of the concepts of data hiding, data abstraction, polymorphism inheritance and exception handling.
3. Ability to understand the generic principles of object oriented programming using "C++".
4. An understanding the use of templates in "C++".
5. An ability to plan, design, execute and document sophisticated object oriented programs to handle different computing problems.

Course Outcomes:

The student after undergoing this course will be able to:

1. Differentiate between structure oriented programming and object oriented programming.
2. Design algorithms using principles of object oriented programming.
3. Apply concepts of operator overloading, constructors and destructors.
4. Explain the applications of polymorphism and inheritance in object oriented programming.
5. Apply the knowledge of standard template library achieve reusability.
6. Illustrate stream I/O and exception handling.

UNIT - 1 **(12 Hours)**

Introduction: Principles of object oriented programming, object-oriented paradigm. Overview and Benefits of Object-Oriented Programming. Basic concept of oops-Objects, Classes, Encapsulation, Data Abstraction, Inheritance, Polymorphism, Dynamic Binding, Message Passing. Structure of a C++ program, Data types. Constants , tokens, expressions, control structures, functions ,arrays, Strings.

UNIT - 2 **(12 Hours)**

Classes and Objects, Constructors and destructors. Concepts of polymorphism, Function overloading, operator overloading, Overloading types, & rules, explicit & implicit type conversion operators, Pointers and Pointers arithmetic.

UNIT - 3 (12 Hours)

Inheritance, extending classes, multiple inheritance, hybrid inheritance, pointers, virtual functions, and classes, and polymorphism. I/O streams and classes, Manipulators, Classes for file streams, file I/O operations and functions.

UNIT - 4 (12 Hours)

Template functions and classes, implementation, Exception handling: Need, Throwing mechanism, try, catch block, Introduction to the Standard Template Library: Components of STL, Containers, Algorithms, Iterators , Applications.

Recommended Readings:

1. E Balaguruswamy; Object oriented programming with C++; Tata McGraw Hill.
2. K R Venugopal, Rajkumar, T. Ravishankar; Mastering C++; Tata McGraw Hill.
3. Paul Deitel, Harvey M. Deitel; C++ for Programmers; Pearson Education.
4. Herbert Schildt ; Teach yourself C++; TMH.
5. J. R. Hubbar; Programming with C++; Schaum's Outlines;McGraw Hill.
6. D. Ravichandran ; Programming with C++; McGraw Hill.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. Basics of C++ (input /output / control statements / functions/ array/ string)
2. Classes and Objects
3. Constructors and Destructors with Pointers.
4. Operator Overloading.
5. Inheritance and Polymorphism.
6. Console I/O and files.
7. Template.
8. Exception Handling.
9. STL and String manipulation.
10. Mini Project (Individual project).

IT 4.1 Discrete Mathematical Structures

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 4.1	Discrete mathematical Structures	3	1	--	3	100	25	--	-	--	**125**

Course Objective: This course is designed to introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures that are essential to the field of Computer Science.

Course Outcomes: On completing this course students will be able to

1. Perform operations on discrete structures such as sets, functions, relations, and sequences.
2. Know the properties of equivalence relations and partial orderings.
3. Apply algorithms and use definitions to solve problems to prove statements in elementary number theory.
4. Construct mathematical arguments using logical connectives and quantifiers and verify the correctness of an argument using propositional and predicate logic and truth tables.
5. solve problems using the basic principles of counting theory, including permutation, combinations, and the pigeonhole principle
6. Solve problems involving recurrence relations and generating functions.
7. Understand lattices and Boolean algebras.
8. Explain basic definitions and properties associated with simple planar graphs, including isomorphism, connectivity, and Euler's formula, and describe the difference between Eulerian and Hamiltonian graphs.
9. Use graphs and trees as tools to solve combinatorial optimization problems

UNIT - 1 (12 Hours)

Set Theory : Sets, Set Operations, Relations and their properties, Equivalence Relations, partial orderings.
Functions: One-to-One and Onto Functions, Inverse Function, Composition of functions, Graphs of functions and some important functions.
Integers: Integers and division (excluding applications of congruences and cryptology), primes and greatest common divisors, Integers and algorithms.

UNIT - 2 (12 Hours)

Propositional Calculus: Propositional logic, propositional equivalences, predicates and quantifiers, rules of inference.
Boolean Algebra: Boolean functions, representing Boolean functions.
Mathematical Induction: Principle of Mathematical Induction and applications.

UNIT - 3 (12 Hours)

Counting: The basics of counting, pigeonhole principle, permutations and combinations, binomial coefficients.
Advanced Counting Techniques: Recurrence relations, solving linear recurrence relations, inclusion –exclusion principle, applications of inclusion – exclusion principle.

UNIT - 4 (12 Hours)

Graph theory: Graphs and graph models, graph terminology and special types of graphs, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, shortest path problems, planar graphs, graph coloring.
Trees: Introduction to Trees, applications of trees, tree traversal, Spanning Trees, Minimal Spanning Trees.

Recommended Readings:

1. Kenneth H. Rosen; Discrete Mathematics and Its Applications; Tata McGraw Hill (6th edition).
2. B Kolman, R.C. Busby and Sharon C. Ross; Discrete Mathematical Structures; Prentice Hall.
3. J. P. Tremblay and R. Manohar, McGraw Hill; Discrete Mathematical Structures with Applications to Computer Science; New York McGraw Hill.
4. Swapan Kumar Sarkar; Discrete Mathematics; S.Chand Publication.
5. Dr. D. S. C ;Discrete Mathematical Structures; Prism Books Pvt. Ltd.
6. G.V.Kumbhojkar; Discrete Structures And Graph Theory; Pradeep Prakashan.

IT 4.2 ENTREPRENEURSHIP DEVELOPMENT

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 4.2	Entrepreneurship Development	3	1	--	3	100	25	--	--	--	**125**

Course Objectives:

The subject aims to provide the student with:

1. An understanding of qualities and requirements of an entrepreneur.
2. An ability to understand the requirements of Project identification, development and implementation.
3. An understanding of Break even analysis.
4. An understanding of the role of Communication in organizations.
5. An understanding of the complexity of managing in a global world.

Course Outcomes:

The student after undergoing this course will be able to:

1. Demonstrate the skills for project identification, development and implementation.
2. Explain the essential qualities and requirements of an entrepreneur.
3. Apply the concepts of Break even analysis.
4. Explain the role of effective Communication in organizations.
5. Apply managerial concepts to solve complex problems related to global issues.

UNIT - 1 (12 Hours)

Definition and clarification of concept of entrepreneurship: Qualities of an entrepreneur
Skills required for entrepreneurship, Functions of an entrepreneur, Importance of entrepreneur in economic development. Theories of Entrepreneurship: Economic theory, Sociological theory, Psychological theory. Types of entrepreneurs: Based on type of business, Based on use of technology, Based on motivation, Based on stages of development, Based on motive, Based on capital ownership, Danhof's classification. Project identification: External environment analysis, Meaning and characteristics of a project, Classification of projects, Project life-cycle, Project identification, Sources and screening of project ideas.

Project formulation: Meaning and significance, Feasibility analysis, Techno-economic analysis, Input analysis, Financial analysis, Social cost benefit analysis. Project feasibility. Pre-feasibility study: Project feasibility report - Meaning, Importance and Contents. Importance of location of a project.

UNIT - 2 (12 Hours)

Project financing and institutional finance: Classification of capital – Fixed capital -Meaning, Factors governing fixed capital requirements, Working capital – Meaning and concepts, Types, Factors determining working capital requirements. Sources of finance – Share capital, Debenture capital, Lease finance and term loans from commercial banks. Institutional finance. IFCI, ICICI, IDBI, SIDBI, EXIM Bank, Commercial banks – Functions and schemes. Small scale industries: Definition and characteristics, Role in Indian economy, Steps for starting a SSI unit, Problems faced by SSIs. Incentives and subsidies – Need and Types.

UNIT - 3 (12 Hours)

Financial aspects: Break even analysis, Income statement, Balance sheet. Profit and loss account, Fund flow statement, Ratio analysis – Liquidity, leverage and profitability ratios. Capital budgeting – Need, Importance, Process, Nature of capital budgeting problem, Weighted average cost of capital, approaches to fixing a capital budget, methods of project evaluation: Payback period, Accounting rate of return, discounted cash flow, Net Present Value Index.

UNIT - 4 (12 Hours)

Managerial aspects: Introduction to management, Functions of a manager, Different schools of management. Types of organisation structures, Leadership-Trait theory, Behavioural theory, Contingency theory, Motivation -Carrot and stick theory, Maslow's theory, Herzberg's theory, Vroom's theory, McClelland's theory. Communication – Importance, Process, types and forms, Barriers to communication, Principles of effective communication. Marketing management, Meaning and importance, Marketing mix, Types of marketing tasks, Market segmentation – process and criteria, Marketing implementation and control.

Recommended Readings:

1. A. Vinod ; Entrepreneurial Development and Project Management ; Calicut University Publication; 2002, 4/e.
2. C.B. Gupta and S.S. Khanka; Entrepreneurship and Small Business Management; Sultan Chand and Sons; 1997,2/e.
3. C.B.Gupta and N.P.Srinivasan ; Entrepreneurship; Sultan Chand and Sons; 1997,4/e.
4. Philip Kotler ; Marketing Management ; Pearson Education, 2003; 11/e.
5. P. C. Tripathi and P.N. Reddy ; Principles of Management ; Tata McGraw Hill; 1991, 2/e.
6. Prassanna Chandra; Fundamentals of Financial Management; Tata McGraw Hill; 2001, 3/e.
7. Harold Koontz and Heinz Weihrich ; Management; McGraw Hill; 1988, 9/e.

IT 4.3 COMPUTER ORGANIZATION AND ARCHITECTURE

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 4.3	Computer Organization and Architecture	3	1	2	3	100	25	25	--	--	**150**

Course Objectives:

The subject aims to provide the student with:

1. An understanding of relationship between hardware and software.
2. An ability to recognize how machine organization impacts the efficiency of applications written in a high-level language.
3. An ability to understand the system performance and concepts of RISC architecture.
4. An understanding of different ways of communicating with I/O devices and standard I/O interfaces.
5. An understanding of memory hierarchy.
6. An ability to develop solutions for basic programs using assembly language.

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain the organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.
2. Identify high performance architecture design.
3. Create an assembly language program to program a microprocessor system.
4. Explain the ways to take advantage of instruction level parallelism for high performance processor design.
5. Demonstrate memory hierarchy and its impact on computer cost/performance.

UNIT - 1 (12 Hours)

Introduction: Organization and Architecture, Structure and function
A top level view of Computer Function and Interconnection: Computer Components, Computer Function, Interconnection structure, Bus interconnection.
Computer Arithmetic: Arithmetic and Logic Unit, Integer Representation, Integer Arithmetic, Floating Point Representation, Floating Point Arithmetic.
Instruction Sets: Machine Instruction Characteristics, Types of Operands, Addressing Modes and Formats- Addressing, Instruction Formats.

UNIT - 2 (12 Hours)

Cache Memory: Computer memory system Overview, Cache Memory Principles, Elements of Cache Design
Internal Memory Technology: Semiconductor Main Memory, Error correction, RAM and ROM Chips , Memory address map/Memory connection to CPU , Associative Memory -Hardware organization
External Memory: Magnetic Disk, RAID, Optical Memory
Virtual Memory : Address space and memory space, Address mapping using pages
Associative memory page table, Page replacement.

UNIT - 3 (12 Hours)

Input/output: External Devices, I/O Modules, Programmed I/O, Interrupt Driven I/O, Direct Memory Access (DMA Controller), I/O Channel and Processor.
Processor Structure and Functions: Processor Organization, Register Organization, The instruction cycle, Instruction Pipelining.
Quantitative principles of computer design : Amdahl's Law, CPU performance equation- MIPS as a metric.

UNIT - 4 (12 Hours)

Reduced Instruction Set Computers (RISCs) : Instruction execution characteristics, The use of Large Register file, Compiler based Register Organization, Reduced instruction set architecture, RISC versus CISC controversy, Introduction to VLIW.
Control unit operation: Micro operations, Control of the processor, Hardwired implementation.
Micro programmed control: Basic concepts, Microinstruction sequencing, Microinstruction execution.

Recommended Readings:

1. William Stalling; Computer Organization and Architecture: Designing for performance; Pearson Education; 2010; 8/e ; . ISBN 978-81-317-3245-8.
2. Morris Mano ; Computer system architecture; Pearson Education; 1993; 3/e; ISBN 81-7808-687-5.
3. Patterson and Hennessy; Computer Architecture A Quantitative Approach; Morgan Kaufmann Publishers; 1996; 2/e; ISBN 1-55860-329-8.
4. Kai Hwang; Advanced Computer Architecture - Parallelism, Scalability, Programmability; Tata McGraw Hill, 2010; 2/e.
5. Carl Hamacher, Zvonko Vranesic, Safal Zaky; Computer Organization; 5/e.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments. The Term Work Marks to be awarded based on the assessment of experiments conducted.)

1. Program to convert a decimal number into binary value.
2. Program to convert a decimal number into hexadecimal value.
3. Program to convert a decimal number into octal value.
4. Program to convert a binary number into decimal value.
5. Program to convert a hexadecimal number into decimal value.
6. Program to convert a octal number into decimal value.
7. Program to Implement Floating-Point Addition.
8. Program to Implement Floating-Point Subtraction.
9. Program to Implement Floating-Point Multiplication.
10. Program to Implement Floating-Point Division.
11. Program to Implement Multiplication of Unsigned Binary Integers.
12. Program to Implement Booth's Algorithm for Two's Compliment Multiplication.

IT 4.4 SOFTWARE ENGINEERING

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 4.4	Software Engineering	3	1	2	3	100	25	--	25	--	**150**

Course Objectives:

The subject aims to provide the student with:

1. An understanding of the current issues and practices in software engineering with an emphasis on the software development process.
2. An ability to understand the software planning and management.
3. Ability to plan software requirements specifications, system modeling, quality specifications, and program specifications.
4. An understanding of software design approaches.
5. An understanding of the requirements of software project management.
6. An ability to recognize social, ethical, cultural, and safety issues in software deployment.

Course Outcomes:

The student after undergoing this course will be able to:

1. Design a specification a software system for any existing system.
2. Plan a design of software system as per the specification.
3. Implement a software system it with readable, reusable, modular and object-oriented techniques.
4. Design a test procedure for validity, correctness and completeness.
5. Implement a software maintenance schedule.
6. Demonstrate the skills of a Software Designer, Software Architect or Project Manager for the development of software to solve business and technical problems.
7. Explain the methodologies, architectural approaches, project management techniques, and team dynamics.

UNIT - 1 (12 Hours)

Introduction to Software Engineering, scope of software engineering: The software process- client, developer and software development life cycle: user requirement phase, specification phase, Design phase, implementation phase, Integration phase, maintenance phase, improving the software process, capability maturity models, costs and benefits of software process management. Software life cycle models and comparison of all life cycle models.

UNIT - 2 (12 Hours)

Requirements gathering- Data flow modeling, behavioural modeling, Data dictionary, data flow diagrams. IEEE standards for software requirements. Effort estimation and scheduling, Cost estimation models- Function point analysis and COCOMO . Basic design concepts: Cohesion and its various types, coupling and its various types and partitioning.

UNIT - 3 (12 Hours)

Object modeling using UML: UML overview, nature and purpose of models. UML concepts – UML view, static view, use case view, state machine view, activity view, interaction view.
Sample Tool- Argo UML, an open source tool.

UNIT - 4 (12 Hours)

Managing software project, project planning, process planning- the standard process, requirement change management, quality management, Risk management, the project management plan team structure, communication, scheduling, quality planning, measurement and tracking planning, team programming aspects, software configuration management. Project execution, project monitoring and control, project closure performing, closure analysis, closure analysis report.

Recommended Readings:

1. Stephen R.Schah ; Object Oriented and Classical Software Engineering; TMH.
2. James Rumbaugh, Ivar Jacobson, Grady Booch; The Unified Modeling Language Reference Manual, Pearson education; 2/e.
3. Pankaj Jalote ; Software Project Management in practice; PEA.
4. Roger S. Pressman ; Software Engineering – A practitioner's approach; McGraw Hill; 6/e.
5. K. K. Aggarwal and Yogesh Singh ; Software Engineering ; New Age Publications.
6. J.Rumbaugh et al; Object Oriented Modelling & Design; PHI.
7. Argo UML – www.argouml.org

List of Experiments:

Implement the database application and document the various phases of its development. The implementation can be standalone or web based. A report must be submitted that contains the following.

1. Introduction of the project (Project selection and planning).
2. Create Software Requirement Specification (SRS) document as per IEEE.
3. To study different types of Life Cycle Models and use the appropriate model for the project.

4. To draw Functional Description (DFD).
5. To draw Behavioral Description (Use case diagram) using Argo UML.
6. To draw class diagram using ArgoUML.
7. To draw state diagram using ArgoUML.
8. To draw activity diagram using ArgoUML.
9. To draw sequence diagram using ArgoUML.
10. Project Implementation.
11. Conclusion.

IT 4.5 DESIGN AND ANALYSIS OF ALGORITHMS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 4.5	Design and Analysis of Algorithms	3	1	2	3	100	25	--	--	25	**150**

Course Objectives:

1. To learn techniques for the design and analysis of efficient algorithms.
2. To understand common algorithms, algorithmic paradigms, and data structures used to solve various problems.
3. Understand the difference between the lower and upper bounds of various problems and their importance in deciding the optimality of an algorithm.

Course Outcomes:

The student after undergoing this course will be able to:

1. To demonstrate how the worst-case time complexity of an algorithm is defined.
2. Compare the efficiency of algorithms using asymptotic complexity.
3. Design efficient algorithms using standard algorithm design techniques.

UNIT - 1 (12 Hours)

Algorithm Analysis & Complexity:
Algorithm Definition and Specification, Performance analysis (Space complexity, Time complexity, Asymptotic Notations), Recurrences (methods), Performance measurement, Performance analysis of recursive algorithms, Recursion, Towers of Hanoi problem, Comparison of recursion and Iteration, Dynamic Storage Management, Garbage Collection.

UNIT - 2 (12 Hours)

Divide and Conquer strategy: General method, Binary search, Finding Maximum and Minimum, Merge sort technique, Quick sort technique
Greedy method strategy: General method, Knapsack problem, Job sequencing with deadlines, Minimum cost Spanning trees(Prims & Kruskals algorithm), Optimal storage on tapes, Optimal merge patterns, Single source Shortest paths.

UNIT - 3 (12 Hours)

Dynamic Programming: General method, Multistage graphs, All pairs shortest paths, Single Source Shortest paths, Knapsack problem, Travelling Sales person problem, Flow Shop Scheduling. Search & Traversal Techniques: Techniques for

graphs- Breadth first search, Depth first search, D search, Connected components and spanning trees, Biconnected components, Code Optimization. Text processing algorithms (pattern matching).

UNIT - 4 (12 Hours)

Backtracking: General method, Sum of subsets Problem, Graph Coloring, Hamiltonian Cycles.
NP-Hard and NP-Complete Problems: Basic concepts- non-deterministic algorithms, NP-Hard and NP-Complete classes, COOK's theorem, NP-Hard Scheduling Problems, NP-Hard Code generation Problems.

Recommended Readings:

1. E.Horowitz and S. Sahini ; Fundamentals of Computer Algorithms; Galgotia publication.
2. T.H.Cormen, C.E. Leiserson, R.L.Rivest ; Introduction to Algorithms; PHI.
3. Aho Hopcraft and Ulman ; The Design and Analysis of Computer Algorithms; Addison Wesley.
4. Brassord and Bratley ; Fundamentals of Algorithms; PHI.
5. Robert Sedjewick; Algorithms; Addison Wesley.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. To implement the following using array as data structure and analyze its time complexity
    a. Insertion sort .
    b. Selection sort .
    c. Bubble sort .
    d. Quick sort .
    e. Merge sort .
2. To implement Linear and Binary search and analyze its time complexity.
3. To implement Optimal Binary Search Tree problem and analyze its time complexity.
4. To implement Dijkstra's algorithm and analyze its time complexity.
5. To implement minimum spanning trees using Kruskal's algorithm.
6. To implement minimum spanning trees using Prim's algorithm.
7. To implement a program for travelling salesman problem.
8. To implement DFS and BFS and analyze their time complexities.
9. To implement following string matching algorithms and analyze time complexities:
    a) Rabin Karp
    b) Knuth Morris Pratt
10. To implement Hamiltonian cycle problem

IT 4.6 MICROPROCESSOR AND INTERFACING

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 4.6	Microprocessor and Interfacing	3	1	2	3	100	25	--	25	--	**150**

Course Objectives:

The subject aims to provide the student with:

1. An in-depth understanding of the Intel 8086 architecture and programming model.
2. An ability to write Assembly language programs for a given task.
3. An understanding of different types of memories, peripheral IC's like 8255, 8259 and 8254and their interfacing with the processor.
4. An ability to interface various I/O devices with the processor.

Course Outcomes:

The student after undergoing this course will be able to:

1. Describe the architecture and explain the working of each block in 8086 processor.
2. Analyze the instruction set of 8086 processor.
3. Analyze the timing sequence of various instructions.
4. Create Assembly language programs for a given task.
5. Explain the basic programmable ICs like 8255, 8259 and 8254.
6. Design interfacing of memories and various I/O devices with the processor.

UNIT - 1 (12 Hours)

Microprocessor 8086: Detail study of 8086 architecture, addressing modes, instruction formats, data transfer instructions, string instructions, logical instructions, arithmetic instructions, processor control instructions, comparison of 8086 with 8088, assembly language programming, assembly process, assembler directives, procedures-far procedures, near procedures, parameter passing techniques, macros, macro advantages.

UNIT - 2 (12 Hours)

8086 CPU Module: Basic 8086 CPU design, generating system clock and reset signals, microcomputer bus type and buffering techniques. System Bus Structure:

Basic 8086 configurations, maximum and minimum mode, system bus timing, interrupts and interrupt responses.

8087 Coprocessor: Architecture, connection and cooperation with main processor, Instruction Set of 8087, Programming with the Arithmetic Coprocessor. Use of floating point ADD/SUB/MUL/DIV instructions, Use of F.P. instruction for generating Sine/Cosine/Exp/Log functions.

UNIT - 3 (12 Hours)

Interfacing: Programmable Peripheral Interface (PPI): Basic Description of 8255, Architecture, Modes of operation, programming the 8255.
Programmable timer8253/8254,
Interrupt Controller: Features of 8259, block diagram of 8259, Interrupt sequence, priority modes and other features Programming the 8259 and interfacing.
Brief introduction to DMA controller and keyboard, Video controller.
System Design of 8086 using Memory chips and simple I/O devices using interfaces.

UNIT - 4 (12 Hours)

80386 Architecture : Architecture and signal descriptors, Register organization, Addressing modes, Extended instruction set.
Real mode operation of 80836: Real mode operation, Memory addressing and interrupt processing.
Protected mode operation of 80386: Protected mode operation, memory organization – segmentation, descriptor types, and paging, interrupt processing in protected mode.
80386 Memory Management Unit: MMU, virtual memory, descriptor tables GDT, LDT, IDT
Review processors from 80486 onwards.

Recommended Readings:

1. John F. Uffenbeck ; The 8086/8088 family design, programming and interfacing; PHI.
2. Douglas V. Hall; Microprocessors and Interfacing: Programming and Hardware; TMH.
3.Liu and Gibson ; Microprocessor Systems: The 8086/8088 family architecture programming and design; PHI.
4. Gaonkar; Microprocessor Architecture, Programming and Applications; PHI.
5. M. Rafiquzzaman; Microprocessor and Microcomputer Based Systems; PHI.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. Assembly language programming for 8086.
   Study of instruction set, Use of MUL/DIV instructions, Use of string processing instruction, use of XLAT instruction for code conversion.
2. Assembly language programming for 8086/8087
   Study of NDP instruction set, Use of floating point ADD/SUB/MUL/DIV instructions, Use of F.P. instruction for generating Sine/Cosine/Exp/Log functions.
3. Use of ROM-BIOS services.
4. Uses of DOS interrupt services.
5. Programs based on 386 addressing modes.
6. Programs based on bit manipulation instructions using assembly language or C.
7. Programs to find square-root of 16-bit number.
8. Interfacing keyboard.
9. Interfacing display controller.
10. Elevator problem.

THIRD YEAR: INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTION AND EXAMINATION

(RC 2016-17)

SEMESTER –V

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P#	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 5.1	Introduction to Data Communication	3	1	--	3	100	25	--	--	--	**125**
IT 5.2	Java Programming	3	1	2	3	100	25	--	25	--	**150**
IT 5.3	Statistical Models for Information Science	3	--	--	3	100	25	--	--	--	**125**
IT 5.4	Intelligent Agents	3	1	2	3	100	25	25	--	--	**150**
IT 5.5	Operating Systems	3	1	2	3	100	25	--	--	25	**150**
IT 5.6	Database Management Systems	3	1	2	3	100	25	--	25	--	**150**
TOTAL		**18**	**05**	**08**	**--**	**600**	**150**	**25**	**50**	**25**	**850**

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/ she submits to the department a certified journal reporting the experiments conducted during the semester.

THIRD YEAR: INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTION AND EXAMINATION

(RC 2016-17)

SEMESTER –VI

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P#	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 6.1	Data Mining	3	1	2	3	100	25	--	--	--	**125**
IT 6.2	Theory of Computation	3	1	--	3	100	25	25	--	--	**150**
IT 6.3	Computer Networks	3	1	2	3	100	25	--	--	25	**150**
IT 6.4	Computer Graphics	3	1	2	3	100	25	--	25	--	**150**
IT 6.5	Web Technology	3	1	2	3	100	25	--	25	--	**150**
IT 6.6	Software Testing and Quality Assurance	3	1	--	3	100	25	--	--	--	**125**
TOTAL		**18**	**06**	**08**	**--**	**600**	**150**	**25**	**50**	**25**	**850**

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/ she submits to the department a certified journal reporting the experiments conducted during the semester.

IT 5.1 INTRODUCTION TO DATA COMMUNICATION

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 5.1	Introduction to Data Communication	3	1	-	3 hrs	100	25	-	-	-	**125**

Course Objectives:

1. To learn and understand fundamentals of data communications.
2. To understand the conceptual and analytical differences between analog and digital communication.
3. To understand a conceptual foundation for the study of data communications using the open system interconnection (OSI) layered architecture model.

Course Outcomes:

The student after undergoing this course will be able to:

1. Understand the basic concepts of data communication components used at various transmission speeds.
2. Explain the different network topologies and their advantages and disadvantages.
3. Explain how to build a network model and why.
4. Understand how data could be encoded to digital bits.
5. Identify different types of Transmission Mediums.
6. Apply and differentiate between different error detection and correction methods.

UNIT - 1 (10 Hours)

Introduction to Data Communication, Components of data communication, Networks, Protocols and Standards. Network Models: Layered Task, The OSI Reference Model, TCP/IP protocol Suite, Addressing. Basic Concepts of Data Communication: Line Configuration - Point-to-Point, Multipoint. Topology: Mesh, Star, Tree, Bus and Ring and Hybrid Technologies. Transmission Modes: Simplex, half Duplex and Full-Duplex. Categories of Networks – LAN, MAN and WAN, Inter networks. Transmission Media:
Guided Media – Twisted–pair cable, Coaxial cable and Optical fibre. Unguided Media – Wireless Communication, Terrestrial microwave, satellite communication and cellular telephony. Transmission Impairments: Shannon's Theorem, Comparison of different Media, Distortion, attenuation and noise.

UNIT - 2 (14 Hours)

Data Encoding: Analog Data, Digital Data, Analog Signal and Digital Signals. Spread Spectrum: Direct Sequence and Frequency Hopping, CDMA. Data Communication Interface: The Physical Layer: Asynchronous and Synchronous Transmission, Interfacing – V.24/EIA 232-F, ISDN Physical Interface.

UNIT - 3 (14 Hours)

Data Link Layer: Flow Control – Stop and Wait Flow Control, Sliding Window , Error Detection: Types of errors, Detection Methods, Parity Check, Cyclic Redundancy Check using modulo-2, Polynomials (CRC-16, CRC-32), Error Control – Stop and Wait ARQ, Go-Back-N ARQ and Selective-Reject ARQ. Data Link Protocols: Asynchronous Protocols , Synchronous Protocols, Character Oriented Protocols – BSC , Bit-Oriented Protocols- HDLC, Configuration, Types of frames and Modes of Communication, operation. Packet Switching, Message Switching and circuit switching

UNIT - 4 (10 Hours)

Local Area Networks: Topologies (Bus, Ring, Star, Tree) and transmission media. LAN Protocol Architecture : LLC(Logical Link Control), Medium Access Control (MAC).
Introduction to Networking and Internetworking devices: Repeaters, Routers, Gateways, Bridges: Functions, Protocol Architecture and Spanning Tree Approach. Wireless WAN's: Cellular Telephony, satellite Networks. High Speed LANs: Emergence, Ethernet, Token Ring, Fiber channel.

Recommended Readings:

1. B.A. Forouzan; Data Communication and Networking; Tata McGraw Hill, 4/e
2. Andrew S. Tanenbaum ; Computer Networks; Pearson Education
3. William Stallings; Data and Computer Communication; 7/e.
4. J.S Katre; Computer Network Technology; Tech-Max Publications; 2010.
5. Fred Halsall ; Data Communications, Computer Networks and Open Systems; Addison Wesley; 3/e.
6. D.P.Nagpal; Data Communication and Networking; S. Chand;1/e

IT 5.2 Java Programming

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT5.2	Java Programming	3	1	2	3	100	25	--	25	--	**150**

Course Objectives:

The subject aims to provide the student with:

1. An ability to plan, design, execute and document sophisticated object oriented programs to handle different computing problems using "Java".
2. An understanding of how things work in the web world.
3. An understanding of the client-side implementation of web applications.
4. An ability to understand the generic principles of object oriented programming using "Java".
5. An understanding the use of Event driven Graphics programming in "Java".
6. Understands how data is accessed from the file.

Course Outcomes:

The student after undergoing this course will be able to:

1. Design algorithms using principles of object oriented programming
2. Demonstrate the use-cases, pseudo code, and an incremental coding plan for a given Problem specification.
3. Explain the operations of common data structures and algorithms.
4. Design a "Java" program to solve a given problem specification.
5. Illustrate stream I/O, Graphics programming and exception handling.
6. Design robust web based applications satisfying user requirements.

UNIT – 1 (12 Hours)

Java Evolution, Java History , Java Features: Overview of Java Language, Constants, Variables and Data Types, Operators and Expressions, Decision making, branching and looping. Classes, Objects and Methods, Arrays, String and Vectors.

UNIT – 2 (12 Hours)

Interfaces, Packages, Collections, Multithreading, Managing errors and Exception.

UNIT – 3 (12 Hours)

Graphics Programming, Java AWT, Event Handling, Swings, JDBC .

UNIT – 4 (12 Hours)

Networking, Java Beans , Java Enterprise Applications: Java Servlets, Java Server Pages, Introduction to struts Framework, Security in java.

Recommended Readings:

1. E. Balagurusamy; Programming with Java A Primer; Tata McGrawHill Companies 5th edition.
2. H. M. Deitel and P. J. Deitel; Advanced Java 2 Platform HOW TO PROGRAM;Prentice Hall 9th edition.
3. Hervert Schildt; The complete reference JAVA2; TMH
4. John P. Flynt ;Java Programming; Thomson 2nd.
5. Ken Arnold ;Java Programming Language; Pearson.
6. Cay Horstmann; Big Java; 2nd edition; Wiley India Edition.
7. Sachin Malhotra, Saurabh Chaudhary; Programing in Java; Oxford University Press, 2010.

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. Programs using constructor and destructor.
2. Creation of classes and use of different types of functions.
3. Count the number of objects created for a class using static member function.
4. Write programs on interfaces.
5. Write programs on packages.
6. Write program using java collections.
7. Write programs using function overloading.
8. Programs using inheritance.
9. Programs using IO streams.
10. Programs using files.
11. Write a program using exception handling mechanism.
12. Programs using AWT.
13. Programs on swing.
14. Programs using JDBC.
15. Program to design scientific calculator using event-driven programming paradigm of Java.
16. Develop multi-threaded echo server and a corresponding GUI client in Java.
17. Write program to make use of Java beans.

IT 5.3. Statistical Models for Information Science

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th	Marks					
		L	T	P	Duration (Hrs)	Th	S	TW	P	O	Total
IT 5.3	Statistical Models for Information Science	3	-	-	3	100	25	--	--	---	**125**

Course Objective:

1. To understand about data and its statistics
2. To study behavior of information in terms of its dispersion, skewness etc.
3. Identify the rules of sampling and its effect.
4. To know Hypothesis and its usage
5. To understand various test and regression analysis.

Course Outcomes:

The student after undergoing this course will be able to:

1. Analyze Sampling System
2. Evaluate Hypothesis Testing for various Conditions
3. Analyze Chi- Square Tests
4. Perform the analysis of Variance.
5. Implement Linear Regression.

UNIT 1 (12 Hours)

Introduction to Data collection, Experiments and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method.

Data Preparation Process, Problems in Preparation Process, Missing Values and Outliers, Types of Analysis, Statistics in Research.

Descriptive Statistics: Measures of Central Tendency, Measures of Dispersion, Measures of Skewness, Kurtosis, Measures of Relationship, Association in Case of Attributes, Other Measures.

UNIT 2 (12 Hours)

Sampling and Statistical Inference: Parameter and Statistics, Sampling and Non-sampling Errors, Sampling Distribution, Degree of Freedom, Standard Error, Central Limit Theorem, Finite Population Correction, Statistical Interference.

Hypothesis. Basic Concepts Concerning Testing of Hypothesis, Testing the Hypothesis, Testing Statistic and Critical Region, Critical Value and Decision Rule, Procedure for Hypothesis Testing, Hypothesis Testing for Mean, Hypothesis Testing for Proportion, Hypothesis Testing for Variance, Hypothesis Testing for Difference of Two Mean, Hypothesis Testing for Difference of Two Proportions, Hypothesis Testing for Difference

of Two Variances, P-Value Approach, Power of the Test, Limitations of the Tests of Hypotheses.

UNIT 3 (12 Hours)

Chi-Square Tests: Test of Difference of more than Two Proportions, Test of Independence of Attributes – Alternative Formula, Yates Correction. Test of Goodness of Fit – Goodness of Fit Test for Normal Distribution, Caution in Using Chi Square Tests
The Anova Technique, The Basic Principle of ANOVA, One Way ANOVA – Analysis of Variance Table, Short-cut Method for one-way ANOVA; Two Way ANOVA – One Observation per cell, Latin-square Design.

UNIT 4 (12 Hours)

Dependent and Independent Variables, Simple Linear Regression Model –Least Square Estimation, Coefficient of Determination, Standard Error, Assumptions or Conditions Required; Multiple Linear Regression Model – Least Squares Estimation, R^2 and Adjusted R^2 Coefficients, Standard Error, Assumptions; Problem of Multicolinearity – Variable Elimination.
The Mathematical Basis, Important Methods of Factor Analysis – Centroid Method, Principle Components Method, Maximum Likelihood Method; Rotation in Factor Analysis, R-Type and Q-Type Factor Analysis, Merits and Demerits of Factor Analysis.

Recommended Readings:

1. C. R. Kothari, Gaurav Garg; Research Methodology – Methods and Techniques; New Age International (P) Limited, Publishers; Third Edition.

2. Ghosh B.N., Scientific Methods and Social Research; Sterling Publishers Pvt. Ltd. New Delhi; 1982.

3. Freedman P. The Principles of Scientific Research; Pergamon Press, New York, 1960; Second Edition.

4. John, Peter W.M.; Statistical Design and Analysis of Experiments; The MacMillan Co. New York, 1971

5. Yamane, T.; Statistics: An Introductory Analysis; Harper and Row, New York 1973; Third Edition.

IT 5.4 INTELLIGENT AGENTS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 5.4	Intelligent Agents	3	1	2	3	100	25	25	-	-	**150**

Course Objectives:

1. To understand the concepts of Artificial intelligence.
2. Learn and understand the knowledge representation techniques for knowledge base.
3. Learn the method of solving problems using artificial intelligence.
4. To learn and understand the fundamentals of Neural Network.

Course Outcomes:

At the end of the course the student will be able to:

1. Analyze a problem which requires intelligent techniques to solve.
2. Apply different forms of Learning.
3. Implement the knowledge representation and manipulation techniques.
4. Demonstrate the application of Neural Networks to perform intelligent tasks.

UNIT 1 (12 Hours)

Intelligent agents: environment, properties and structure. Problem solving agents. Searching for solutions: Breadth-first search, Depth-first search, uniform-cost search, Depth-limited and Iterative deepening depth-first search. Heuristic search strategies: Best-first search, memory bounded heuristic search, Hill climbing search and simulated annealing search. Constraint Satisfaction problems, Game Playing, the minimax algorithm, alpha-beta pruning, imperfect-real time decisions, games involving an element of chance.

UNIT - 2 (12 Hours)

Propositional logic: Reasoning in propositional logic. First order predicate logic, Inference in First-order predicate logic, Unification algorithm, forward chaining, backward chaining, Conjunctive Normal Form for predicate logic, theorem proving by resolution principle. Semantic networks, Reasoning with default information. Truth maintenance system,

UNIT - 3 (12 Hours)

Planning: Components of Planning system, planning problem, planning with state space search, Partial order planning. Acting under uncertainty, conditional probability, the axioms of probability, full-joint distribution, independence, Bayes' rule. and its use.. Bayesian (belief) networks. Introduction to Natural language Processing: Syntactic analysis, augmented grammars, Semantic interpretation,

UNIT - 4 (12 Hours)

Expert Systems: Structure of Expert Systems, The Human element in Expert System, How Expert Systems Work, Benefits of Expert Systems, Types of Expert Systems. Learning: Forms of learning, Rote learning, Reinforcement Learning, Learning from observation, Inductive learning, learning decision trees. Neural Network Fundamentals, Neural Network Architecture, Training the network, Learning Algorithms, Back propagation, Benefits of Neural Networks.

Recommended Readings:

1. S. Russell and P. Norvig; Artificial Intelligence: A Modern Approach; Prentice Hall; 3/e, 2009
2. Elaine Rich, Kevin Knight, Shivashankar B Nair; Artificial Intelligence; TMH, 3/e, 2009.
3. B. Yegnanarayana; Introduction to Artificial Neural Networks; (PHI)
4. Efraim Turban,Jay E. Aronson; Decision support & Intelligent systems; PHI,7/e
5. Patrick H. Winston ; Artificial Intelligent; Addison-Wesley, 3/e

List of Experiments in Intelligent Agents:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. To implement Breadth First Search
2. To implement Depth First Search
3. To implement Tower Of Hanoi problem
4. To implement Tic-Tac-Toe problem
5. To implement Missionaries and Cannibals problem
6. To implement Water Jug Problem
7. To implement 8-puzzle problem
8. Case Study: Neural Networks
9. Case Study: Expert System
10. Case Study: Natural Language Processing

IT 5.5 OPERATING SYSTEMS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 5.5	Operating Systems	3	1	2	3	100	25	--		25	**150**

Course Objectives:

The subject aims to provide the student with:

1. An understanding of how Operating system works
2. An understanding of the process and threads in operating system
3. An ability to understand the scheduling algorithm and deadlock management
4. An ability to understand the memory management I/O systems.
5. Learn features of different operating system.

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain the fundamental concepts of operating systems, its evolution and various architectures.
2. Explain terminologies associated with operating system concepts such as processes, threads, concurrency control, synchronization, CPU scheduling and semaphores.
3. Implement algorithms for different scheduling algorithm.
4. Demonstrate and Implement algorithms for different memory management
5. Demonstrate use of different operating systems and commands

UNIT – 1 (12 Hours)

Introduction to Operating Systems: Overview and working of different operating systems. Functions of operating systems, Design approaches: layered, kernel based and virtual machine approach. Process management Concepts, Threads, CPU Scheduling, Process Synchronization, Deadlocks Concept, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery.

UNIT – 2 (12 Hours)

Memory management: Concept, Swapping, Contiguous memory allocation, Paging, Segmentation, Segmentation with paging. Virtual memory: Concept, Demand paging, Page replacement, Thrashing, File System: File system interface and File system implementation

UNIT – 3 (12 Hours)

I/O Systems: Overview of I/O Systems, Secondary storage structure, Tertiary storage structure. Multiprocessor Operating Systems - Introduction, structure of multiprocessor operating system, operating system design issues, processor scheduling, reliability and fault tolerance. Protection and security issues

UNIT – 4 (12 Hours)

Concurrency Control: theoretical aspect, distributed database system, concurrency control algorithms. Case studies of operating systems:- Windows and Unix: Basic overview, commands, process management and memory management in each. Android operating system architecture and basic programming concepts. Android architecture, Linux kernel, android libraries, Android runtime and application framework.

Recommended Readings:

1. Silberschatz and Galvin; The Operating System Concepts; Wesley Publishing Co.; 3rd Edition
2. W. Stallings; Operating Systems; PHI 5th Edition.
3. M Singhal and NG Sivaratri; Advanced Concepts in Operating Systems;TMH;
4. Sumitabha Das; UNIX - Concepts and applications;TMH;3rd edition.
5. Joseph joyner;Android Programming for Beginners: The Ultimate Android App Developer's Guide;Speedy publishing;
6. A.S Tanenbaum; Operating systems, Design and implementation;PHI
7. Achyut S. Godbole; Operating Systems;TMH;

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1) Program to implement First Come First Serve Scheduling technique
2) Program to implement Shortest Job First Serve Scheduling technique
3) Program to implement Priority Scheduling technique
4) Program to implement Round Robin Scheduling technique
5) Program to implement First In First Out Page Replacement technique
6) Program to implement Least Recently Used Page Replacement technique
7) Program to implement Optimal Page Replacement technique
8) Basic Android Programming.

IT 5.6 Database Management System

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	ThDuration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 5.6	Database Management System	3	1	2	3	100	25	--	50		**175**

Course Objectives:

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. To understand the relational database design principles.
4. To become familiar with the basic issues of transaction processing and concurrency control.

Course Outcomes:

The student after undergoing this course will be able to:

1. Demonstrate the basic elements of a relational database management system
2. Identify the data models for relevant problems.
3. Design an entity relationship model, convert entity relationship diagrams into RDBMS and formulate SQL queries.
4. Apply normalization for the development of application software.

UNIT – 1 (12 Hours)

Database System Applications, Purpose of Database Systems, View of Data - Data Abstraction, Instances and Schemas, Data Models, Database Languages - DDL, DML, Database Architecture, Database Users and Administrators, History of Data base Systems.

Introduction to Data base design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views destroying/altering Tables and Views.

UNIT – 2 (12 Hours)

Relational Algebra - Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus - Tuple relational Calculus - Domain relational calculus

Form of Basic SQL Query - Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values - Logical connectives - AND, OR and NOT - Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT – 3 (12 Hours)

Introduction to Schema Refinement - Problems Caused by redundancy, Decompositions - Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms - BCNF - Properties of Decompositions - Loss less join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design - Multi valued Dependencies - FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

Transaction Management - Transaction Concept - Transaction State - Implementation of Atomicity and Durability - Concurrent - Executions - Serializability - Recoverability - Implementation of Isolation - Testing for serializability.

Concurrency Control - Lock - Based Protocols - Timestamp Based Protocols - Validation - Based Protocols - Multiple Granularity.

UNIT – 4 (12 Hours)

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing - Clustered Indexes, Primary and Secondary Indexes, Index data Structures - Hash Based Indexing, Tree based Indexing, Comparison of File Organizations.

Tree Structured Indexing: Intuitions for tree indexes, Indexed Sequential Access Methods(ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendible vs. Linear Hashing.

Recommended Readings:

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw Hill, VI edition, 2006.
3. Database Systems, 6th edition, Ramez Elmasri, Shamkat B. Mavathe, Pearson Education, 2013.
4. Database Principles, Programming, and Performance, P.O'Neil, E.O'Neil, 2nd ed., ELSEVIER.

5. Database Systems, A Practical approach to Design implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
6. Database Systems Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
7. Fundamentals of relational Database Management Systems, S. Sumathi, S.Esakkirajan, Springer.
8. Database Management System Oracle SQL and PL/SQL, P.K. Das Gupta, PHI.
9. Introduction to Database Management, M.L. Gillenson and others, Wiley Student Edition.
10. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
11. Introduction to Database Systems, C.J. Date, Pearson Education.
12. Database Management Systems, G.K. Gupta, TMH.

List of Experiments in Database Management System

(At least 8 experiments should be conducted.. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. To study Data Definition language Statements.
2. To study Data Manipulation Statatements.
3. Study of SELECT command with different clauses
4. Study of GROUP functions (avg, count, max, min, Sum).
5. Study of various type of SET OPERATORS (Union, Intersect, Minus).
6. Study of various type of Integrity Constraints.
7. Study of Various type of JOINS.
8. To study Views
9. To Study Triggers

IT 6.1 DATA MINING

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT6.1	Data Mining	3	1	2	3	100	25	--	--	--	**125**

Course Objectives:

The subject aims to provide the student with ability to:

1. Understand the basic concepts and techniques of data mining.
2. Understanding various aspects of data mining such as data preprocessing, data modeling, DMQL.
3. Learn the association rules, classification and prediction methods and also the several clustering techniques.
4. Learn anomaly detection schemes
5. Understand the design of data warehouse.

Course Outcomes:

The student after undergoing this course will be able to:

a) Explain data mining fundamentals and mechanisms.
b) Demonstrate data mining techniques to implement data mining algorithms.
c) Describe data warehousing concepts and components.
d) Explain the importance of outlier detection.
e) Illustrate Web mining.

UNIT – 1 (10 Hours)

Introduction to Data Mining: Basic Data Mining Tasks, Data Mining Functionalities, Data Mining from a Database Perspective, Data Mining Issues. Data Preprocessing: Data Cleaning, Data Integration & Transformation, Data Reduction, Discretization & Concept Hierarchy generation.

Data Modeling. Data Mining Query Language.
Data Mining Association Rules. Association Rule Mining. Mining Single Dimensional Boolean Association Rules from Transactional Databases.

UNIT – 2 (14 Hours)

Introduction to Classification & Prediction: Classification by Decision tree induction, Bayesian Classification, k-Nearest Neighbor Classifier, Classification by Back propagation, Introduction to Prediction Concept.
Introduction to Cluster Analysis. Types of data in cluster analysis, Clustering Methods, Partitioning Methods, Hierarchical Methods, Density Methods, Grid-Based Methods, Model-Based Clustering Methods.

UNIT – 3 (12 Hours)

Data Mining Anomaly Detection: Variants of Anomaly/Outlier Detection Problems, Applications. Types of anomaly detection schemes: Graphical & Statistical-based, Distance-based, and Model-based.
Graph Mining, Social Network Analysis, Multidimensional Analysis and Descriptive Mining of complex data objects, Spatial Data Mining, Multimedia data mining, Text Mining, Mining World Wide Web.

UNIT – 4 (12 Hours)

Data Warehousing: Concepts and Mechanisms: Need, Functions & Application. Data Warehousing Components: Overall architecture, Data Warehouse Implementation, Multidimensional Data Model, Efficient Computation of Data Cube, OLTP v/s Data Warehousing.
Building a Data Warehouse: Planning a Data Warehouse, Conceptual Data Warehouse Modeling.

OLAP Servers: Need for OLAP, Multidimensional v/s Multi relational OLAP. Categorization of OLAP tools: MOLAP, ROLAP. OLAP tools & Internet. Data Extraction, Cleanup and transformation. Metadata. Query and Reporting tools.

Recommended Reading

1. Data mining - Concepts and Techniques -Jiawei Han and Micheline Kamber, Morgan Kuaffman publisher, ISBN:1-55860-489-8
2. Data Warehousing, Data Mining & OLAP – Alex Berson, Stephen J. Smith, TMH publication, ISBN: 0-07-058741-8
3. Introduction to Data Mining with case studies- G.K. Gupta, PHI Publisher, ISBN:81-203-3053-6
4. Mastering Data Mining-Michel. J. A. Berry. Gordon S.Linoff, Wiley Publications, ISBN: 978-0-471-33123-0
5. Data Mining-Pieter Adriaans and Dolf Zantinge.- PEA, **ISBN**:8178084252

List of Experiments

(**At least 8 experiments should be conducted from the list of experiments.)**

1. Study of Data mining Tools and Techniques
2. Write program to implement data Smoothening
3. Write program to implement normalization
4. Write program to implement Apriori Algorithm.
5. Write program to implement FP Tree
6. Write program to implement Decision Tree Induction
7. Write program to implement classification by back propagation.
8. Write program to implement K nearest Neighbor
9. Write program to implement Density Based clustering
10. Model and design data warehouse

IT6.2 THEORY OF COMPUTATION

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	ThDuration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT6.2	Theory of Computation	3	0	2	3	100	25	--	--	--	125

Course Objectives:

The subject aims to provide the students with:

1. An ability to understand how efficiently problems can be solved on a model of computation, using an algorithm.
2. An understanding of the basic concepts in theoretical computer science, and the formal relationships among machines, languages and grammars.

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain the basic concepts of deterministic and non-deterministic finite automata.
2. Design a finite automaton to recognize a given regular language.
3. Describe the formal relationships among machines, languages and grammars,
4. Explain the uses of Turing Machine.

UNIT – 1 (12 Hours)

Basic Mathematical objects:-Sets, logic, Functions, Relations, Languages.
Regular Expressions and Finite Automata: - Regular Languages and Regular Expressions, Finite Automata (DFA), Automata to implement union, intersection and complement operations. NFA, €-NFA, Kleene's theorem, Minimal finite Automata, The pumping lemma for regular languages, Moore and Mealy Machine.

UNIT – 2 (12 Hours)

Context –free Languages and Push down Automata:- Regular Grammars, Context Free Grammars, Derivation Trees and Ambiguity. Simplified forms and Normal Forms – CNF, GNF. The Pumping Lemma for context –free languages.
Push Down Automata : Deterministic Pushdown automaton, A PDA corresponding to a given CFG, CFG corresponding to a given PDA.

UNIT – 3 (12 Hours)

Turing Machine and their languages: Computing a Partial function with a Turing machine, Combining Turing machines.
Variations of Turing Machine, Nondeterministic Turing Machine, Universal Turing Machine, Models of computation and the Church- Turing thesis.

UNIT – 4 (12 Hours)

Recursively Enumerable languages:- Recursively Enumerable and Recursive languages, Enumerating a Language, General Grammars - Unrestricted Grammars , Context-Sensitive Language and Chomsky Hierarchy.
Unsolvable Problems :- A non recursive language and unsolvable Decision problems, Reducing one problem to another- The halting problem, Rice's Theorem, Post's Correspondence Problem.

Recommended readings:

1. Introduction to languages and the theory of computation By John C. Martin, Tata McGraw Hill
2. An Introduction to Formal Languages and Automata By Peter Linz, Narosa Publishers.
3. Introduction to Automata Theory, Languages and Computation By Hopcraft and Ullman, Narosa Publishing House
4. Introduction to Theory of computation by Michael Sipser, Cengage Learning
5. Theory of Computer Science, Automata Languages & Computations by N.Chandrashekhar and K.L.P. Mishra , PHI publication

LIST OF EXPERIMENTS:

1) Program to implement a DFA
2) Program to implement a NFA.
3) Program to implement a Mealy Machine.
4) Program to implement a Moore machine.
4) Program to convert CFG to CNF.
5) Program to implement Push Down Automata.
6) Program to implement a Turing Machine.
7) Study of Java Formal Languages and Automata Tool(JFLAP).

IT 6.3 COMPUTER NETWORKS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 6.3	Computer Networks	3	1	2	3	100	25	-	-	25	**150**

Course Objectives:

1. To introduce various types of computer networks.
2. To understand the TCP/IP and OSI models with merits and demerits.
3. To introduce UDP and TCP Models.
4. To introduce IP v6.

Course Outcomes:

At the end of the course, the student should be able to:

1. Explain basics of Computer Networks and various protocols.
2. Differentiate and explain the internetworking devices.
3. Apply different routing algorithms.
4. Explain the concepts of IP v6.

UNIT – 1 (12 Hours)

Reference Model: The OSI reference Model, TCP/IP reference model, Comparison of the OSI and TCP/IP reference model. Introduction to Physical Layer. Data Link Layer : Data Link Layer design issues, Medium Access Control Sub layer (MAC), the channel allocation problem, Multiple Access Protocols: ALOHA, Carrier Sense Multiple Access (CSMA) protocols, Collision-free protocol, Bit-Map Protocol, Binary Countdown, Limited contention protocols, Adaptive Tree Walk Protocol, WDMA (Wavelength Division Multiple Access) Protocol.

UNIT – 2 (12 Hours)

Network Layer: Network Layer design issues, Routing Algorithms - optimality principle, shortest path, flooding, Distance Vector Routing, Control to Infinity Problem, Link state Routing, Hierarchical Routing, Congestion Control algorithms, Need for congestion control, Congestion prevention policies, Congestion control in virtual circuit subnets and congestion control in datagram subnets, Quality of Service, Internet Protocol, IP Address, IP ver. 4, IP ver. 6, DHCP, Overview of OSPF and BGP.

Networking and Internetworking Devices - Repeaters, bridges, routers and gateways. Address Resolution Protocol, Reverse Address Resolution Protocol, Internet Control Message Protocol, Ports, Sockets, Socket types.

UNIT – 3 (12 Hours)

Transport Layer: UDP, Purpose of UDP, UDP Header, TCP, the TCP Service Model, The TCP Segment Header, TCP Connection Establishment, The TCP Connection Release, Comparison of TCP and UDP.

Application Layer: Domain Name System – DNS, Electronic Mail, MIME, File Transfer Protocol – FTP, TFTP, Telnet Protocol, Hyper Text Transfer Protocol (HTTP), Simple Mail Transfer Protocol (SMTP), Simple Network Management Protocol (SNMP).

UNIT – 4 (12 Hours)

ISDN: principles of ISDN, Evolution of ISDN, Objectives, Benefits, Services and Architecture of ISDN.

Frame Relay Congestion Control: congestion in frame relay networks approaches to congestion control, traffic rate management.

ATM: Cell format, Architecture, ATM Adaptation Layers.

Cellular Concept and Cellular System Fundamentals, WLAN Technology, Bluetooth: basics and Protocol Stack. Introduction to Wireless WANs.

Recommended Readings:

1. Andrew S Tanenbaum; Computer Networks; Pearson Education; 5/e
2. William Stallings; ISDN and Broadband ISDN with Frame relay and ATM; Pearson Education; 4/e
3. J.S Katre; Computer Network Technology; Tech-Max Publications; 2010.
4. Behrouz A. Forouzan; Data Communications and Networking; TMH; 2013, 5/e

List of Experiments in Computer Networks:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. Study of Different Networking devices.
2. Study of connecting the Computer in LAN.
3. Study of basic networking commands.
4. Implementation of flag byte with bit stuffing framing techniques
5. Implementation of binary countdown Protocol
6. To find IP address of local & remote host

7. To access URL
8. Client Server Application
9. Case Study: Wireless Networks
10. Case Study: Network Security

IT 6.4 COMPUTER GRAPHICS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 6.4	Computer Graphics	3	1	2	3	100	25	-	25	-	**150**

Course objectives:

The subject aims to provide the student with:

1. Introduction to the contemporary terminology and progress in Computer Graphics.
2. Introduction to various issues and trends in Computer Graphics.
3. An Understanding of 2D and 3D transformations.
4. An Understanding of geometric transformations, geometric algorithms, 3D object models (surface and volume),
5. An understanding of the animation techniques.

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain the concepts of computer graphics system
2. Implement the algorithms for two dimensional transformations.
3. Demonstrate the techniques of clipping
4. Explain the basics of 3D Graphics and three dimensional transformations.
5. Design a simple animation system.

UNIT - 1 (12 Hours)

Overview of graphic systems: Raster scans systems, Random scan systems.

Output Primitives. Points and lines, Line drawing algorithms, DDA, Bresenhams line algorithm Circle generating algorithms, Properties of circles, Midpoint circle algorithm, Ellipse generating algorithm, Properties of Ellipses, Midpoint ellipse algorithm, Filled area primitives, Scan line polygon Fill algorithm, Inside – outside tests, Scan line fill of curved boundary, Boundary fill algorithm, Flood fill algorithm, Fill area functions.

UNIT - 2 (12 Hours)

Two Dimensional Geometric Transformations: Basic Transformations, Translation, Rotation, Scaling, Composite transformation, Translations, Rotations, Scaling, Other transformations- Reflection, Shear.

Two-Dimensional Viewing: The viewing pipeline, Viewing coordinate reference frame, Window to viewport coordinate transformation, 2-D viewing functions, Clipping operations, Point Clipping, Line clipping , Cohen- Sutherland Line Clipping, Polygon Clipping, Sutherland Hodgeman Polygon clipping, Weiler- Atherton Polygon Clipping, Curve clipping, Text clipping.

UNIT - 3 (12 Hours)

Three Dimensional Concepts: 3- Dimensional display methods, Parallel projections Perspective projection, Depth cueing, Surface rendering, Exploded and cutaway views. Three Dimensional Object representations- Polygon surfaces, Polygon tables, Three Dimensional Geometric and Modeling transformations- Translation Rotation, Coordinate Axes, rotations , Scaling , Reflections , Shears
Three Dimensional Viewing, Transformation from world to viewing coordinates Projections.
Picture Structure: Defining Symbols By Procedures, Display Procedures, Boxing, Structured Display Files. Techniques for Achieving Realism. Curves And Surfaces: Shape Description Requirements, Parametric Functions, Bezier Methods. B-Spline Methods.

UNIT - 4 (12 Hours)

Classification of visible – surface detection algorithms, Back – Face detection , Depth buffer method , A – Buffer method , Scan – Line method , Depth Sorting method , BSP- Tree method, Area Sub-division method.

Color Models and Color Applications- Properties of light ,Standard primaries and the, Chromaticity Diagram, XYZ Color model, CIE Chromaticity Diagram, RGB color model, YIQ Color Model , CMY Color Model, HSV Color Model, HLS Color Model

Computer Animation: Design of animation sequences, General computer animation functions, Raster Animations, Computer animation languages, Motion specification, Direct motion specification, Goal directed systems Kinematics and dynamics.

Recommended Readings:

1. Donald Hearn and M. P. Baker ; Computer Graphics; Prentice Hall of India Pvt. Ltd.
2. William Newman and Robert Sproull; Principles of Interactive Graphics; Tata McGraw hill Publishing company Ltd.
3. N. Krishnamurthy; Introduction to Computer Graphics; TMH
4. Steven Harrington; Computer Graphics; Tata McGraw Hill.
5. Foley, Van Dam, Feiner and Hughe; Computer Graphics: Principles and Practice

List of Experiments in Computer Graphics:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. To study basic Graphics Primitive functions
2. To draw a Line using DDA line drawing algorithm
3. To draw a line using Breshenham's algorithm
4. To draw circle using midpoint circle algorithm
5. To draw an ellipse using mid-point ellipse algorithm.
6. To translate, rotate and scale the 2D object.
7. To translate, rotate and scale the 3D object.
8. To fill polygon using boundary fill algorithm.
9. To fill polygon using flood fill algorithm.
10. To implement Cohen–Sutherland 2D clipping and window–viewport mapping
11. To perform 2-D animation

IT 6.5 WEB TECHNOLOGY

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT6.5	Web Technology	3	1	2	3	100	25	--	25	--	**150**

Course objectives:

The subject aims to provide the student with:

1. Introduction to the technologies behind today's web-based applications.
2. An Understanding of building real web applications.
3. An understanding of the basic design principles of the web model of computing.
4. Learning different technologies to building different real world applications.

Course Outcome:

At the end of the course, students should be able to:

1. Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
2. Explain the Web Application Terminologies, Internet Tools, E-Commerce and other web services.
3. Explain the fundamentals of ASP and Web Hosting
4. Implement applications using different technologies like PHP.

UNIT -1 (12 hours)

Introduction to Web: Web Architecture, Web Applications, Web servers, Web Browsers, Internet standards.

HTML: Elements, Attributes, Tags, Forms, Frames, Tables, Overview and features of HTML5

Cascading Style Sheets: Need for CSS, basic syntax and structure of CSS, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, Overview and features of CSS3.

XML: Introduction to XML, uses of XML, XML key components, DTD and Schemas, Transforming XML using XSL and XSLT

UNIT -2 (12 hours)

JavaScript: Introduction to client side scripting, documents, forms, statements, comments, variables, operators, conditional statements, loops, events, objects, functions.

AJAX: JavaScript for AJAX, Asynchronous data transfer with XML Http Request, Implementing AJAX Frameworks

jQuery: Introduction, Syntax, jQuery Selector, jQuery Events, jQuery effects, jQuery and HTML

UNIT -3 (12 hours)

PHP: Variables and Constants, Controlling Program Flow, Functions, Arrays, Files,
Directories, Forms and Database, Exploring Cookies, Sessions, and PHP Security

Case Study: Cross platform Web application development

UNIT -4 (12 hours)

Web Applications in ASP.Net: Application Structure and State, Web Forms: Standard Controls, Navigation Controls: TreeView, Menu and SiteMapPath, Validation Controls, Working with Database Controls

Web Applications in Java: JSP life cycle and implementation, Servlet Programming, Working with JDBC

Recommended Readings:

1. Kogent Learning Solutions Inc ;Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book; Dreamtech Press
2. Achyut Godbole; Web Technologies; Wesley Publishing Co
3. Jon Duckett; JavaScript and JQuery: Interactive Front-End Web Development.
4. Jonathan Peppers; Xamarin Crossplatform Application Development
5. Mridula Parihar; ASP.net Bible; Tata MCgraw Hill
6. P.J Deitel .H.M Deitel; Internet and World wide Web. How to program
7. E. Balaguruswamy; Programming with Java; TMG.
8. Herbert Schildt; Java 2 Complete Reference;
9. Raj kamal; Internet and web technologies;

List of Experiments:

(At least 8 experiments should be conducted based on broad areas listed below)

1. Create static web pages using HTML.
2. Create website to demonstrate use of various CSS styling techniques such as inline, internal and external.
3. Programs to demonstrate use of XML for maintaining and displaying information(XSLT).
4. Validating Web forms using JavaScript.
5. Web page to demonstrate the use of AJAX.
6. Web page to implement the concept of jQuery.
7. Creating a web application using PHP.
8. Creating a web application using ASP. Net.
9. Java Servlet programming.
10. Creating a three-tier applications using JSP and Databases.
11. Implementing Session tracking and cookies in JSP.
12. Implementing Session tracking and cookies in PHP

IT 6.6 SOFTWARE TESTING AND QUALITY ASSURANCE

Subject Code	Name of the subject	Scheme of Instruction Hrs/Week			Scheme of Examination Marks					
		L	**T**	**P**	**Th**	**S**	**TW**	**P**	**O**	**TOTAL**
IT 6.6	SOFTWARE TESTING AND QUALITY ASSURANCE	4	3	3	100	25	--	--	--	125

Course objectives:

The subject aims to provide the student with:

1. An understanding of importance of an effective testing strategy.
2. Skills to plan and prepare appropriate tests for all phases of software development.
3. An Understanding of measures and controls for the quality of testing
4. Techniques for early detection of errors and to resolve the same. Learning different technologies to building different real world applications.

Course Outcomes: After successful completion of this course the student will

1. Manage, plan and prepare rigorous, formal, visible and repeatable tests that will fully exercise software, in the development of quality systems.
2. Apply different testing approaches to all stages of software development.
3. Prepare test plans, strategy, specifications, procedures and controls to provide a structured approach to testing.
4. Apply the techniques and methods covered to testing packages.
5. Describe the different types of testing tools available and identify the appropriate types of tools for their needs.

UNIT – 1 (12 Hrs)

Basic Concepts and Preliminaries: Role of Testing, Verification and Validation, Failure, Error, fault and Defect, Notion of Software Reliability, Objectives of Testing, What is a Test case? Expected Outcome, Concept of Complete Testing, Central Issue in Testing, testing Activities, Test Levels, White-box and Black-box Testing, Monitoring and Measuring Test Execution, Test Team Organization and Management

Software Quality: 5 views of SW Quality, McCall's Quality Factors and Criteria, ISO 9126 Quality Characteristics, ISO 9000:2000 Software Quality Standard

Unit Testing: Concept of Unit Testing, Static & Dynamic Unit Testing, Defect Prevention, Mutation Testing, Debugging, Unit Testing in XP, JUnit Framework, Tools for Unit Testing

UNIT – 2 **(12 Hrs)**

Control Flow Testing: Basic Idea, Outline, Paths in a Control Flow Graph, Path Selection Criteria, Generating Test Input,

Data Flow Testing: General Idea, Data Flow Anomaly, Overview of Dynamic Data Flow Testing, Data Flow Graph & Terms, Data Flow Testing Criteria, Comparison of Testing Techniques

Functional Testing: Concepts of Howden, Complexity of applying Functional Testing, Pair wise Testing, Equivalence Class Partitioning, Boundary Value Analysis, Decision Tables, Error Guessing

UNIT – 3 **(12 Hrs)**

System Integration Testing: Concept, Different types of Interfaces & Interface Errors, Granularity of System Integration Testing, Techniques, Software Hardware Integration, Test Plan for System Integration, Off-the-shelf Component Integration

System Test Design: Test Design Factors, Requirements Identification, Characteristics of Testable Requirements, Test Objective Identification, Modelling a Test Design Process & Results, Test Case Design Effectiveness

UNIT – 4 **(12 Hrs)**

System Test Planning and Automation: Structure of a System Test Plan, Intro & Feature Description, Assumptions, Test Approach, Test Suite Structure, Test Environment, test Execution Strategy, test Effort Estimation, Scheduling & Test Milestones, System test Automation, Evaluation & Selection of Test Automation Tools, Test Selection Guidelines for Automation, Characteristics of Automated Test cases, Structure of an Automated Test case, Test Automation Infrastructure,

System Test Execution: Modelling Defects, Metrics for tracking System Test, Orthogonal Defect Classification, Defect Causal Analysis, Beta Testing, First Customer Shipment, System Test Report, Product Sustaining, Measuring Test Effectiveness

Recommended Readings:

1. Kshirasagar Naik and Priyadarshi Tripathy; Software Testing and Quality Assurance: Theory and Practice; Wiley Publications
2. William E. Perry; Effective Methods for Software Testing Third Edition; Wiley Publications
3. Jeff Tian ; Software Quality Engineering – Testing, Quality Assurance and Quantifiable Improvement; Edition 2006, ISBN: 81-265-0805-1
4. Louise Tamares ; Introducing Software testing; ISBN: 81-7808-678-6

List of Experiments:

(At least 8 experiments should be conducted based on broad areas listed below)

1. Case study on software Testing and Quality Assurance
2. Manual Debugging in Visual studio
3. Study and use of any one Software Testing Tools
4. Software Requirement Specification of Mini project
5. Implementation of Project
6. Testing of project
7. To perform case study on Test Driven Development
8. To perform case study on Scenario Testing and Reporting

APPENDIX A

FINAL YEAR: INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTION AND EXAMINATION

(RC 2016-17)

SEMESTER –VII

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P#	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 7.1	Image Processing	3	1	2	3	100	25	--	--	--	**125**
IT 7.2	Principles of Compilers	3	1	2	3	100	25	--	25	--	**150**
IT 7.3	Mobile Computing	3	1	2	3	100	25	--	--	25	**150**
IT 7.4	Elective-I	3	1	2	3	100	25	--	--	25	**150**
IT 7.5	Elective-II	3	1	-	3	100	25	--	--	--	**125**
IT 7.6	Project	--	--	4	--	--	--	--	--	25	**25**
TOTAL		**15**	**05**	**12**	**--**	**500**	**125**	**--**	**25**	**75**	**725**

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/ she submits to the department a certified journal reporting the experiments conducted during the semester.

List of Electives

Subject Code	Elective-I	Subject Code	Elective-II
IT 7.4 .1	Embedded System Design	IT 7.5.1	Geographical Information System
IT 7.4 .2	Genetic Algorithms	IT 7.5.2	Computer Forensics
IT 7.4 .3	Bio Informatics	IT 7.5.3	Digital Signal processing
IT 7.4 .4	Electronic Commerce	IT 7.5.4	IT Business Methodology

FINAL YEAR: INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTION AND EXAMINATION

(RC 2016-17)

SEMESTER –VIII

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P#	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 8.1	Distributed System	3	1	2	3	100	25	--	--	25	**150**
IT 8.2	Computer Cryptography and Network Security	3	1	2	3	100	25	--	25	--	**150**
IT 8.3	Elective-III	3	1	2	3	100	25	--		--	**125**
IT 8.4	Elective-IV	3	1	2	3	100	25	--	--	25	**150**
IT 8.5	Project*	--	--	8	--	--	--	75	--	75	**150**
TOTAL		**12**	**04**	**16**	**--**	**400**	**100**	**75**	**25**	**125**	**725**

* Term Work in Project is a separate Head of Passing.

A candidate is considered to have successfully fulfilled the requirement of a semester, provided he/ she submits to the department a certified journal reporting the experiments conducted during the semester.

List of Electives

Subject Code	Elective-III	Subject Code	Elective-IV
IT 8.3.1	Web Services	IT 8.4.1	VLSI Design
IT 8.3.2	Natural Language Processing	IT 8.4.2	Cloud Computing
IT 8.3.3	Fuzzy Logic and Neural Networks	IT 8.4.3	Advanced Computer Architecture
IT 8.3.4	Advanced Data Structures and Algorithms	IT 8.4.4	Storage Area Networks

APPENDIX B

IT7.1 IMAGE PROCESSING

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	ThDuration(Hrs)	Marks					
						Th	S	TW	P	O	Total
IT7.1	Image Processing	3	1	2	3	100	25	--	--	--	**125**

Course Objectives:

1. To focus on imparting knowledge about the conceptual and practical aspects of Image Processing.
2. To analyze the basic principles and mathematical preliminaries behind Image Processing Techniques.
3. To know signal Processing aspect in Image Processing.
4. To formulate the importance of colour image processing and understanding its usage.

Course Outcomes:

The student after undergoing this course will be able to:

1. Describe the theory underlying basic techniques of Image Processing with detailed instruction for their application.
2. Understand the concepts and principles of the Image Processing Techniques like image enhancement, restoration, compression and segmentation.
3. Be able to implement basic Image Processing algorithms.
4. To carry out simulations for various processes in Image Processing.

UNIT -1 (12 Hours)

Introduction to Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

Elements of Visual Perception – Structure of the human eye, image formation in the eye, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition. Basic concepts in sampling and quantization, representing digital image. Some Basic Relationships between Pixels – neighbors of a pixel, adjacency, connectivity, regions, boundaries, distance measure.

Basics of intensity transformation and spatial filtering. Some Basic Intensity Transformation Functions – Image negatives, log transformation, power law transformations, piecewise – linear transformation functions. Histogram Processing - Histogram Equalization, fundamentals of Spatial filtering – mechanics of spatial filtering, spatial correlation and convolution. Smoothening spatial filtering – Smoothening linear filter.

UNIT - 2 (12 Hours)

Filtering in the frequency domain: Samping and the fourier transform of sampled function, sampling theorem, aliasing. Properties of 2D discrete fourier transform – relationship between spatial and frequency intervals, translation and rotation, periodicity, symmetry properties, fourier spectrum and phase angle, 2D convolution theorem. Image smoothening using frequency domain filters – ideal low pass filters, Butterworth lowpass filters, Gaussian lowpass filters. Image sharpening using frequency domain filters – ideal high pass filter, Butterworth highpass filter, Gaussian high pass filter.

A Model of the Image Degradation/Restoration Process. Noise Models – spatial and frequency properties of noise, periodic noise, estimation of noise parameters. Restoration in the Presence of Noise only (spatial filtering) - Mean Filters, Order-Statistics Filters, adaptive filters. Minimum Mean Square Error (Wiener) Filtering.

UNIT - 3 (12 Hours)

Color Fundamentals. Color Models – the RGB color models, the CMY and CMYK color models, the HSI color models. Basics of Full-Color Image Processing. Image Segmentation based on color – segmentation in HSI color space, segmentation in RGB vector space, color edge detection.

Wavelets and multiresolution processing: Image pyramids, subband coding, the Haar transform.

Image compression: Some basic compression method – Huffman coding.

Morphological Image Processing: Erosion and Dilation – erosion, dilation, duality. Opening and Closing, The Hit-or-Miss Transformation. Some Basic Morphological Transformation. Some Basic Morphological Algorithms – boundary extraction, hole filling, extraction of connected components, convex hull, thinning, thickening, skeletons and pruning.

Image segmentation: point, line and edge detection – detection of isolated points, line detection. Thresholding – foundation and Basic Global thresholding. Region based segmentation – region growing, region splitting and merging.

UNIT - 4 (12 Hours)

Representation and Description: Representation – Boundary following, chain codes, polygonal approximation using minimum parameter polygons. Boundary Descriptors – simple discriptors, shape numbers, Fourier descriptors, statistical moments. Regional descriptors - Some Simple Descriptors, topological descriptors.

Object Recognition: Patterns and Pattern Classes. Recognition Based on Decision-Theoretic Methods - Matching, Optimum Statistical Classifiers. Structural Methods - Matching Shape Numbers, String Matching.

Recommended Readings:

1. R.C. Gonzalez, R.E. Woods;Digital Image Processing; Pearson Prentice Hall; 2009; Third Edition.
2. A.K. Jain; Fundamentals of Digital Image Processing; PHI;
3. Milan Sonka, Vaclav Hlavac, Roger Boyle; Image Processing, Analysis and Machine Vision;
4. W.K. Pralt; Digital Image Processing; McGraw Hill;

List of Experiments in Image Processing and Pattern Recognition:

1. Introduction to image processing and pattern recognition
2. Create image in Java
3. Convert a colored image to grayscale image
4. Zooming and shrinking of an image
5. Negative of an image
6. Threshold of an image
7. Histogram of an image
8. Image smoothening
9. Erosion and dilation

IT 7.2 PRINCIPLES OF COMPILERS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 7.2	Principles of Compilers	3	1	2	3	100	25	-	25	-	**150**

Course Objectives:

1. To introduce essential theory, algorithms, and tools used in compiler construction.
2. To study the design of lexical, syntax, and semantic analysis of source files.
3. To study the construction of syntax trees, and symbol tables.
4. To understand code generation and optimization techniques.

Course Outcomes:

The student after undergoing this course will be able to:

1. Understand how compilers translate source code to machine executable.
2. Utilize tools to automate compiler construction such as LEX and YACC
3. Comprehend how to perform parsing (top down and bottom up).
4. be familiar with techniques for simple code optimizations.
5. Have the knowledge to design, implement, and test a compiler for a simple language.

UNIT - 1 (12 Hours)

A language processing system, an overview of Assemblers, Macro processors, Linkers, Loaders, Debugger, Text editor, Compiler, Interpreter.
Introduction to Language Translator, Phases of compilation, Bootstrapping and Porting, Compiler writing tools.
The role of a lexical analyser. Design of lexical analyzer. Implementation of lexical analyzer.
A Language for specifying lexical analyzer. Study of the features and applications of LEX/FLEX tool.

UNIT - 2 (12 Hours)

Overview of Context free grammar. Derivations and Parse trees, Ambiguity, Left recursion, Left factoring.
Top down parsing: Recursive descent parsing and Predictive parsers.
Bottom up parsing: Shift-reduce parsers. Operator precedence parsers, LR parsers.

Study of YACC Tool: Programming with YACC. Combining YACC and FLEX.

UNIT - 3 (12 Hours)

Intermediate Code Generation: Intermediate Language, Declarations, Assignment statements, Boolean expressions, Case statement, Procedure call.
Run Time environments: Source language issues, Storage organization, Storage allocation strategies.
Symbol tables: The content of a symbol table, Data structures for Symbol Table, Representing scope information.
Error detection and recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

UNIT - 4 (12 Hours)

Code generation: Issues in the design of a code Generator, Basic blocks and flow graphs, Next-use information, A simple Code generator, The DAG representation of Basic blocks, Peephole Optimization, Generating code from DAGS.

Code optimization: The principle sources of optimization, Optimization of basic blocks, Machine dependent optimization, Register allocation optimization.

Recommended Readings:

1. Aho and Ulman ; Principles of Compiler Design; Narosa publishing House, ISBN: 81-85015-61-9
2. Aho, Ulman and Sethi; Compilers, Principles, techniques and tools; Pearson Education Asia, ISBN: 81-7808-046-X.
3. Vinu V. Das ; Compiler design with FLEX and YACC; PHI publication, ISBN:978-81-203-3251-5
4. Louden; Compiler Construction, Principles and Practice; Galgotia Publication, ISBN:0-534-93972-4

List of Experiments in Principles of Compilers:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. A program to detect tokens from user defined expression.
2. A LEX program to find if the input is integer, real number or word.
3. A LEX program to add line numbers for given text.
4. A LEX program to convert decimal numbers to hexadecimal numbers.
5. A LEX program to compute average of given set of numbers.
6. A YACC program to parse an expression for a given grammar.
7. A program that combines YACC and LEX.
8. A program to obtain First and Follow for a user specified grammar.
9. A program to obtain Leading and Trailing for a user specified grammar.
10. To implement code generation algorithm

IT 7.3 MOBILE COMPUTING

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	ThDuration(Hrs)	Marks					
						Th	S	TW	P	O	Total
IT7.3	Mobile Computing	3	1	2	3	100	25	--	--	25	**150**

Course Objectives:

1. To understand the basic concepts and principles in mobile computing.
2. To be acquainted of the major layers of the mobile protocol stack.
3. To learn the basics of the major telecommunication systems GSM and DECT.
4. To understand the basic concepts of the various classes of satellites.
5. To be exposed to the concepts of Bluetooth and Wireless LAN

Course Outcomes

After completing the course the students will be able to:

1. Explain the basics of mobile telecommunication systems
2. Choose the best solution for each layer of the mobile protocol stack.
3. Describe the fundamentals of GSM and DECT telecommunication systems.
4. Identify the problems and their solutions for mobile network layer and mobile transport layer.
5. Describe the essentials of Satellite systems, Bluetooth and WAP.

UNIT - 1 (12 Hours)

Introduction: Applications, Simplified Reference model.
Wireless Transmission: Frequencies for Radio Transmission, Signals, Antenna, Signal Propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems.

UNIT - 2 (12 Hours)

Medium Access Control: Motivation for a specialized MAC, SDMA, FDMA. TDMA, CDMA, Comparison of S/T/F/CDMA.
Telecommunication System: GSM , DECT.

UNIT - 3 (12 Hours)

Mobile Network Layer: Mobile IP, Dynamic Host Configuration Protocol, Mobile ad-hoc networks.
Mobile Transport Layer: Traditional TCP, Classical TCP improvements, TCP over 2.5/3G wireless networks, Performance Enhancing Proxies.

UNIT - 4 (12 Hours)

Satellite Systems: History, Applications, Basics, Routing, Localization, Handover.
Wireless LAN :Bluetooth.
Support for Mobility: Wireless Application Protocol (version 1.x).

Recommended Readings:

1. Mobile Communications by Jochen Schiller, Second Edition, Pearson Education, ISBN: 978-81-317-2426-2.
2. Fundamentals of Mobile Computing by Prasant Kumar Pattnaik, Rajib Mall, Second Edition, PHI Learning Private Limited, ISBN: 978-81-203-5181-3.
3. Wireless Communication Networks and Systems by William Stallings, Copy Beard, Global Edition, Pearson Education, ISBN-13: 978-1-292-10871-1.
4. Mobile Computing Handbook by Mohammad Ilyas, ImadMahgoub, First Edition, CRC Press, Auerbach Publications, ISBN: 0-8493-1971-4.
5. AdHoc Mobile Wireless Networks by C.K. Toh, Pearson Education, Second Edition, ISBN-13: 978-0130078179

List of Experiments:

1. Case Study: The Simplified Reference Model.
2. Case Study: Frequencies for radio Transmission.
3. Program to implement Minimum Shift Keying (MSK).
4. Case Study: Medium Access Control
5. Program to check orthogonality and autocorrelation of codes.
6. Case Study: Global System for Mobile Communications (GSM).
7. Case Study: Mobile IP
8. Case Study: Classical TCP improvements
9. Build an ad-hoc network using different Bluetooth devices.
10. Design a webpage using WML and WMLScript.

IT 7.4.1 EMBEDDED SYSTEM DESIGN

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
IT 7.4.1	Embedded System Design	3	1	2	3	100	25	-	-	25	150

Course Objectives:

The subject aims to provide the student with:

1. To conceptualize the basics of embedded systems.
2. To conceptualize the basics of organizational and architectural issues of a microcontroller
3. To learn programming techniques used in microcontroller
4. To understand fundamentals of real time operating system

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain about microcontrollers embedded processors and their applications
2. to write the programs for microcontroller.
3. Describe the role of embedded systems in industry.

UNIT – 1 (12 Hours)

Introduction to Embedded Systems:
Overview of Embedded System Architecture, Application areas, Categories of embedded systems, specialties of embedded systems. Recent trends in embedded systems. Brief introduction to embedded microcontroller cores CISC, RISC, ARM, DSP and SoC (System on Chip).

The Microcontroller Architecture:
Introduction to 8051 Microcontroller, Architecture, Pin configuration, Memory organization, Input /Output Ports, Counter and Timers, Serial communication, Interrupts.

UNIT – 2 (12 Hours)

Assembly Language Programming of 8051:
Instruction set, Addressing modes, Development tools, Assembler Directives, Programming based on Arithmetic & Logical operations, I/O parallel and serial ports, Timers & Counters, and Interrupt Service Routine.

UNIT – 3 (12 Hours)

Embedded / Real Time Operating System:
Architecture of kernel, Task and Task scheduler, Interrupt service routines, Semaphores, Mutex, Mailboxes, Message queues, Event registers, Pipes, Signals, Timers, Memory management, Priority inversion problem. Off-the-Shelf Operating Systems, Embedded Operating Systems, Real Time Operating System (RTOS) and Handheld Operating Systems.

UNIT – 4 (12 Hours)

Embedded System - Design case studies: Digital clock, Battery operated smart card reader, Automated meter reading system, Washing Machine, Microwave Owen, Automotive Embedded Systems

Embedded software development tools: Code generation tools, Simulator, Testing and debugger, Integrated Development Environments (IDE) for 8051 systems, Memory and Processor sensitive program and device drivers.

Recommended Readings:

1. M. A. Mazidi, J. G. Mazidi, R. D. McKinlay; The 8051 microcontroller & Embedded systems; , Pearson
2. Kenneth J. Ayala, Dhananjay V. Gadre; . The 8051 microcontroller & Embedded systems; Cengage Learning.
3. Dr. K. V. K. K. Prasad; Embedded / real – time systems: concepts, design & programming, Black Book; Dreamtech press, Reprint edition 2013.
4. Raj Kamal; Embedded System: architecture, programming and design; TMH.
5. Frank Vahid; Tony Givargis,;John Wiley; Embedded System Design;
6. Laya B. Das, Pearson; Embedded systems an integrated approach;
7. Frank Vahid,;Tony Givargis;Embedded system design A Unified hardware/software Introduction.
8. Shibu K.V; Introduction to Embedded Systems; Mc Graw Hill

List of Experiments:

(At least 8 experiments should be conducted based on the broad areas listed below)

Using Keil

1. Write a program to send ASCII values 0,1,2,3,4,5,6,7,8,9,a,b,c,d,e to port 1
2. Write a program to toggle the bits of P1
3. Write a program to send and receive data serially
4. Programming based on arithmetic operations in 8051
5. Programming based on logical operations in 8051
6. Programming based on timers in 8051
7. Programming based on interrupts in 8051

Based on RTOS

1. To implement Shortest Job First Scheduling algorithm
2. To implement Priority Inheritance Protocol
3. Case Study: Reliability & Fault tolerance in RTOS

Case Study on Embedded System

1. Digital clock,
2. Battery operated smart card reader,
3. Automated meter reading system,
4. Washing Machine,
5. Microwave Owen,
6. Automotive Embedded Systems

IT 7.4.2 GENETIC ALGORITHMS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
IT 7.4.2	**GENETIC ALGORITHMS**	**3**	**1**	**2**	**3**	**100**	**25**	**-**	**-**	**25**	**150**

Course Objective:

The subject aims to provide the student with:

1. Understanding of genetic algorithm.
2. Learn different genetic algorithms and their industrial application.
3. Know to assess the suitability of genetic algorithms for specific problems

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain the fundamentals of genetic algorithm and how it can use in search problem to find approximate solution.
2. Identify which problem can be solved using genetic algorithm.
3. Apply the Advanced concepts of genetic algorithm in search problem and optimization

UNIT – 1 (12 Hours)

Introduction to Genetic Algorithms: Robustness of Traditional Optimization and Search Methods, Goals of Optimization, Difference between Genetic Algorithms and Traditional Methods, Simple Genetic Algorithm and its major operators, Example using Genetic Algorithm, Similarity Templates Schemata.

Mathematical Foundations: Fundamental theorem, Schema Processing, Two-armed and K-armed bandit problem, Building block hypothesis, Minimal deceptive, Similarity templates as hyper planes.

UNIT – 2 (12 Hours)

Computer Implementation of Genetic Algorithms: Data structures, Reproduction, crossover and mutation, mapping objective functions to fitness form, Fitness scaling.

Applications Of Genetic Algorithms: De Jong and Function optimization, Structural optimization via genetic algorithm, Medical image registration with genetic algorithms, Iterated prisoner's dilemma problem.

UNIT – 3 (12 Hours)

Advanced Operators And Techniques In Genetic Algorithm Search: Dominance, Diploidy and Abeyance, Inversion and other Re-ordering Operators, Macro operators, Niche and Specialization, Multi objective optimization.

Knowledge based techniques, Genetic Algorithms and Parallel processors, Genetic Based machine learning, Classifier systems.

UNIT – 4 (12 Hours)

Industrial Application Of Genetic Algorithms: Data Mining using genetic Algorithms, Approaches to search in data mining.

Genetic Algorithm Specifics.

Recommended Readings

1. David E. Goldberg, Genetic Algorithms in search, optimization machine learning Pearson Education, 6th Edition ISBN 81-7808-130-X
2. Charles L Karr and L. Michael Freeman, Industrial applications of Genetic Algorithms, CRC Press, Washington DC, 1999 ISBN: 0-8493-9801-0
3. Intelligent agent's adaptive control: Industrial applications- L.C. Jain and C.W.de Silva
4. Handbook of Genetic Algorithms -Davis, Lawrence, ISBN:0-442-00173-8.
5. An Introduction to Genetic Algorithms-Melanie Mitchell, ISBN: 81-203-1358-5

Experiment List

(At least 8 experiments should be conducted based on the broad areas listed below)

1. Case study on traditional and Genetic Algorithmic approach.
2. Program to implement Cross over and mutation operations.
3. Program to map an objective functions to fitness form.
4. Program on inversion and Re-ordering operators.
5. Program to find minimum of a function using genetic algorithm.
6. Program on constraint minimization using genetic algorithm.
7. Program to implement classifier using genetic algorithm.
8. Case study on the industrial applications of the genetic algorithms

IT 7.4.3 Bio Informatics

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th	Marks					
		L	T	P	Duration (Hrs)	Th	S	TW	P	O	Total
IT 7.4.3	Bio Informatics	3	1	2	3	100	25	--	--	25	**150**

Course Objectives:

The subject aims to provide the student with:

1. An ability to understand the broad scope of Bioinformatics.
2. An understanding of the theory and practices of computational methods of Bioinformatics.
3. An understanding of how to demonstrate the basic programming tools used in the field of genomics.
4. An ability to observe various tools used in Bioinformatics
5. A keen interest in Bioinformatics

Course Outcomes:

The student should be able to:

1. Implement Methods used in Bioinformatics.
2. Study Genome Analysis and Gene Mapping.
3. Compare Phylogenetic Analysis and Sequence Analysis.
4. Analyze various algorithms used in Bioinformatics
5. Apply various Tools used in Bioinformatics.

UNIT -1 (12 hours)

Introduction to Bioinformatics: Introduction, Historical Overview and Definition, Bioinformatics applications, Major databases in bioinformatics, Data Management and Analysis, Molecular Biology and Bioinformatics, Central Dogma of Molecular Biology**.**

Information Search and Data Retrieval: Tools for web search,Data Retrieval Tools,Data Mining of biologicaldatabases.

Genome Analysis and Gene Mapping: Genome Analysis, Gene Mapping, The Sequence AssemblyProblem, Genetic Mapping and Linkage Analysis, Physical Maps,

Cloning Entire Genome,Genome Sequencing, Applications of Genetic Maps, Sequence Assembly Tools, Identification of Tools in Contigs, Human Genome Project.

UNIT -2 (12 hours)

Sequence Alignment : Dot matrices and Hash coding, Dynamic programming in sequence algorithm, BLAST, FASTA.

Alignment of Multiple Sequences and Phylogenetic Analysis: Methods of multiplesequence alignment, Evaluating Multiple alignments, Applications, Phylogenetic Analysis, Methods of Phylogenetic Analysis, Tree evaluation, Problems in Phylogenetic Analysis, Dual automated tools.

UNIT -3 (12 hours)

Profiles and Hidden Markov Models: Using Profiles, Hidden Markov Models.
Gene Identification and Prediction: Basics of Gene Prediction, Pattern Recognition, Gene Prediction methods, Other Tools.
Gene Expression and Microarrays: Working with DNA Microarrays, Clustering Gene Expression Profiles, Data sources and tools for microarrays analysis, Applications – Functional Genomes, Comparative Genomics, Medical Applications, Microarrays in Pharmaceutical industries, DNA Microarrays.

UNIT -4 (12 hours)

Determination and Analysis of Molecular Structures: Experimental structure determination technique, Visualization and representation of molecular structure, Geometrical analyses of structures.
Protein Classification and Structure Visualisation: Overview of protein structure, Protein Structure Visualisation, Structure based protein classification, Protein Structure databases, Protein Structure Visualisation Database andTools, Protein Structure Alignment, Domain Architecture Databases, Tools for Plotting Protein-Ligand Interaction, Protein ClassificationApproach.
Introduction to Drug Discovery: Areas influencing drug discovery, Pharmacogenetics and Pharmacogenomics applications, Analysis of Single Nucleotide Polymorphism, Important parameters in Drug Discovery.

Recommended Readings:

1. Bioinformatics – Methods and Applications, S.C. Rastogi, N. Mendiratta and P. Rastogi,4th Edition, PHI, ISBN: 8120325826 ISBN-13: 9788120325821, 978-8120325821

2. Bioinformatics-Databases and Algorithms, by N.Gautham, Narosa Publication ISBN: 81-7319-715-6
3. Bioinformatics- A Beginner's Guide, Jean-Michel Claveriw, Cerdric Notredame WILEY dreamtech India Pvt. Ltd, ISBN:81-265-0380-7
4. Introduction to Bioinformatics, Arthur M. Lesk, OXFORD publishers (Indian Edition)ISBN-10: 0199251967 ISBN-10: 0199251967
5. Introduction to Bioinformatics, T K Attwood & D J Parry-Smith Addison Wesley Longman, ISBN 0 582 327881

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. To implement sequence alignment using hash coding.
2. To implement Pairwise sequence alignment.
3. To implement Sequence similarity searching for sequences.
4. To implement multiple sequence alignment.
5. To implement Phylogenetic analysis using distance based method.
6. To implement evaluation of trees.
7. To implement microarray image analysis.
8. To implement prediction of secondary structure of proteins.
9. To implement sequence based prediction.
10. To validate 3D protein structure.

IT 7.4.4 Electronic Commerce

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 7.4.4	Electronic Commerce	3	1	2	3	100	25	-	-	25	**150**

Course Objectives:

1. To develop an understanding of different business models of E-Commerce.
2. To develop an understanding of Electronic Payment Systems.
3. To develop an understanding of Elements of Supply Chain.
4. To develop an understanding of Security in E-Commerce.

Course Outcomes:

The student after undergoing this course will be able to:

1. Students would be able to analyze the concept of electronic market and market place.
2. Students would be able to understand the different Business Models.
3. Students would be able to understand different types of security threats in E-Commerce.
4. Students would be able to understand the different Applications of E-Commerce.

UNIT - 1 (12 Hours)

Introduction to Electronic Commerce: Defining E-Commerce, Components and Features of E-Commerce, Forces Fueling E-Commerce, Electronic Commerce Industry Framework, The Information Superhighway, Multimedia Content and Network Publishing, Messaging and Information Distribution, Common Business Services Infrastructure, Other Key Support Layers, Traditional Commerce versus E-Commerce, Advantages and limitation of E-Commerce, Benefits to Organization and Society, Drivers of E-Commerce, Categories of E-Commerce, E- Business, E-Business versus E-Commerce, E-Business advantages, E-Business application, Concept of EDI.

Planning and Launching of Online Business: Business Models, Advantages of Bricks and Clicks business model, Superiority of bricks and clicks over pure online model, Difference between brick and mortar and pure online business model, Launching online business, Life cycle approach for launching an online business, One to One Enterprise.

UNIT - 2 (12 Hours)

Electronic Payment System: Traditional payment systems, Internet based payment system, Essential requirements of E-Payment System, Credit cards, Debit cards, Smart cards, EFT, Electronic or Digital Cash, E-Cheques, E Wallet, Consumer, Legal, and Business Issues.

Payment Gateways: Payment gateway process, Advantages and Disadvantages of Payment Gateway, Secure Electronic Transaction Protocol, Types of Payment Gateway: Cyber Cash, Net Bill, First Virtual Holdings and Virtual PIN.

Electronic Commerce and Banking: Changing Dynamics in the Banking Industry Open versus Closed Models, Management Issues in Online Banking, Differentiating Products and Services, Managing Financial Supply Chains, Pricing Issues in Online Banking, Marketing Issues, Back-Office Support for Online Banking.

UNIT - 3 (10 Hours)

Applications of E-Commerce: Business to Business, Business within Business, Customer to Business, Applications of E-Commerce in Retailing, Economic viability of an Online Firm, Financial Analysis, Business models of E-tailing, Service Sector: Online travel services, Online Career Industry, Online Insurance services.

Electronic Commerce and Retailing: Changing Retail Industry Dynamics, Mercantile Models from the Consumer's Perspective, Types of Purchases, Types of Consumers, Management Challenges in Online Retailing.

Intranets and Supply-Chain Management: Supply-Chain Management Fundamentals, Pull versus Push Supply-Chain Models, Elements of Supply-Chain Management, Integrating Functions in a Supply Chain, Managing Retail Supply Chains, The Order Management Cycle (OMC).

UNIT - 4 (10 Hours)

Intranets and Customer Asset Management: Challenges in Implementing Customer Asset Management, Customer Asset Management and Supply Chains, Online Sales Force Automation, Elements of Online Sales Automation, Intranets and Sales Automation, Management Issues, Online Customer Service and Support - The Web and Customer Service, The Role of Technology in Customer Service, Technology and Marketing Strategy, Marketing Decision Support Systems, Marketing Decision Support Applications.

Security in E-Commerce: Introduction, Threats to Internet Security, Types of Threats, Security System on Internet, Network Security, Client Server Network Security, Data and Transmission Security, Firewalls, Security Protocols.

Recommended Readings:

1. Nidhi Dhawan; Introduction to E-Commerce; International Book House Pvt. Ltd; 2010
2. Ravi Kalakota & Andrew B. Whinston; E-Commerce; Pearson Education India

List of Experiments in E-Commerce:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. An analysis of Different Ecommerce Websites
2. A Survey on Online Payment Method
3. Study of E-Commerce Softwares
4. A Survey on Enterprise Resource Planning(ERP)
5. Mini Project: Designing of E-Commerce Website
6. Case Study: Amazon.in
7. Case Study: Online Banking in India
8. Case Study: SCM in India
9. Case Study: E-Business in Action

IT 7.5.1 GIS GEOGRAPHICAL INFORMATION SYSTEM (Elective II)

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th	Marks					
		L	T	P	Duration (Hrs)	Th	S	TW	P	O	Total
IT 7.5.1	Geographical Information system	3	1	-	3	100	25	--	--	--	**125**

Course Objective:

1. Understand the purposes of GIS and the kinds of problems to which GIS is applied.
2. Understand maps and way it is represented in digital form.
3. Understand the fundamental types of GIS data, including raster and vector data.
4. Understand the basics of data capture, storage, analysis and output in a GIS.
5. Understand the limitations of geographic information systems and of geographic data in general.

Course Outcomes

1. Students are able to explain the concept, terminology and practices of GIS.
2. Students are able to demonstrate how GIS data is digitally represented and how the data is processed.
3. Students are able to design, implement and manage a GIS application.

UNIT 1 (12hrs)

Introduction to GIS: Definitions and related terminology of GIS. Evolution of GIS, Components of GIS, Approaches to the study of GIS.

Maps and GIS : Characteristics of maps, Plane and geographic coordinates, Map projection

Establishing a geo referencing framework for mapping locations of earth, Topographic mapping

Thematic mapping

UNIT 2 (12 hrs)

Digital Representation of Geographic data: Technical issues to digital representation of data

Database and database management system, Raster geospatial data representation

Vector data representation, Object oriented geospatial data representation, Relationship between data representation and data analysis in GIS.

Geospatial Data Quality and Data Standards : Concepts and definition of data quality, Components of geospatial data, Data quality assessment, Managing data spatial errors, Geospatial data standards, Geospatial data standards and GIS development

UNIT 3 (12 hrs)

Raster Geoprocessing : Characteristics of raster geoprocessing**,** Acquiring and handling raster geospatial data**,** Raster geospatial data analysis, Output functions of raster geoprocessing**,** Cartographic modeling,

Vector Geoprocessing: Characteristics of vector geoprocessing, Vector data input functions

Non topological GIS analysis functions, Feature based topological functions, Layer based topological functions, Vector geoprocessing output functions, Approaches to vector geoprocessing.

UNIT 4 (12hrs)

Geo Visualization and Geospatial Information Products: Cartography in the context of GIS, Human computer interaction and GIS, Visualization of geospatial information Principles of cartographic design in GIS, Generation of information product,.

GIS Implementation and Project Management: Software engineering as applied to GIS, GIS project planning, System analysis and user requirement studies, Geospatial database design methodology, System implementations in technology roll out, System maintenance and technical support.

GIS Issues and Prospects: Issues of implementing GIS, The trends of GIS development**.,** Frontiers of GIS research.

Recommended Readings

1. C. P. Lo, Albert K. W. Yeung; Concepts And Techniques Of Geographic Information Systems;2nd Edition, Prentice Hall of India, ISBN-13: 978-0131495029

2. Ian Heywood, Sarah Cornelius, Steve Carver; An Introduction to Geographical Information Systems;4th Edition; Pearson Education, ISBN-13: 978-0273722595

3. George B. Korte; The GIS Book; 5th Edition, Cengage Learning, ISBN-13: 978-8131503997

4. Kang – Tsung Chang; Introduction to Geographical Information Systems;8th Edition, McGraw-Hill Higher Education, ISBN-13: 978-0078095139

IT 7.5.2 COMPUTER FORENSICS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT7.5.2	Computer Forensics	3	1	0	3	100	25	--	--	--	**125**

Course Objective:

The subject aims to provide the student with:

1. Familiarization with the types and categories of Cyber Crime
2. Understand concept and scope of Computer Forensics
3. knowledge and skill required to minimize the occurrence and severity of incidents related to forensics and cyber law.
4. An appropriate level of awareness, knowledge and skill required to minimize the occurrence and severity of incidents related to forensics and cyber law.

Course Outcomes:

Upon completion of this course, student will be able to

1. Describe fundamental computer forensics concepts and procedures.
2. Explain how to recover hidden data for forensic analysis from Windows and Linux/Unix file systems
3. Apply digital forensic tools to discover, collect, preserve and analyze Windows and Linux/Unix digital evidence.
4. Document and report digital evidence to court.

UNIT – 1 (12 Hours)

Computer Forensics Fundamentals: Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Back-up and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.

UNIT – 2 (12 Hours)

Evidence Collection and Data Seizure: Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene —

Computer Evidence Processing Steps — Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration —Practical Implementation.

UNIT – 3 **(12 Hours)**

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project. Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case

UNIT – 4 **(12 Hours)**

Current Computer Forensic tools: Evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools. Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

Recommended Readings:

1. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi. 2004
2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning, 2008
3. Chris Davis, David Cowen & Aaron Philipp; Hacking Exposed Computer Forensics Secrets & Solutions; Tata McGraw-Hill Publishing Company Limited, ISBN 0-07- 059895-9
4. Man Young Rhee; “Internet Security: Cryptographic Principles”, “Algorithms and Protocols”,;Wiley Publications, 2003;
5. Richard E.Smith,;“Internet Cryptography”;3rd Edition Pearson Education; 2008.
6. MarjieT.Britz; “Computer Forensics and Cyber Crime”: An Introduction”; 3rd Edition, Prentice Hall;

IT 7.5.3 Digital Signal Processing

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th	Marks					
		L	T	P	Duration (Hrs)	Th	S	TW	P	O	Total
IT 7.5.3	Digital Signal Processing	3	1	-	3	100	25	--	--	-	**125**

Course Objectives:

1. Understand basic concepts and methodologies in Digital Signal Processing.
2. Understand the fundamental concepts of discrete transforms.
3. Study the applications of Z Transforms.
4. Study of digital filters and their applications.

Course Outcomes

Upon completion of this class, students should be able to:

1. Explain the concepts of signals and systems and the basic operations on them.
2. Analyse the behaviour of periodic and aperiodic signals in frequency domain using the Fourier Series and Fourier Transforms.
3. Describe the concept and characteristics of Z Transforms and its use in the analysis and applications of systems.
4. Explain the techniques of designing of Infinite Impulse Response (IIR) filters and Finite Impulse Response (FIR) filters.

UNIT -1 (12 Hours)

Digital Signal Processing and Its Benefits. Application Areas. Key DSP Operations. Digital Signal Processors. Overview of Real-world Applications of DSP. Telecommunications Applications of DSP. DFT and its Inverse. Properties of the DFT. Computational Complexity of the DFT. The Decimation-in-Time Fast Fourier Transform Algorithm. Inverse Fast Fourier Transform. Implementation of the FFT. Other Discrete Transforms. An Application of the DCT: Image Compression.

UNIT -2 (12 Hours)

Discrete-Time Signals and Systems. The Z-Transform, The Inverse Z-Transform. Properties of the Z-Transform. Some Applications of the Z-Transform in Signal Processing. Correlation and Convolution. Correlation Description. Convolution Description. Implementation of Correlation and Convolution. Application Examples.

UNIT -3 (12 Hours)

Introduction to Digital Filters. Types of Digital Filters: FIR and IIR Filters. Choosing Between FIR and IIR Filters. Filter Design Steps. Introduction. FIR Filter Design. FIR

Filter Specifications. FIR Coefficient Calculation Methods. Window Method. The Optimal Method. Frequency Sampling Method. Comparison of the Window, Optimum and Frequency Sampling Methods. Special FIR Filter Design Topics. Realization Structures for FIR Filters. Finite Wordlength Effects in FIR Digital Filters. FIR Implementation Techniques. Design Example. Application Examples of FIR Filters.

UNIT -4 (12 Hours)

Design of Infinite Impulse Response (IIR) Digital Filters: Summary of the Basic Features of IIR Filters. Design Stages for Digital IIR Filters. Performance Specification. Coefficient Calculation Methods for IIR Filters. Pole-Zero Placement Method of Coefficient Calculation. Impulse Variant Method of Coefficient Calculation. Matched Z-Transform (MZT) Method of Coefficient Calculation. Bilinear Z-Transform (BZT) Method of Coefficient Calculation. Use of BZT and Classical Analog Filters to Design IIR Filters. Calculating IIR Filter Coefficients by Mapping S-Plane Poles and Zeros. Using IIR Filter Design Programs. Choice of Coefficient Calculation Methods for IIR Filters. Realization Structures for IIR Digital Filters. Finite Wordlength Effects in IIR Filters. Implementation of IIR Filters. A Detailed Design Example of an IIR Digital Filter.

Recommended Readings:

1. Digital Signal Processing – by Emmanuel C..Ifeachor, &Barrie.W.Jervis, Second edition, Pearson Education / Prentice Hall, 2002.
2. Digital Signal Processing: Principles, Algorithms, and Applications, by John G. Proakis and Dimitris G. Manolakis, Prentice Hall, 1996
3. Discrete-Time Signal Processing, by Alan V. Oppenheim, Ronald W. Schafer, Prentice Hall, ISBN:0-13-216292-X
4. Digital Signal Processing, A Computer Based approach, by S.K. Mitra, Tata McGraw Hill, 1998
5. Digital Signal Processing by Ramesh Babu, Scitech India publications Limited, Fourth Edition,2007

IT 7.5.4 IT Business Methodology

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 7.5.4	IT Business Methodology	3	1	-	3	100	20	5	-	-	**125**

Course Objectives:

1. To explore the concept of Decision support system.
2. To understand the concept of ERP.
3. To understand the ethical practices in management.

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain the concept of Management Information system.
2. Differentiate the ERP modules.
3. Describe the ERP Implementation Lifecycle.

UNIT - 1 (10 Hours)

Management Information Systems: Need, Role of managers, Business and technology trends, Reengineering. Transaction management.
Models and Decision Support: Need, Understanding processes, Decision Support Systems (DSS), Executive Information Systems (EIS), Expert Support Systems (ESS), and Building ESS.
Value: Importance, source of value system, types, values, loyalty and ethical behavior, value across culture.
Business ethics: Nature, characteristics and needs, ethical practices in management.

UNIT - 2 (12 Hours)

Business modeling for ERP: Overview, concept, significance and principles of business engineering, BRP, ERP and IT business engineering with IT, ERP and management concerns, building an MIS, Business as a system, core process in a manufacturing company, entities for data model in a manufacturing company, extended ERP.
Enterprise - An Overview: Integrated management information, Business modeling, Integrated business model.

ERP : A Manufacturing Perspective: ERP, CAD/CAM, MRP,BOM, closed loop MRP, MRP-II, JIT and Kanban, PDM, Make To Order, Make To Stock, Assemble To Order, Engineer To Order, Configure To Order.

UNIT - 3 (10 Hours)

ERP Modules: Finance, Plant management, Quality management, Materials management.
Benefits of ERP: Reduction of lead time, On-time shipment, Reduction in cycle time, Improved resource utilization, Better customer satisfaction, Improved supplier, Performance, Increase flexibility, Reduced quality costs, Improved information, accuracy and decision making capability.
ERP Implementation Lifecycle: Pre-evaluation screening, Package evaluation, Project planning phase, Gap analysis, Reengineering, Configuration, Implementation team engineering, Testing, Going live, End-user training, Post implementation.

Vendors, Consultants and users: in-house implementation, Vendors, Consultants, End-users.

UNIT - 4 (8 Hours)

Strategic Analysis: Competitive environment, External agents, IS techniques to gain competitive Advantage, Product Differentiation and new products, Need for innovation, Costs and dangers of strategies, Quality management: Operations, tactics and strategy.

Organizing Businesses and Systems: Production Chain, Disintermediation, Auctions, Entrepreneurship, Planning.

Information management and Society: Individual perspective, Business perspective: Vendor, Consumer, Education and training, Social interaction, Responsibility and ethics.

Recommended Readings:

1. Gerald V. Post and David L. Anderson; Management Information Systems; (TMH).
2. Vinod Kumar Garg, N. K. Venkita Krishna; Enterprise resource planning.
3. Alexis Leon; Enterprise Resource Planning; TMH.
4. Robert G. Murdick, Joel E. Ross and James R. Claggett; Information System for Modern Management; (PHI).
5. S.K Chakraborty; Value and Ethics for Organization.

IT 8.1 DISTRIBUTED SYSTEM

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
IT 8.1	Distributed System	3	1	2	3	100	25	-	-	25	150

Course Objectives:

The subject aims to provide the student with:

1. Understand the major technical challenges in distributed systems design and implementation.
2. To present the principles underlying the functioning of distributed systems
3. Expose students to past and current research issues in the field of distributed systems
4. Provide experience in the implementation of typical algorithms used in distributed systems

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain what a distributed system is, why you would design a system as a distributed system and what the desired properties of such systems are.
2. List the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions
3. Recognize how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems

UNIT – 1 (12 Hours)

Introduction to Distributed System. Goals: Connecting Users and Resources, Transparency, Openness, Scalability. Hardware Concepts: Multiprocessors, Homogeneous Multicomputer Systems, Heterogeneous Multicomputer Systems. Hardware & Software Concepts,Design Issues & Challenges Distributed Operating Systems, Network Operating Systems Middleware.
The Client-Server Model: Clients and Servers, Application Layering, Client-Server Architectures

Layered Protocols: Lower-Level Protocols, Transport Protocols, Higher-Level Protocols. **Remote Procedure Call**: Basic RPC Operation , Parameter Passing , Extended RPC Models, Example: DCE RPC.
Remote Object Invocation: Distributed Objects, Binding a Client to an Object, Static versus Dynamic Remote Method Invocations, Parameter Passing, DCE Remote Objects, Java RMI 95. **Message-Oriented Communication**: Persistence and Synchronicity in Communication, Message-Oriented Transient Communication, Message-Oriented Persistent Communication. Stream-Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization

UNIT – 2 (12 Hours)

Processes: Introduction to Threads, Threads in Distributed Systems, Clients, User Interfaces, Client-Side Software for Distribution Transparency. Servers- General Design Issues, Object Servers, Approaches to Code Migration, Migration and Local Resources, Migration in Heterogeneous Systems. D'Agents. Software Agents 173, Software Agents in Distributed Systems, Agent Technology
Message Passing Communication: Communication Primitives, Message Synchronization and Buffering, Pipe, Pipe and Socket APIs, Group Communication, Multicasting
Clock Synchronization: Physical Clocks, Clock Synchronization Algorithms, Use of Synchronized Clocks. Logical Clocks: Lamport timestamps, Vector timestamps. Global State. Election Algorithms, The Bully Algorithm, A Ring Algorithm. Mutual Exclusion: Centralized, Distributed, and Token Ring Algorithms. A Comparison of the Three Algorithms. Distributed Transactions: The Transaction Model, Classification of Transactions, Implementation of Concurrency Control

UNIT – 3 (12 Hours)

Introduction to consistency and replication: Reasons for Replication, Object Replication, Replication as Scaling Technique. Data-Centric Consistency Models, Strict, Linearizability and Sequential, Causal, FIFO, Weak, Release, Entry Consistency models: Client-Centric Consistency Models: Eventual Consistency, Monotonic Reads, Monotonic Writes, Read Your Writes, Writes Follow Reads and Implementation. Distribution Protocols: Replica Placement, Update Propagation, Epidemic Protocols, Consistency, Primary-Based, Replicated-Write, Cache-Coherence Protocols
Introduction To Fault Tolerance: Basic Concepts, Failure Models, Failure Masking by Redundancy. Process Resilience: Design Issues, Failure Masking and Replication, Agreement in Faulty Systems. Reliable Client-Server Communication: Point-to-Point Communication, RPC Semantics in the Presence of Failures. Reliable Group Communication: Basic Reliable-Multicasting Schemes, Scalability in Reliable Multicasting, Atomic Multicast. Distributed Commit: Two-Phase Commit, Three-Phase Commit. Recovery: Check pointing, Message Logging.

UNIT – 4 (12 Hours)

Distributed Object-Based Systems: Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance and security issues with CORBA and DCOM. Comparison of CORBA and DCOM

Distributed File Systems: Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance and security issues with Sun Network File System

Distributed Document-Based Systems: Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance and security issues with World Wide Web

Recommended Readings:

1. Andrew S. Tanenbaum and Maarten Van Steen; Distributed Systems: Principles and Paradigms; Prentice Hall, ISBN – 81 – 7808 – 789-8.
2. George Coulouris, Jean Dollimore & Tim Kindberg; Distributed Systems – Concept and Design; Pearson (LPE).; 4th Edition ;ISBN 978-81-317-1840-7.
3. Randay Chow, Theodore Johnson; Distributed Operating System and Algorithm Analysis; Pearson (LPE) ISBN 978-81-317-2859-8

List of Experiments:

(At least 8 experiments should be conducted from the list of experiments.)

1. Program to implement Single Client Single Server Chat Application
2. Program to implement Multiple Clients Single Server Chat Application
3. Program to implement Remote Method Invocation Application
4. Case study on Component Object Model (COM)
5. Case study on Distributed Component Object Model (DCOM)
6. Case study on Common Object Request Broker Architecture (CORBA)
7. Program to implement Berkeley's Algorithm for clock synchronization
8. Case study in generating Interface Definition Language (IDL) in Java using CORBA
9. Program to implement Lamport Timestamps clock synchronization
10. Program to implement Vector Timestamps clock synchronization

IT 8. 2 COMPUTER CRYPTOGRAPHY AND NETWORK SECURITY

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
IT 8.2	Computer Cryptography and Network Security	3	1	2	3	100	25	-	-	25	150

Course Objectives:

The subject aims to provide

1. An Understanding of different cryptography techniques
2. A study of different cryptography algorithms and perform cryptanalysis
3. Concepts of different network security issues
4. Ability to secure their network and message passed in the network

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain different cryptographic techniques
2. Implement different algorithm for encryption
3. Illustrate how network security is achieved
4. Perform cryptanalysis of different algorithm

UNIT – 1 (12 Hours)

Need of Information Security, Security Trends, Security Services, Security Mechanism, Security Attacks, The OSI Security Architecture, Model for Network Security.

Symmetric Cipher Model- Substitution Techniques : Caesar Cipher, Mono-alphabetic Cipher, Poly-alphabetic Cipher, Playfair Cipher, Hill Cipher, Problems with Symmetric Cipher Algorithms, Transposition Techniques, Steganography. Intrusion Detection, Malicious Software: Viruses and Related Threats, Virus Countermeasures.

UNIT – 2 (12 Hours)

Block Ciphers Principles, Fiestel Structure , Data Encryption Standard, Strength of DES, Block Cipher Modes of Operation, Triple DES. Confidentiality Using Symmetric Ciphers:

Placement of Encryption Function, Traffic Confidentiality, Key Distribution. Principles of Public Key Cryptosystems, RSA Algorithm. Key Management, Diffie-Hellman Key Exchange.

UNIT – 3 (12 Hours)

Message Authentication And Hash Functions: Authentication Requirements, Authentication Functions. Message Authentication Codes. Hash Algorithms: MD5 Message Digest Algorithm, Overview of Secure Hash Algorithm. Digital Signatures and Digital Signature Standard. Authentication Applications: Kerberos, X.509 Authentication Service: Certificates, Obtaining a User's Certificate , Revocation of Certificates , Authentication Procedures.

UNIT – 4 (12 Hours)

Electronic Mail Security: Pretty Good Privacy: Services, Cryptographic Keys and Key Rings, S/MIME: Overview , MIME Content Types , S/MIME Functionality Brief overview of IPSec and SSL/TLS. Secure Electronic Transaction: SET overview, SET Participants, Dual Signature, Payment Processing. Firewall Design Principles , Trusted systems.

Recommended Readings:

1. William Stallings; Cryptography And Network Security Prentice Hall Of India, ISBN:81-203-3018-8 ; 4th Edition
2. Behrouz A. Forouzan; Cryptography And Network Security; Tata McGraw Hill; ISBN-13:978-0-07-066046-5
3. Atul Kahate; Cryptography And Network Security; Tata McGraw Hill; ISBN-13:978-0-07-064823-4

List of Experiments:

(At least 8 experiments should be conducted based on the broad areas listed below)

1. Implementation of Caesar Cipher
2. Implementation of Transposition Cipher
3. Implementation of Play fair Cipher
4. Implementation of Hill Cipher
5. Implementation of one time pad technique
6. Implementation of DES
7. Implementation of RSA
8. Implementation of Stenography
9. Study of Account and password management. PAM, password cracking.
10. Study of Security analysis tools: Nessus, Microsoft baseline security analyzer ,wireshark ,nmap tcpdump, networking commands.

IT 8.3.1 WEB SERVICES

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 8.3.1	Web Services	3	1	2	3	100	25		-	-	**125**

Course Objectives:

1. To learn and understand the various concepts of Web Services.
2. To learn basics of XML which is the basic prerequisite to understand how the different documents of the respective protocols are designed.
3. To learn the different protocols used in web services and their role and importance in designing a web service.

Course Outcomes:

The student after undergoing this course will be able to learn:

1. How information is exchanged between applications within a distributed environment. (SOAP).
2. How the web services are described to the world over internet (WSDL).
3. How the web service is published and made known to the world over the internet. (UDDI).
4. How to explain the conversation pattern that a web service is expecting to engage in. (WSCL)
5. How workflow systems automate business processes. (Workflow).
6. Advantages and Disadvantages of Web Services.
7. Transactions and the transaction protocols used in web service.
8. Security issues in Web Services.

UNIT - 1 (14 Hours)

Web Service and SOA fundamentals: Introduction, Concept of Software as a Service(SaaS), Web services versus Web based applications, Characteristics of Web services, Service interface and implementation, The Service Oriented Architecture(SOA), Quality of service (QoS), Web service interoperability, Web services versus components, RESTful services , Impact and shortcomings of Web services.

Web Services Architecture: Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for

implementing web services, web services communication, basic steps of implementing web services, developing web services enabled applications.

UNIT - 2 (12 Hours)

Extensible Markup Language (XML): XML Fundamentals. XML, XML Documents, XML Namespaces. XML Schema, Processing XML.
XML Parsing: SAX, COM, JAXB. Xpath, XQuery.

UNIT - 3 (14 Hours)

SOAP: Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP communication model, Building SOAP Web Services, developing SOAP Web Services using Java, Error handling in SOAP, Advantages and disadvantages of SOAP.

Describing and Discovering Web Services: WSDL in the world of Web Services, Web Services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL Tools, limitations of WSDL, Service discovery, role of service discovery in a SOA, service discovery mechanisms, UDDI – UDDI Registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, support for categorization in UDDI Registries, Publishing API, Publishing information to a UDDI Registry, searching information in a UDDI Registry, deleting information in a UDDI Registry, limitations of UDDI.

UNIT - 4 (12 Hours)

Conversations: Web service conversation Language, WSCL Interface component, Relationship between WSCL and WSDL.
Workflow: Business Process Management, Workflow and workflow Management systems, Business Process Execution Language (BPEL).
Security: Everyday Security Basics, Security Is An End-to-End Process, Web Service Security Issues, Types of Security Attacks and Threats, Web Services Security Roadmap, WS-Security.

Recommended Readings:

1. Michael P. Papazoglou; Web Services & SOA: Principles and Technology; Pearson Education , 2/e,.

2. Harvey M.Dietel & Paul J.Dietel ; Web Services: A Technical Introduction; Prentice Hall PTR, ISBN: 0130461350
3. Sandeep Chatterjee, James Webber; Developing Enterprise Web Services – An Architect's Guide; Pearson Education ISBN: 0-13-140160-2.
4. Stephen Potts, Mike Kopack; Sams Teach Yourself Web Services in 24 Hours; Sams Publications ISBN:13:978-0672325151.
5. R. Nagappan, R. Skoczylas, R.P. Sriganesh; Developing Java Web Services; Wiley India.

List of Experiments in Web Services:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. To implement XML Schema and File
2. To study and implement XML inheritance.
3. To study and implement SOAP and WSDL.
4. To study and implement DOM.
5. To implement XML encryption
6. To implement XML query
7. Creating web service using JAVA
8. Creating web service using .NET
9. Case study on XPath, XJAXB

IT8.3.2. Natural Language Processing

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	ThDuration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT8.3.2	Natural Language Processing	3	1	2	3	100	25	--	--	--	125

Course Objectives:

The subject aims to provide the students with:

1. To understand the basic of Natural Language processing.
2. To develop an understanding of various techniques used in Natural Language Processing and understand the various application areas for NLP.

Course Outcomes:

The student after undergoing this course will be able to:

1. Understand the complexities and the key issues involved in NLP
2. Understand various core techniques and their adaptations for NLP
3. Explore and propose different domains in which NLP can be applied efficiently
4. Develop new applications and techniques for NLP

UNIT - 1 (12 Hours)

Regular Expressions, Finite-State Automata , Formal Languages , Non-Deterministic FSAs , Relating Deterministic and Non-Deterministic Automata , Regular Languages and FSAs , Morphology, Finite-State Morphological Parsing , Finite-State Transducers , Sequential Transducers and Determinism. The combination of an FST, Lexicon and Rules , Lexicon-Free FSTs: The Porter Stemmer , Word and Sentence Tokenization , Detection and Correction of Spelling Errors , Minimum Edit Distance Simple (Unsmoothed) *N*-grams , Training and Test Sets , *N*-gram Sensitivity to the Training Corpus

UNIT - 2 (12 Hours)

English Word Classes, Tagsets for English, Part-of-Speech Tagging. Rule-Based Part-of-Speech Tagging, HMM Part-of-Speech Tagging ,Computing the Most-Likely Tag Sequence: Hidden Markov and Maximum Entropy Models: Markov Chains,The Hidden Markov Model, Likelihood Computation: The Forward Algorithm, Decoding: The Viterbi Algorithm, HMM Training: The Forward-Backward Algorithm.Maximum Entropy Models: Background ,Linear Regression, Logistic Regression, Maximum Entropy Modeling., Maximum Entropy Markov Models.

UNIT - 3 (12 Hours)

Formal Grammars: Context-Free Grammars, Sentence-Level Constructions Clauses and Sentences , Treebanks, Heads and Head Finding , Grammar Equivalence and Normal Form, Dependency Grammars, Categorial Grammar, Spoken Language Syntax , Disfluencies and Repair Syntactic Parsing: Top-Down Parsing, Bottom-Up Parsing, CKY Parsing, The Earley Algorithm, Chart Parsing , Partial Parsing Statistical Parsing: Probabilistic Context-Free Grammars, PCFGs for Disambiguation, PCFGs for Language Modeling, The Collins Parser:Features and Unification: Unification of Feature Structures Feature Structures in the Grammar

UNIT - 4 (12 Hours)

The Representation of Meaning: Computational Desiderata for Representations, Canonical Form, Inference and Variables, First-Order Logic, Lambda Notation. The Semantics of First-Order Logic, Inference Information Extraction: Named Entity Recognition, NER as Sequence Labeling Practical NER Architectures, Relation Detection and Classification. Supervised Learning Approaches to Relation Analysis, Temporal and Event Processing, Temporal Expression Recognition, Temporal Normalization . Machine Translation: Typology, Lexical Divergences, Classical MT and the Vauquois Triangle, Direct Translation, Transfer,The Interlingua Idea: Using Meaning, Statistical MT. Using Human Raters , Automatic Evaluation: BLEU, Question Answering and Summarization: Information Retrieval,The Vector Space Model, Evaluation of Information-Retrieval Systems, Homonymy, Polysemy, and Synonymy, Summarization

Recommended readings:

1, Speech and Language processing An introduction to Natural Language Processing, Computational Linguistics and speech Recognition by Daniel Jurafsky and James H. Martin ISBN-13: 978-0131873216
2, “Foundations of Statistical Natural Language Processing” by Chris Manning and HinrichSchuetzeISBN-13: 978-0262133609
3. Natural Language Processing with Python by Steven Bird, Ewan Klein, Edward Lopper ISBN-13: 978-0596516499
4. Handbook of Natural Language Processing, Second Edition--Nitin Indurkhya, Fred J. Damerau, Fred J. Damerau ISBN-13: 978-1420085921

LIST OF EXPERIMENTS:

1) Study of python basics. Getting and setting up various freely available datasets
2) Implement depth first and breadth first search
3) Implement a simple n-gram language model that allows n to vary from two to four
4) Implement a model that uses linear interpolation
5) Implement a model that uses Discounting for n = 1 to 4
6) To implement simple decision tree
7) To implement a simple text classification technique
8) To implement a simple text summarization technique

IT 8.3.3 FUZZY LOGIC AND NEURAL NETWORKS

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	ThDuration(Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 8.3.3	Fuzzy Logic and Neural Networks	3	1	2	3	100	25	--	--	--	**125**

Course Objectives:

1. To provide basic introduction to concepts and methodologies of Fuzzy Logic and Neural Networks.
2. To develop knowledge about the conceptual and practical aspect of Neural Networks and Fuzzy Logic.
3. To develop a foundation that can be used for further research in Fuzzy Logic and Neural Networks.

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain the basic concept and techniques of Neural Networks.
2. Differentiate between crisp set and fuzzy set.
3. Describe the learning rules used in Neural Networks.
4. Apply the concepts of Fuzzy Logic and Neural networks in practical applications.

UNIT -1 (12 Hours)

History of Neural Networks. Structure and function of a single neuron. Neural Net Architecture. Neural Learning. Common usage of neural networks in classification, clustering, vector quantization. pattern association, function approximation and forecasting. Evaluation of networks. Implementation of neural networks.

Perceptrons. Linear Separability Perceptron Training Algorithm, Guarantee of Success, Pocket algorithm, Adaline. Multilayer networks, Multilevel discrimination, Architecture, objectives and working of Backpropagation algorithm. Setting the parameter values of Backpropagation algorithm. Accelerating learning process and applications of Backpropagation algorithm.

UNIT - 2 (12 Hours)

Prediction tasks using Recurrent Networks and feedforward networks, Radial basis functions. Polynomial networks. Unsupervised learning. Hamming networks, simple competitive learning. counter-propagation network, adaptive resonance theory, Self

organizing maps. Non-iterative procedures for association, Discrete Hopfield Network, Brain-State_in_a_box Network, Boltzmann Machine, Bi-directional Associate memory.

UNIT - 3 (12 Hours)

History and Motivation for Fuzzy Logic. Classical sets, Fuzzy sets, Operations of Fuzzy sets, Properties of Fuzzy sets, A Geometric interpretation of Fuzzy sets, possibility theory. (03 hrs) Fuzzy relations, composition of Fuzzy relations, Fuzzy graphs and numbers, Functions with Fuzzy arguments, arithmetic operations on Fuzzy numbers. Basics of Fuzzy rules, Fuzzy mapping rules, Fuzzy implication rules, Fuzzy rule based models for function approximation, Theoretical foundation of fuzzy mapping rules, Types of fuzzy rule based models: Mamdani model, TSK model, and standard additive model.

UNIT - 4 (12 Hours)

Propositional logic and first order predicate calculus. Fuzzy logic: Fuzzy implication, approximate reasoning, Criteria of Fuzzy implications, Three families of Fuzzy implications. Possibility versus Probability, Probability of a Fuzzy event. Probabilistic interpretation of Fuzzy sets. Fuzzy Logic in Expert Systems. intelligent agents and Mobile robot navigation,. Fuzzy logic in database systems, Fuzzy relational data models and operations, Fuzzy object oriented database. Fuzzy information Retrieval and Web search.

Recommended Readings:

1. Kishan Mehrotra, Chilukuri Mohan, and Sanjay Ranka; Elements of Artificial Neural Networks by Penram International Publishing (India)
2. John Yen and Reza Langari,Fuzzy Logic, Intelligence, Control and Information; Pearson Education
3. Neural Networks and Fuzzy Systems: A dynamical Systems Approach toi Machine Intelligence, by Bart Kosko, PHI
4. Neural Networks: A comprehensive Foundation, - By Simon Haykin, Pearson Education
5. Introduction to Artificial Neural Networks, - By Jacek M. Zurada, Jaico PublishingHouse
6. Neural Networks, Fuzzy Logic, and Genetic Algorithms Synthesis and Applications by S. Rajasekaran, G.A. Vijayalakshmi Pai, PHI

List of Experiments in Data Compression:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. Implementation of basic logic gates using Neural networks
2. Designing a Neural Network to simulate any Boolean function.
3. Implementation of Perceptron Learning Algorithm

4. Implementation of Back propagation Algorithm
5. Implementation of Hebbian rule
6. Implementation of fuzzy set operations.
7. Implementation of fuzzy inference rules.
8. Implementation of an application using Neuro Fuzzy techniques.

IT 8.3.4 ADVANCED DATA STRUCTURES AND ALGORITHMS

Subject code	Name of Subject	Scheme of Instruction Hrs/week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
IT 8.3.4	Advanced Data Structures and Algorithms	3	1	2	3	100	25	--	--	--	125

Course Objective:

1. To understand the need and use of advanced concepts in data structures.
2. To study the design and implementations of algorithms for advanced data structures.
3. To learn efficient parallel and probabilistic algorithms.

Course Outcomes:

fter completing this course students will be able to:

1. Explain the concepts of advanced data structures.
2. Describe various implementations and operations on advanced data structure concepts like trees, heaps, tries, digital trees etc.
3. Apply different types of parallel and probabilistic algorithms.

UNIT 1 (12 Hours)

Dynamic Hashing, Motivation for Dynamic Hashing, Dynamic Hashing Using Directories. Analysis of Directory-Based Dynamic Hashing Directoryless Dynamic Hashing, Insertion into Min-Max heap, Deletion of Min element, Deaps. Insertion into Deap and Deletion of the Min element, Leftist Trees Binomial Heaps Cost Amortization. Insertion into binomial heap, Combining two binomial heap Deletion of Min Element

UNIT 2 (12 Hours)

Fibonacci Heaps: Insertion, Deletion, Extract Min, Union and Decrease Min operations with Fibinacci Heaps. Search structures: Optimal Binary Search Trees, AVL trees, 2-3 Trees, 2-3-4 Trees,. Red –Black Trees: Definition and properties, Searching, Insertion, Deletions.

UNIT 3 (12 Hours)

B-Trees: Definitions of m-way search trees Searching an m-way search trees Definitions and properties of B-tree Insertion into B-tree Deletion from b-tree Splay Trees Digital search trees, Binary tries Patricia Tries: Searching, Insertions and Deletions,

UNIT 4 (12 Hours)

Introduction to parallelism models :Simple algorithms for parallel computers CRCW and EREW algorithms Brent's theorem and work efficiency. Probabilistic Algorithms: Expected versus average time Pseudorandom generation, Buffon's needle numerical integration, Probabilistic counting, Monte Carlo algorithms

Recommended Readings:

1. Fundamentals of data structures in c++ by Ellis Horowitz,SartajSahni, Dinesh Mehta, Galgotia Publication, ISBN: 817515-278-8
2. Computer Algorithms – Saar Baase. PHI , ISBN: 0201612445
3. Graph Theory with application to engineering and computer science by DeoNarsingh, Charles E Millican. MGh, PHI, ISBN: 978-81-203-0145-0
4. Fundamentals of Algorithms by Gilles Brassard and Paul Bratly. PHI, ISBN: 9780133350685.
5. Computer Algorithms by Horowitz, SartajSahni. Rajasekharan – Galgotia, ISBN: 9788175152571
6. Introduction to algorithms by Thomas H cormen, Charles E Leiserson, Ronald L Rivest. PHI, ISBN: 81-203-1353-4

List of Experiments

Experiment 1 WAP to implement Stack ADT using Linked list with the basic operations as Create(), IsEmpty(), Push(), Pop(), IsFull() with appropriate prototype to a functions

Experiment 2 WAP to implement Queue ADT using Linked list with the basic functions of Create(), IsEmpty(), Insert(), Delete() and IsFull() with suitable prototype to a functions

Experiment 3 WAP to generate the binary tree from the given inorder and postorder traversal.

Experiment 4 WAP to generate the binary tree from the given inorder and preorder traversals

Experiment 5 WAP to store k keys into an array of size n at the location computed using a hash
function, loc = key % n, where k<=n and k takes values from [1 to m], m>n. To handlethe collisions use the following collision resolution techniques,
a. Linear probing
b. Quadratic probing
c. Random probing
d. Double hashing/rehashing
e. Chaining

Experiment 6 BST WAP for Binary Search Tree to implement following operations:
a. Insertion

b. Deletion
i. Delete node with only child
ii. Delete node with both children
c. Finding an element
d. Finding Min element
e. Finding Max element
f. Left child of the given node
g. Right child of the given node
h. Finding the number of nodes, leaves nodes, full nodes, ancestors, descendants.

Experiment 7 (AVL Trees and Red-Black Trees)

I. WAP for AVL Tree to implement following operations: (For nodes as integers)
a. Insertion: Test program for all cases (LL, RR, RL, LR rotation)
b. Deletion: Test Program for all cases (R0, R1, R-1, L0, L1, L-1)
c. Display: using set notation.

Experiment 8 (B-Trees)

I. WAP to implement insertion, deletion, display and search operation in m-way B tree (i.e. a non-leaf node can have atmost m children) for the given data as integers (Test the program for m=3, 5, 7).
II. WAP to implement insertion, deletion, display and search operation in m-way B tree(i.e. a non-leaf node can have atmost m children) for the given data as strings (Test the program for m=3, 5, 7).

Experiment 9 (Min-Max Heaps, Binomial Heaps and Fibonacci Heaps)

I. WAP to implement insertion, deletion and display operation in Min-Max Heap for the given data as integers.
II. WAP to implement Make_Heap, Insertion, Find_Min, Extract_Min, Union, Decrease_Key and Delete_Key operations in Binomial Heap for the given data as strings.

IT8.4.1 VLSI DESIGN (Elective IV)

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	ThDuration(Hrs)	Marks					
						Th	S	TW	P	O	Total
IT8.3.4	VLSI Design	3	1	2	3	100	25	--	--	25	**150**

Course Objective:

1. To study various aspects of VLSI Design
2. To understand working of MOS Transistor under various bias.
3. To understand various semiconductor Technology processes.
4. To understand VHDL.
5. To understand verification Testing of MOS Circuits.

Course Outcomes:

1. To analyse the characteristics of MOS device under dc Bias.
2. To implement Digital Circuits using VHDL.
3. To verify ATPG Techniques on to digital Circuits.
4. To Design circuits for CMOS Transistor.

UNIT -1 (12 Hours)

Introduction, A Brief History, MOS Transistors, CMOS Logic – Inverter, NAND Gate, Combinational Logic, NOR Gate, Compound Gates, Pass Transistors and Transmission Gates, Tristates, Multiplexers, CMOS Fabrication and Layout.
MOS Transistor Theory – Ideal I-V Characteristics, C-V Characteristics – Simple MOS Capacitance Models. Nonideal I-V Effects – Velocity Saturation and Mobility Degradation, Channel Length Modulation, Body Effect, Junction Leakage, Tunneling. DC Transfer Characteristics- Complementary CMOS Inverter DC Characteristics, Beta Ratio Effects, Noise Margin.

UNIT - 2 (12 Hours)

CMOS Processing Technology: CMOS Technologies – Background, Wafer Formation, Photolithography, Well and Channel Formation, Silicon Dioxide, Isolation, Gate Oxide, Gate and Source/Drain Formation, Contacts and Metallization, Passivation, Metrology.
Circuit Characterization and Performance Estimation: Delay Estimation, RC Delay Models – Elmore Delay Model. Power Dissipation – Static Dissipation, Dynamic Dissipation, Interconnect – Resistance, Capacitance, Design Margin – Supply Voltage, Temperature, Process Variation, Design Corners. Reliability – Reliability Terminology, Electromigration, Self-heating, Hot Carriers, Latchup. Scaling – Transistor Scaling Interconnect Scaling Properties

UNIT - 3 (12 Hours)

Combinational Circuit Design: Circuit Families – Static CMOS – Bubble Pushing, Compound Gates, Asymmetric Gates, Skewed Gates. Cascode Voltage Switch Logic, Pass- transistor Circuits – CMOS with Transmission Gates, Complementary Pass Transistor Logic(CPL), More Circuit Families – Differential Circuits (Differential Split-Level and Cascode Nonthreshold Logic), BiCMOS Circuits. Analog Circuits: MOS Small-signal Model, Current Mirrors, Differential Pairs, Simple CMOS Operational Amplifier. CMOS Physical Design Styles: Static CMOS Gate Layout, General CMOS Layout Guidelines. Layout Optimization for Performance.

UNIT - 4 (12 Hours)

Design Methodology and Tools: Design Methodology – Structured Design Techniques, Microprocessor/DSP, Programmable Logic – Programmable Logic Devices, Field Programmable Gate Arrays(FPGA). Testing and Verification: Logic Verification, Basic Digital Debugging Hints. Manufacturing Tests – Manufacturing Test Principles – Fault Models, Observability, Controllability. Fault Coverage, ATPG, Delay Fault Testing. Design For Testability – Built-in Self-Test(BIST). Basic Programming using VHDL.

Recommended Readings:

1. *Ayan Banerjee,David Harris,Neil H.E. West;* **CMOS VLSI Design: A Circuits and Systems Perspective, (Third Edition);** *Pearson Education , 2011*
2. Neil H.E. West and Kamran Eshraghian; Principles of CMOS VLSI Design; Prentice Hall of India, 1995
3. Douglas Pucknell and Kamran Eshraghian ; Basic VLSI Design; Prentice Hall of India, 1990

List of Experiments

1. Introduction to VHDL and VLSI Design
2. Use of NAND and NOR Gates for realizing other gates using VHDL.
3. Design of Half adder and Full adder using VHDL
4. 4: 1 MUX Design using VHDL
5. Solving of a SOP Expression using VHDL
6. Asynchronous D-Flip Flop using VHDL
7. Decade Counter using VHDL
8. Serial Shift Register using VHDL

IT 8.4.2 CLOUD COMPUTING

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 8.4.2	Cloud Computing	3	1	2	3	100	25		-	25	**150**

Course Objectives:

1. Analyze the components of cloud computing showing how business agility in an organization can be created
2. Evaluate the deployment of web services from cloud architecture
3. Critique the consistency of services deployed from a cloud architecture
4. Compare and contrast the economic benefits delivered by various cloud models based on application requirements, economic constraints and business requirements.

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain the principles of Cloud Computing.
2. Describe the architecture of Cloud Computing Resources.
3. Demonstrate the applications of Cloud Computing for Business.
4. Apply the skills and knowledge to incorporate agility in an organization.

UNIT - 1 (12 Hours)

Cloud Computing Fundamentals: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications.

UNIT - 2 (10 Hours)

Cloud Applications: Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages.

UNIT - 3 (12 Hours)

Management of Cloud Services: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics : Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat)

UNIT - 4 (12 Hours)

Cloud IT Model: Analysis of Case Studies when deciding to adopt cloud computing architecture. How to decide if the cloud is right for your requirements. Cloud based service, applications and development platform deployment so as to improve the total cost of ownership (TCO).

Recommended Readings:

1) Gautam Shroff; Enterprise Cloud Computing Technology Architecture Applications; Cambridge University Press; 1st edition; 2010.
2) Toby Velte, Anthony Velte, Robert Elsenpeter; Cloud Computing, A Practical Approach; McGraw-Hill Osborne Media; 1st edition; 2009.
3) Dimitris N. Chorafas; Cloud Computing Strategies; CRC Press; 1st edition; 2010.

List of Experiments in Cloud Computing:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. To demonstrate practically all the services of the Cloud
2. To develop & deploy our own application on Cloud
3. To install and configure HORTONWORKS SANDBOX HADOOP by using Oracle VirtualBox on Windows Operating System
4. Create an application (Ex: Word Count) using Hadoop Map/Reduce.
5. To Configure & Implement OwnCloud platform to demostrate the concept of PaaS and SaaS.
6. Case Study: PAAS(Facebook, Google App Engine)
7. Case Study: Amazon Web Services.
8. Case Study: Aneka.

IT 8.4.3 ADVANCED COMPUTER ARCHITECTURE

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
		L	T	P	Th Duration (Hrs)	Marks					
						Th	S	TW	P	O	Total
IT 8.4.2	Advanced Computer Architecture	3	1	2	3	100	25	-	-	25	**150**

Course Objectives:

1. To understand concept of parallelism.
2. To give students an insight into the various types of processors and their internal architecture.
3. To familiarize the students, how modern computer systems work and are built.

Course Outcomes:

The student after undergoing this course will be able to:

1. Understand various types of processor along with their internal architecture.
2. Learn how modern systems are built.

UNIT - 1 (12 Hours)

Introduction: Von Neumann architecture, need for high speed computing, how do we increase the speed of computers? Some interesting features of parallel computers**.**

Solving Problems in Parallel: Utilizing temporal parallelism, Utilizing Data Parallelism, Comparison of Temporal and Data Parallel Processing, Data Parallel processing with specialized processors.

Parallel computer structures, Architectural classification schemes, Parallel processing applications

Principles of pipelining: Linear pipeline processor, Non-linear pipeline processors, Instruction and Arithmetic pipeline design, principles of designing pipelined processors.

UNIT - 2 (12 Hours)

Structures and Algorithms for Array Processors: Introduction to SIMD Computer Organization, Interconnection networks, parallel algorithms for array processors

Associative array processing: Associative memory organization**.**

\

UNIT - 3 **(12 Hours)**

Multiprocessors Architecture and Programming: Functional structures, Interconnection networks, Cache coherence and solutions, Interleaved memory organization, Multiprocessor operating systems, Language features to exploit parallelism, detection of parallelism in programs
IBM Blue Gene Supercomputer.

UNIT - 4 **(12 Hours)**

Core level parallel processing: Generalized structure of chip multiprocessors (CMP), cache coherence in CMPs, Intel Core I7 architecture. CMPs using interconnection networks: Ring interconnection of processors, Ring bus CMPs, Intel Xeon Phi Coprocessor architecture**.** General purpose graphics processing unit (GPGPU).

Recommended Readings:

1. Hwang and Briggs; Computer architecture and parallel processing; TMH, ISBN:0-07 031556-6
2. Parallel Computers – Architecture and Programming; V. Rajaraman and C. Siva Ram Murthy; PHI, 2/e
3. Nicholas Carter; Computer Architecture; TMH, ISBN: 0-07-048332-5
4. Kai Hwang; Advanced computer architecture; TMH, ISBN: 0-07-031622-8

List of Experiments in Advanced Computer Architecture:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

Case studies(3 No.s) of various super computers and high performance computing devices.
Parallel and distributed programs using NVDIA (5 No.s)
Simulation of various pipelining techniques. (3 No,s)

IT 8.4.4 STORAGE AREA NETWORK

Subject Code	Name of the Subject	Scheme of Instruction Hrs/Week			Scheme of Examination						
					Th Duration (Hrs)	Marks					
		L	T	P		Th	S	TW	P	O	Total
IT 8.4.4	**Storage Area Network**	**3**	**1**	**2**	**3**	**100**	**25**	**-**	**-**	**25**	**150**

Course Objectives:

The subject aims to provide the student with:

1. Understand the necessity for storage area networks.
2. Understand the appropriateness of the networked storage options
3. Knowledge of the architecture of backup/recovery and virtualization

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain the need for storage area networks.
2. Choose best option for given application environment
3. State architecture of backup/recovery and virtualization.

UNIT - 1 (12 Hours)

Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages; Case study: Replacing a server with Storage Networks; The Data Storage and Data Access problem; The Battle for size and access.

Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels, JBOD, Storage virtualization using RAID and different RAID levels.

UNIT - 2 (12 Hours)

Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems; Availability of disk subsystems. The Physical I/O path from the CPU to the Storage System; SCSI.

Fiber Channel Protocol Stack; Fiber Channel SAN; IP Storage. The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system.

UNIT - 3 (12 Hours)

Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fiber Channel and NAS.

Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network

UNIT - 4 **(12 Hours)**

Overview, creating a Network for storage; SAN Hardware devices, The fiber channel switch, Host Bus adapters; Putting the storage in SAN; Fabric operation from a Hardware perspective.

The switch's Operating system, Device Drivers, The Supporting the switch's components, Configuration options for SANs. Planning for business continuity.

Recommended Readings:

1. Ulf Troppens, Rainer Erkens and Wolfgang Muller; Storage Networks Explained; John Wiley & Sons, 2003.
2. Robert Spalding; Storage Networks: The Complete Reference; Tata McGraw Hill, 2003
3. Richard Barker and Paul Massiglia; Storage Area Network Essentials: A Complete Guide to understanding and Implementing SANs; John Wiley India, 2002
4. Marc Farley; Storage Networking Fundamentals; Cisco Press, 2005

List of Experiments in Storage Area Networks:

(At least 8 experiments should be conducted from the list of experiments. A certified journal reporting the experiments conducted should be submitted at the end of the term)

1. Case Study of a Storage Area Networks
2. Study of a NAS hardware Architecture
3. Implementing Local File System
4. Implementing a network file system
5. Implementation of storage virtual systems in a block level
6. Implementation of storage virtual systems in a file level
7. Study of Switch's operating system
8. Development of SAN application for digital library.

APPENDIX C

QUESTION PAPER PATTERN

Syllabus in each subject will have 4 units.

Question paper shall be drawn as follows:

Question No	From Units	No. of Questions to be Set	No. of Questions to be Answered	Remarks
1-3	1-2	3 x 20marks	2 x 20 marks	Each unit shall have minimum 20 marks
4-6	3-4	3 x 20 marks	2 x 20 marks	Each unit shall have minimum 20 marks
7-8	1-4	2 x 20 marks	1 x 20 marks	---
		8 - 160 marks	5 - 100 marks	

SAMPLE QUESTION PAPER

SUBJECT: MARKS: 100

MAXIMUM DURATION: 3 hours

Instructions to the candidates:

1.

2

Part –A (Questions to be drawn from units 1 & 2)

Answer any **TWO** questions from the following: 2 x 20= 40 Marks

Question-1 .....20 Marks

a)

b)

..

Question-2 .....20 Marks

a)

b)

..

Question-3 .....20 Marks

a)

b)

..

Part –B (Questions to be drawn from units 3 & 4)

Answer any **TWO** questions from the following: 2 x 20= 40 Marks

Question-4 .....20 Marks

a)

b)

..

Question-5 .....20 Marks

a)

b)

..

Question-6 .....20 Marks

a)

b)

..

Part –C (Questions to be drawn from all units i.e. units 1 - 4)

Answer any **ONE** question from the following: 1 x 20= 20 Marks

Question-7 .....20 Marks

a)

b)

..

Question-8 .....20 Marks

a)

b)

..

..