Syllabus and Scheme

B.Tech. in Computer Science & Engineering

(For students admitted from 2012 to 2016)

SEMESTER-I & II

Scheme of Teaching & Examination for I year B.Tech. I Semester
Effective from the Session: 2012 – 2013
(Common to all branches of Engineering)

Sub Code	Subject	Number of Teaching Hours			Duration of Theory Paper (Hours)	Marks Allocation				
		L	T	P		Theory	Term Test	Sessional	Prac. Exam	Total
101	Communicative English	3	1	-	3	80	20			100
102	Engineering Mathematics-I	3	1	-	3	80	20			100
103	Engineering Physics-I	3	1	-	3	80	20			100
104	Engineering Chemistry	3	1	-	3	80	20			100
105	Basic Electrical & Electronics Engineering	3	-	-	3	80	20			100
Total		**15**	**04**	**-**	**-**	**400**	**100**			**500**
106	Engineering Physics Lab-I	-	-	2		-		45	30	75
107	Engineering Chemistry Lab			2				45	30	75
108	Electrical & Electronics Lab	-	-	2		-		60	40	100
109	Practical Geometry	-	-	3				60	40	100
110	Workshop Practice	-	-	2				60	40	100
111	Discipline & Extra curricular Activities	-	-	-				50	-	50
Grand Total		**15**	**04**	**11**	**-**	**400**	**100**	**320**	**180**	**1000**

(Total 30 periods per week)

Scheme of Teaching & Examination for I year B.Tech II Semester
Effective from the Session: 2012 – 2013
(Common to all branches of Engineering)

Sub Code	Subject	Number of Teaching Hours Per Week			Duration of theory Paper (Hours)	Marks Allocation				
		L	T	P		Theory	Term Test	Sessional	Prac. Exam	Total
201	Communication Techniques	2	-	-	3	80	20			100
202	Engineering Mathematics-II	3	1	-	3	80	20			100
203	Engineering Physics-II	2	1	-	3	80	20			100
204	Chemistry & Environmental Engineering	3	1	-	3	80	20			100
205	Engineering Mechanics	3	1	-	3	80	20			100
206	Fundamentals of Computer Programming	3	-	-	3	80	20			100
Total		**16**	**04**	**-**	**-**	**480**	**120**			**600**
207	Engineering Physics Lab-II	-	-	2		-		30	20	50
208	Chemistry & Environmental Engineering Lab	-	-	2		-		30	20	50
209	Computer programming lab	-	-	2				45	30	75
210	Machine Drawing	-	-	3		-		60	40	100
211	Communication Technique Lab	-	-	2		-		45	30	75
212	Discipline & Extra Curricular Activities	-	-	-	-	-		50	-	50
Grand Total		**16**	**04**	**11**	**-**	**480**	**120**	**260**	**140**	**1000**

(Total 31 periods per week)
L = Lecture, **T** = Tutorial, **P** = Practical

101 COMMUNICATIVE ENGLISH

Unit 1

Grammar

1. Tenses
2. Passive Voice
3. Indirect Speech
4. Conditional Sentences
5. Modal Verbs

Unit 2

Composition

1. Dialogue Writing
2. Paragraph and Precis Writing
3. Report, its importance and Report Writing

Unit 3

Short Stories

1. The Luncheon: W.S. Maugham
2. How Much Land Does a Man Need?: Leo Tolstoy
3. The Last Leaf: O. Henry

Unit 4

Essays

1. On the Rule of the Road: A. G. Gardiner
2. The Gandhian Outlook: S. Radhakrishnan
3. Our Own Civilisation: C.E.M. Joad

Unit 5

Poems

1. The Unknown Citizen: W. H. Auden
2. The Character of A Happy Life: Sir Henry Wotton
3. No Men are Foreign: James Kirkup
4. If : Rudyard Kipling

Suggested Readings

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma & Binod Mishra, PHI Learning Pvt. Ltd.
2. English for Engineers: Made Easy, Aeda Abidi & Ritu Chaudhary, Cengage Learning, (New Delhi)
3. A Practical Course for Developing Writing Skills in English, J.K. Gangal, PHI Learning Pvt. Ltd., New Delhi.
4. Intermediate Grammar, Usage and Composition, Tickoo, A. E. Subramaniam & P. R. Subramaniam, Orient Longman (New Delhi)
5. The Written Word , Vandana R. Singh, Oxford University Press (New Delhi)

6. The Great Short Stories edited by D.C. Datta, Ram Narain Lal Publishers (Allahabad)
7. Professional Communication, Kavita Tyagi & Padma Misra,PHI Learning Pvt. Ltd., New Delhi.
8. "Learn Correct English: Grammar, Usage and Composition" by Shiv K. Kumar & Hemalatha Nagarajan, Pearson (New Delhi).
9. "Current English Grammar and Usage with Composition" by R.P. Sinha, Oxford University Press (New Delhi).
10. "Grammar of the Modern English Language", by Sukhdev Singh & Balbir Singh, Foundation Books (New Delhi).

102 ENGINEERING MATHEMATICS-I

Unit 1

Differential Calculus:Asymptotes(Cartesian Coordinates Only), Curvature(Cartesian Coordinates Only), Concavity, Convexity and Point of Inflexion (Cartesian Coordinates Only), Curve Tracing (Cartesian and Standard Polar Curves-Cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral).

Unit 2

Differential Calculus: Partial Differentiation, Euler's Theorem on Homogeneous Functions, Approximate Calculations, Maxima & Minima of Two and More Independent Variables, Lagrange's Method of Multipliers.

Unit 3

Integral Calculus: Surface and Volumes of Solids of Revolution, Double Integral, Double Integral by changing into polar form , Areas & Volumes by Double Integration ,Change of Order of Integration, Beta Function and Gamma Function (Simple Properties).

Unit 4

Differential Equations: Differential Equations of First Order and First Degree - Linear Form, Reducible to Linear form, Exact Form, Reducible to Exact Form, Linear Differential Equations of Higher Order with Constant Coefficients Only.

Unit 5

Differential Equations: Second Order Ordinary Differential Equations with Variables Coefficients, Homogeneous and Exact Forms, Change of Dependent Variable, Change of Independent Variable, Method of Variation of Parameters.

Suggested Readings

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition.
2. Calculus and Analytical Geometry, Thomas and Finney, Narosa Publishing House. New Delhi.
3. A Text Book of Differential Equations, M.Ray and Chaturvedi, Students Friends & Co. Publisher, Agra.
4. Higher Engineering Mathematics, B.V.Ramana, Tata McGraw Hill.

5. Thomas Calculus, Maurice D. Weir, Joel Hass and others, Pearson, 11th Edition.

103 ENGINEERING PHYSICS-I

Unit 1

Interference of light
Michelson's Interferometer: Production of circular & straight line fringes, Determination of wavelength of light, Determination of wavelength separation of two nearby wavelengths.
Newton's rings and measurement of wavelength of light.
Optical technology: Elementary idea of anti-reflection coating and interference filters.

Unit 2

Polarization of light
Plane circular and elliptically polarized light on the basis of electric (light) vector, Malus law.
Double Refraction: Qualitative description of double refraction phase retardation plates, quarter and half wave plates, construction, working and use of these in production and detection of circularly and elliptically polarized light.
Optical Activity: Optical activity and laws of optical rotation, Specific rotation and its measurement using half-shade and bi-quartz devices.

Unit 3

Diffraction of light
Single slit diffraction: Quantitative description of single slit, position of maxima / minima and width of central maximum, intensity variation.
Diffraction Grating: Construction and theory, Formation of spectrum by plane transmission grating, Determination of wavelength of light using plane transmission grating.
Resolving power: Geometrical & Spectral, Raleigh criterion, Resolving power of diffraction grating and telescope.

Unit 4

Elements of Material Science
Bonding in Solids: Covalent bonding and Metallic bonding.
Classification of Solids as Insulators, Semiconductors and Conductors.
Semiconductors: Conductivity in Semiconductors, Determination of Energy gap of Semiconductor.
X-Ray diffraction and Bragg's Law.
Hall Effect: Theory, Hall Coefficient and applications.

Unit 5

Special Theory of Relativity
Postulates of special theory of relativity, Lorentz transformations, relativity of length, mass and time.
Relativistic velocity addition and mass-energy relation, Relativistic Energy and momentum.

Suggested Readings

1. Fundamental of Optics, Jenkins and White, Fourth Edition, McGraw Hill.
2. Optics, Ajoy Ghatak, Third Edition, Tata McGraw Hill.
3. Concept of Modern Physics, A. Baiser, Fifth Edition, McGraw Hill.
4. Modern Physics, J. Morrison, Edition 2011, Elsevier.
5. Elements of Material Science and Engineering, Van Vlack, Sixth Edition, Pearson.

104 ENGINEERING CHEMISTRY

Unit 1

General Aspects of Fuel: Organic fuels, Origin, classification and general aspects of fossil fuels. Solid fuels, Coal, carbonization of coal, manufacturing of coke by Beehive oven and by product oven method. Liquid fuels, Composition of petroleum, advantages and refining of petroleum. Cracking, reforming, polymerization and isomerization of refinery products. Synthetic petrol, Bergius and Fischer Tropsch process. Knocking, octane number and anti-knocking agents. Gaseous fuels, Advantages, manufacturing, composition and calorific value of coal, gas and oil gas.

Unit 2

Fuels Analyses: Ultimate and proximate analysis of coal, Determination of calorific value of solid and gaseous fuels by bomb and Junker's Calorimeter respectively. Calculations of calorific value based on Dulong's formula. Combustion, requirement of oxygen/ air in combustion process. Flue gas analysis by Orsat's apparatus and its significance.

Unit 3

Polymers: Different methods of classification, basic ideas of polymerization mechanisms. Elastomers: Natural rubber, vulcanization, Synthetic Rubbers viz. Buna-S, Buna-N, Butyl and neoprene rubbers.
New Engineering Materials: Fullerenes: Introduction, properties, preparation and uses. Organic Electronic Materials (including conducting polymers- poly (p-phenylene), polythiophenes, Polyphenylene, vinylenes, polypyroles, polyaniline).

Unit 4

Cement: Definition, Composition, basic constituents and their significance, Manufacturing of Portland cement by Rotary Kiln Technology, Chemistry of setting and hardening of cement and role of gypsum.
Glass: Definition, Properties, Manufacturing of glass and importance of annealing in glass making, Types of silicate glasses and their commercial uses, Optical fiber grade glass.

Unit 5

Refractory: Definition, classification, properties, Requisites of good refractory and manufacturing of refractory. Preparation of Silica and fire clay refractory with their uses. Seger's (Pyrometric) Cone Test and RUL Test
Lubricants: Introduction, classification and uses of lubricants. Types of lubrication. Viscosity & viscosity index, flash and fire point, cloud and pour point, steam emulsification number, precipitation number and neutralization number.

Suggested Readings

1. The Chemistry and Technology of Coal, by J G Speigh, CRC Press
2. The Chemistry and Technology of Petroleum, by J G Speigh, CRC Press
3. Polymer Chemistry: An Introduction, Malcolm P. Stevens, Oxford University Press
4. Solid State Chemistry and Its Applications, Anthony R West, John Wiley & Sons
5. Lubricants and Lubrications, Theo Mang, Wilfeied, Wiley-VCH
6. Hand Book of Conjugated Polymers, Tejre A Skotheim and J. R. Reynolds, CRC Press

105 BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Unit 1

Basic Concepts of Electrical Engineering: Electric Current, Electromotive force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction, Lenz's Law, Kirchhoff's laws, Network Sources, Resistive Networks, Series-Parallel Circuits, Node Voltage Method, Mesh Current Method, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems.

Unit 2

Alternating Quantities: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, Single Phase RLC Circuits, Introduction to 3-Phase AC System.

Unit 3

Rotating Electrical Machines; DC Machines: Principle of Operation of DC Machine as Motor and Generator, EMF Equation, Applications of DC Machines.
AC Machines: Principle of Operation of 3-Phase Induction Motor, 3-Phase Synchronous Motor and 3- Phase Synchronous Generator (Alternator), Applications of AC Machines.

Unit 4

Basic Electronics: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behaviour of the PN Junction, PN Junction Diode, Zener Diode, Photovoltaic Cell, Rectifiers, L, C, & L-C filters, Bipolar Junction Transistor, Field Effect Transistor, Transistor as an Amplifier.
Digital Electronics: Boolean algebra, Binary System, Logic Gates and Their Truth Tables.

Unit 5

Communication Systems: Introduction, IEEE Spectrum for Communication Systems, Types of Communication, Amplitude and frequency Modulation.
Instrumentation : Introduction to Transducers: Thermocouple, RTD, Strain Gauges, Load Cell and Bimetallic Strip.
Introduction and classification of ICs.

Suggested Readings

1. Electrical and Electronic Technology by Edward Hughes et al, Pearson Publication

2. Basic Electrical & Electronics Engineering by V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar, Wiley India.
3. Basic Electrical & Electronics Engineering by Van Valkenburge, Cengage learning Indian Edition
4. Basic Electrical and Electronics Engineering by Muthusubrmaniam, TMH
5. Fundamentals of Electrical Engineering by Leonard S. Bobrow, Oxford University Press
6. Fundamentals of Electrical and Electronics Engineering by Ghosh, Smarajit, PHI India
7. Basic Electrical & Electronics Engineering by Ravish Singh, TMH
8. Basic Electronics Engineering by Vijay Baru et al, Dream Tech, New Delhi

106 ENGINEERING PHYSICS LAB-I

1. To determine the wave length of monochromatic light with the help of Fresnel's biprism.
2. To determine the wave length of sodium light by Newton's Ring.
3. To determine the specific rotation of Glucose (Sugar) solution using a polarimeter.
4. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
5. To convert a Galvanometer in to an ammeter of range 1.5 amp. and calibrate it.
6. To convert a Galvanometer in to a voltmeter of range 1.5 volt and calibrate it.
7. To study the variation of a semiconductor resistance with temperature and hence determine the Band Gap of the semiconductor in the form of reverse biased P-N junction diode.
8. To study the variation of thermo e.m.f. of iron copper thermo couple withtemperature.
9. To determine coherent length and coherent time of laser using He-Ne Laser.

107 ENGINEERING CHEMISTRY LAB

1. Proximate analysis of solid fuel.
2. Experiments based on Bomb Calorimeter.
3. To determine the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution.
4. To determine the strength of $CuSO_4$ solution with the help of hypo solution.
5. To determine the strength of NaOH and Na_2CO_3 in a given alkali mixture.
6. Determination of Na/K/Ca by flame photometer in a given sample.
7. Determination of turbidity in a given sample.
8. To determine the flash and fire point of a given lubricating oil.
9. To determine the viscosity of a given lubricating oil by Redwood viscometer.
10. To determine cloud and pour point of a given oil.

108 ELECTRICAL AND ELECTRONICS LAB

Electrical lab

1. Assemble house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring.
2. Prepare the connection of ceiling fan along with the regulator and vary the speed.
3. Prepare the connection of single phase induction motor through 1-Phase Auto-transformer and vary the speed.
4. Prepare the connection of three phase squirrel cage induction motor through 3-Phase Auto-transformer and vary the speed.
5. Prepare the connection of Fluorescent Lamp, Sodium Vapour and Halogen Lamp and measure voltage, current and power in the circuit.

Electronics lab

1. Identification, testing and application of Resistors, Inductors, Capacitors, PN-Diode. Zener Diode, LED, LCD, BJT, Photo Diode, Photo Transistor, Analog/Digital Multi- Metres and Function/Signal Generator.
2. Measure the frequency, voltage, current with the help of CRO.
3. Assemble the single phase half wave and full wave bridge rectifier & the analyse effect of L, C and L-C filters in rectifiers.
4. Study the BJT amplifier in common emitter configuration. Measure voltage gain plot gain frequency response and calculate its bandwidth.
5. Verify the truth table of AND, OR, NOT, NOR and NAND gates.

109 PRACTICAL GEOMETRY

1. (a) Lines, Lettering & Dimension (Sketch Book)

(b) Scale-representative Fraction, Plan scale, Diagonal Scale, Vernier scales (In sheet) comparative Scale, & scale of chords (Sketch Book)

2. (a) Conic Section:-

Construction of Ellipse, Parabola & Hyperbola by different methods (In sheet)

(b) Engineering curves:-

Construction of cycloid, Epicycloids, Hypocycloid and Involutes (In sheet) Archimedean and Logarithmic spiral, (Sketch book)

3. (a) Type of Projection, Orthographic Projection: First Angle and third Angle Projection (Sketch Book)

(b) Projection of Points (Sketch Book)

(c) Projection of Straight lines, different position of Straight lines, methods for determining True length, true inclinations and Traces of straight lines (Four problems in sheet and three problems in (Sketch Book)

(d) Projection of Planes: Different positions of Plane lamina like.:- Regular polygon, circle three of planes (Four problems in Drawing sheet and three problems in Sketch Book.)

4. (a) Projection of Solids:- Projection of right and regular Polyhedron, Prisms, Pyramids and cone (Four Problem in Drawing sheet and there in Sketch Book.)

(b) Section of Solids:- Projection of Frustum of a cone and pyramid, Projection of Truncated Solids (like Prism, Pyramid, Cylinder and Cone) in different positions.

5. (a) Development of Surfaces:- Parallel line and Radial line method for right, regular solids
   (b) Isometric Projections:- Isometric Scales, Isometric Axes, Isometric Projection of Solids.

Suggested Readings

1. Engineering Drawing Geometrical Drawing - P.S.Gill, S.K.Katara & Sons.
2. Engineering Drawing, Dhanarajay A Jolhe ,Tata McGraw Hill.
3. Engineering Drawing, Basant Agarwal & CM Agarwal ,Tata McGraw Hill.
4. Engineering Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.

110 WORKSHOP PRACTICE

Carpentry Shop
1. T – Lap joint
2. Bridle joint

Foundry Shop
1. Mould of any pattern
2. Casting of any simple pattern

Welding Shop
1. Gas welding practice by students on mild steel flat
2. Lap joint by gas welding
3. MMA welding practice by students
4. Square butt joint by MMA welding
5. Lap joint by MMA welding
6. Demonstration of brazing

Machine Shop Practice
1. Job on lathe with one step turning and chamfering operations
2. Job on shaper for finishing two sides of a job
3. Drilling two holes of size 5 and 12 mm diameter on job used / to be used for shaping
4. Grinding a corner of above job on bench grinder

Fitting and Smithy Shop
1. Finishing of two sides of a square piece by filing
2. Tin smithy for making mechanical joint and soldering of joint
3. To cut a square notch using hacksaw and to drill three holes on PCD and tapping

Suggested Readings

1. Mechanical Workshop Practice, K.C. John, PHI Learning New Delhi.
2. Elements of Workshop Technology Hajra & Choudhary,Media Promoters &Publisher.
3. Workshop Technology , W.A.J.Chapman, CBS Publisher & Distributor New Delhi.

111 DISCIPLINE & EXTRA CURRICULAR ACTIVITIES (DECA)

Component – A **Discipline:** **25 Marks**

The marks shall be deducted from this component for those who shall involve themselves in indiscipline/undesirable/Ragging activities or in case of penalty of marks imposed by Standing Disciplinary Committee (SDC) and approved by Head of the Institution concerned subject to a maximum of 25 marks.

Component – B Extra Curricular Activities: 25 Marks

Marks shall be awarded for the participation of students in various Extra Curricular Activities organised by the respective institutions as per the following, subject to a maximum of 25 marks. In case student does not participate in any of the Extra Curricular Activities, he/ she shall be awarded zero(0) marks in DECA - Component B.

(i) National Cadet Corps (NCC).
(ii) National Service Scheme (NSS)
(iii) Scouts & Guide
(iv) Sports Activities
(v) Literary Activities & model
(vi) Cultural Activities
(vii) Paper Presentation/ Participation in National Conferences/ Seminars/ Workshops etc.
(viii) Blood Donation
(ix) Participation in activities of College Annual day Celebration
(x) Organising/ Participation/ Volunteer in different activities organised by the departments/ institute
(xi) Organising/ Participation in activities of Students Chapters of ISTE, IE (I), IEEE, IETE, Vivekanand Kendra etc.

201 COMMUNICATION TECHNIQUES

Unit 1

Elements of Communication

1. Communication: Meaning, Importance and Process
2. Objectives of Communication
3. Media and Types of Communication

Unit 2

Basics of Communication

1. Verbal and Non-Verbal Communication
2. Formal and Informal Channels of Communication
3. Qualities of Good Communication

Unit 3

Skills of Communication

1. Barriers to Communication
2. Professional Communication

3. Interpersonal Communication and methods to improve it

Unit 4

Grammar

1. Subject-Verb Agreement (Concord)
2. Linking Words (Conjunctions)
3. Relative Clauses
4. Common Errors

Unit 5

Composition

1. Resume Writing
2. Business Letter Writing: Sales, Credit, Enquiry, Order, Claim, Complaint, Job Applications, etc.
3. E-mail messages
4. Telephone Etiquettes

Suggested Readings

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI Learning Pvt. Ltd.(New Delhi)
2. English Grammar and Composition, Gurudas Mukherjee, Ane Books Pvt. Ltd.(New Delhi)
3. Current English Grammar and Usage with Composition, R.P. Sinha, Oxford University Press (New Delhi)
4. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw Hill (New Delhi)
5. Business Communication, Meenakshi Raman & Prakash Singh, Oxford University Press (New Delhi)
6. Professional Communication, Aruna Koneru, Tata McGraw Hills, New Delhi.
7. A Practical Course for Developing Writing Skills in English, J.K. Gangal, PHI Learning Pvt. Ltd., New Delhi.
8. "Communicative English for Engineers and Professionals", by Nitin Bhatnagar & Mamta Bhatnagar, Pearson (New Delhi).
9. "The Ace of Soft Skills", by Gopalswamy Ramesh & Mahadevan Ramesh, Pearson (New Delhi)

202 ENGINEERING MATHEMATICS-II

Unit 1

Coordinate Geometry of Three Dimensions: Equation of a sphere, Intersection of a sphere and a plane, tangent plane, Intersection of two spheres, orthogonality of two spheres, Right circular cone. Right circular cylinder.

Unit 2

Matrices: Rank of a matrix, Rank of matrix by reducing to normal forms, Consistency of systems of linear simultaneous equations and its solution, Eigen values and Eigen vectors, Cayley-

Hamilton theorem (without proof), Diagonalization of matrix.

Unit 3

Vector Calculus: Scalar and vector field, differentiation & integration of vector functions, Gradient, Divergence, Curl and Differential Operator, Line, Surface and volume Integrals.

Unit 4

Application of Vector Calculus: Green's Theorem in a Plane, Gauss's and Stoke's Theorem (without proof) and their Applications.
Fourier Series: Expansion of simple functions in Fourier Series, half range Fourier sine and cosine series, change of interval. Harmonic Analysis.

Unit 5

Differential Equations: Series Solutions of Second Order Linear Differential Equations with Variable Coefficients (Complementary Functions only), Partial Differential Equations of First Order : Lagrange's Form, Standard Forms, Charpit's Method .

Suggested Readings

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition.
2. Calculus and Analytical Geometry, Thomas and Finney, Narosa Publishing House N. Delhi.
3. A Text Book of Differential Equations, M.Ray and Chaturvedi, Students Friends & Co. Publisher, Agra.
4. Higher Engineering Mathematics, B.V.Ramana, Tata Mcgra Hill.
5. Mathematics for Engineers, Chandrika Prasad, Prasad Mudranalaya Allahabad.
6. Advanced Mathematics for Engineers, Chandrika Prasad, Prasad Mudranalaya Allahabad.

203 ENGINEERING PHYSICS-II

Unit 1

Quantum Mechanics: Compton effect & quantum nature of light, Derivation of time dependent and time independent Schrödinger's Wave Equation, Physical interpretation of wave function and its properties, boundary conditions, Particle in one-dimensional box.

Unit 2

Applications of Schrödinger's Equation, Particle in three-dimensional box and Degeneracy, Barrier penetration and tunnel effect, Tunneling probability, Alpha Decay, Summerfield's Free electron gas model Postulates, Density of energy states, Fermi energy level.

Unit 3

Coherence and Optical Fibres, Spatial and temporal coherence, Coherence length, Coherence time and 'Q' factor for light, Visibility as a measure of coherence, Spatial Coherence and size of the source, Temporal coherence and spectral purity, Optical fiber as optical wave-guide, Numerical aperture , maximum angle of acceptance and applications of Optical Fiber.

Unit 4

Lasers and Holography: Theory of laser action, Einstein's coefficients, Components of a laser, Threshold conditions for laser action; Theory, Design and applications of He-Ne and semiconductor lasers; Holography versus photography, Basic theory of holography, Basic requirement of a holographic laboratory; Applications of holography in microscopy and interferometry.

Unit 5

Nuclear Radiation Detectors, Characteristics of gas filled detectors: general considerations, Constructions, Working and properties of: Ionization chamber, proportional counter, G. M. Counter and Scintillation Counter.

Suggested Readings

1. Fundamental of Optics, Jenkins and White, Fourth Edition, McGraw Hill.
2. Optics, Ajoy Ghatak, Third Edition, Tata McGraw Hill.
3. Quantum Mechanics, Schiff, Third Edition, McGraw Hill.
4. Quantum Mechanics, Merzbacher, Third Edition, Wiley India.
5. Nuclear Physics: Principles and Applications, John Lilley, Wiley India.

204 CHEMISTRY & ENVIRONMENTAL ENGINEERING

Unit 1

Water: Common Impurities of water Hardness of water, Determination of hardness by Clark's test and complexometric (EDTA) method, Numerical based on hardness and EDTA method, Municipal Water Supply: Requisites of potable water, Steps involved in purification of water, Sedimentation, coagulation, Filtration and Sterilization, Break point chlorination.

Unit 2

Water Treatment: Softening of water, Lime-Soda, Permutit (Zeolite) and Deionization (Demineralization) methods, Boiler troubles their causes, disadvantages and prevention: Formation of solids (Scale and Sludge), Carry over (Priming and Foaming), Corrosion and Caustic, Embrittlement. Numerical problems based on Lime-Soda and Zeolite softening methods.

Unit 3

Basics of Environment: Environmental Pollution, Environmental Acts and Regulations, Environmental Impact Assessment (EIA), Necessity and methodology of EIA. Renewable sources of energy, Potential & present status of renewable sources of energy in India. Functional concepts of Ecology, Basics of species, Ecosystem, Hydrological and chemical cycles, Energy flow in ecosystems. Biodiversity, population dynamics.

Unit 4

Air Pollution, Noise Pollution and Solid Waste Management: Air Pollution, Harmful effects of Air Pollution, Control of Air Pollution. Noise Pollution, Harmful effects of noise pollution, control of noise pollution. Global warming, Acid rain, Ozone depletion. Solid Waste

Management, Classification of solid waste, Collection, transportation, treatment, and disposal of solid waste. Economic recovery of solid waste. Sanitary landfill, on site sanitation.

Unit 5

Water Pollution: Water pollution, Harmful effects of water pollution, control of water pollution. Waste water management, Treatment & disposal of wastewater. Reuse and saving in use of water, rain water harvesting.
Corrosion: Definition and its significance. Mechanisms of Chemical (Dry) and Electrochemical (Wet) corrosion. Protection from corrosion, Protective coatings, cathodic protection, sacrificial anode and modification in designs.

Suggested Readings

1. Chemistry of water treatment, Samuel Faust & Osman M Aly, CRC Press
2. Boilers water treatment. Principles and Practice, Colin Frayne, CRC Press
3. Corrosion Understanding the Basic, by Joseph R Davis, ASM International
4. Atmospheric pollution, by W Buch , Tata McGraw Hill(TMH)
5. Introduction to Environmental Science, by G Tyler Miller and Scott Spoolman, Cengage Learning
6. Introduction to Environmental Engineering, by Mackenzie L Davis and David A Cornwell, Tata McGraw Hill(TMH)

205 ENGINEERING MECHANICS

Unit 1

Statics Of Particles and Rigid Bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Varignon's Theorem, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.
Virtual work: Principle of Virtual Work, Active forces and active force diagram.

Unit 2

Centroid & Moment of Inertia: Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section, Polar moment of inertia, M.I of solid bodies.
Lifting Machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines; System of Pulleys, Simple wheel and axle, Wheel and differential axle, Weston's differential pulley block, Worm and worm wheel, Single purchase winch crab.

Unit 3

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction.
Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives.

Unit 4

Kinematics of Particles and Rigid Bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative Motion.
Kinetics of Particles and Rigid Bodies: Newton's laws, Equation of motion in rectangular coordinate, radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.

Unit 5

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-conservative Force, Conservation of energy.
Impulse and Momentum: Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body.

Suggested Readings

1. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill.
2. Engineering Mechanics, Hibbeler, Pearson Education.
3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
5. Engineering Mechanics, Shames, Pearson Education.
6. Engineering Mechanics, Boresi and Schmidt, CL-Engineering.
7. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning.

206 FUNDAMENTAL OF COMPUTER PROGRAMMING

UNIT – 1

Programming in C: Structure of C Program, Concept of Preprocessor, Macro Substitution, Intermediate code, Object Code, Executable Code. Compilation Process,
Basic Data types, Importance of braces ({ }) in C Program, enumerated data type, Identifiers, Scope of Variable, Storage Class, Constants, Operators & Expressions in C, Type Casting, printf( ) and scanf ( ) with format specifires, reading single character.

UNIT – 2

Control Statements, Command Line Arguments, Arrays in C, Pointers, Using pointers to represent arrays, Pointer & address arithmetic. Structures, using typedef.

UNIT – 3

Arrays of Structures & pointers, File Handling (fscanf, fprintf, feof, fopen, fclose, fread, fwrite only). Dynamic memory Allocation.

UNIT – 4

Functions in C, Passing Parameters (By value & Reference), using returned data, Passing arrays,

structures, array of structures, pointer to structures etc., passing characters and strings, The void pointer.

UNIT – 5

Stored Program Architecture of Computers, Storage Device- Primary Memory and Secondary Storage, Random, Direct, Sequential access methods. Concept of High-Level, Assembly and Low Level programming languages. Representing Algorithms through flow chart, pseudo code, step by step.
Number System: Data Representation, Concept of radix and representation of numbers in radix r with special cases of r=2, 8, 10 and 16 with conversion from radix r1 to radix r2. r's and (r-1)'s complement, Representation of alphabets.

Suggested Readings

1. Ritchie & Kernighan, The C Programming language, 2nd Ed., PHI.
2. Dey & Ghosh, Computer Fundamentals and programming in C, Oxford.
3. Kamthane, Programming in C, 2nd Ed., Pearson.
4. Schildt, The Complete Reference, 4th Ed., TMH.
5. Balaguruswamy, Programming in ANSI C, 5th Ed., TMH.
6. V. Rajaraman, Fundamentals of Computers, 5th Ed. PHI, 2011.
7. Forouzan et.al, Computer Science, 3rd Ed. Cenage Learning.

207 ENGINEERING PHYSICS LAB-II

1. To determine the height of water tank with the help of a Sextant.
2. To determine the dispersive power of material of a Prism for Violet Red and yellow colours of Mercury light with the help of a spectrometer.
3. To measure the Numerical Aperture of an Optical Fibre.
4. To determine the ferromagnetic constants retentivity, permeability and susceptibility by tracing B-H curve using C.R.O.
5. To study the Charge & Discharge of a condenser and hence determine time constant (Both current and voltage graphs are to be plotted.
6. To determine the high resistance by method of leakage, using a Ballistic galvanometer.
7. To verify the expression for the resolving power of a Telescope.
8. To determine the specific resistance of the material of a wire by Carey Fosters bridge.
9. To determine the specific resistance of the material of a wire by Carey Fosters bridge.

208 CHEMISTRY & ENVIRONMENTAL ENGINEERING LAB

1. To determine the hardness of water by HCL method.
2. To determine the hardness of water by EDTA method.
3. Determination of CO_2 in a water sample.
4. Measurement of pH of a given sample by pH-meter.
5. To determine free and residual chlorine in a given water sample.
6. Measurement of dissolves oxygen in water.
7. Measurement of conductivity of a given sample by conductivity meter.

8. Measurement of fluoride in water.
9. Measurement of nitrate in water.
10. Determination of sulphate in water.
11. Evaluation of Reverse Osmosis(RO) Process by TDS measurement.

209 COMPUTER PRAGRAMMING LAB

S.No. Concept to be covered in the exercise

1. Simple OS Commands, vi editor, compiling program, compiler options, linking libraries.
2. Simple input output program, integer, real, character and string. (Formatted & Unformatted), Using Command Line Arguments.
3. Conditional statement (if, if-else-if, switch-case)
4. Looping & iterations (for, while, do-while, continue, break)
5. Using Arrays (one, two and three dimensional)
6. Using Structures and Union.
7. Program using Function (with and without recursion), passing parameters by value & reference.
8. Using pointers.
9. File handling.

210 MACHINE DRAWING

Introduction to machine drawing
Dimensioning, locations and placing.
Orthographic projections: First & third angle methods
Sheet 1: Orthographic Projections (3 Problems)
Sheet 2: Sectional Views (3 Problems)
Sheet 3: Riveted joints, lap joints, butt joints, chain riveting, zig-zag riveting
Sheet 4: Screw fasteners, different threads, Nuts & bolts locking devices, set screws, foundation
Sheet 5: Bearing, Plumber block
Instructions on free hand sketches
List of free hand sketches

- Different type of lines
- Conventional representation of materials
- Screw fasteners
- Bearing: Ball, roller, needle, foot step bearing
- Coupling: Protected type, flange, and pin type flexible coupling
- Welded joints
- Belts and pulleys
- Pipes and pipe joints
- Valves

Suggested Readings

1. Machine Drawing, Lakshminarayan, Jain Brothers.

2. Machine Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.

211 COMMUNICATION TECHNIQUES LAB

1. Phonetic Symbols and Transcriptions
2. Word Formation
3. Affixes
4. Listening and speaking Skills.
5. Words often Mis-spelt and Mis- Pronounced
6. One Word for Many.
7. Synonyms and Antonyms.
8. Seminar Presentation.
9. Group Discussion.
10. Job Interview

Suggested Readings and Packages

1. Advanced Manual for Communication Laboratories and Technical Report Writing, D. Sudha Rani, Pearson, (New Delhi)
2. A Course in Phonetics and Spoken English, J. Sethi & P.V. Dhamija, PHI Learning Pvt. Ltd. (New Delhi)
3. English Language Laboratories: A Comprehensive Manual, Nira Konar, PHI Learning Pvt .Ltd. (New Delhi)
4. Communication Skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI Learning Pvt. Ltd.(New Delhi).
5. Oxford English Learning Package.(With CDs: Headway Series)
6. Tata McGraw Hills English Learning Package (With CDs)
7. "Oxford Advanced Learners' Dictionary" published by Oxford University Press (New Delhi)

212 DISCIPLINE & EXTRA CURRICULAR ACTIVITIES (DECA)

Component – A Discipline: 25 Marks

The marks shall be deducted from this component for those who shall involve themselves in indiscipline/undesirable/Ragging activities or in case of penalty of marks imposed by Standing Disciplinary Committee (SDC) and approved by Head of the Institution concerned subject to a maximum of 25 marks.

Component – B Extra Curricular Activities: 25 Marks

Marks shall be awarded for the participation of students in various Extra Curricular Activities organised by the respective institutions as per the following, subject to a maximum of 25 marks. In case student does not participate in any of the Extra Curricular Activities, he/ she shall be awarded zero(0) marks in DECA - Component B.

(i) National Cadet Corps (NCC).
(ii) National Service Scheme (NSS)

(iii) Scouts & Guide
(iv) Sports Activities
(v) Literary Activities & model
(vi) Cultural Activities
(vii) Paper Presentation/ Participation in National Conferences/ Seminars/ Workshops etc.
(viii) Blood Donation
(ix) Participation in activities of College Annual day Celebration.
(x) Organising/ Participation/ Volunteer in different activities organised by the departments/ institute
(xi) Organising/ Participation in activities of Students Chapters of ISTE, IE (I), IEEE, IETE, Vivekanand Kendra etc.

SEMESTER-III to VIII

Rajasthan Technical University, Kota

Scheme for B.Tech. Computer Science & Engineering-w.e.f. session 2012-13

III	**Computer Science and Engineering**	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject	L	T	P		IA	TE	Total	Common with
3CS1A	Electronic Devices and Circuits	3			3	20	80	100	CS,IT
3CS2A	Data Structures and Algorithms	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3CS3A	Digital Electronics	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3CS4A	Linux and Shell Programming	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3CS5A	Object Oriented Programming	3			3	20	80	100	CS,IT
3CS6A	Advanced Engineering Mathematics	3	1		3	20	80	100	EE, EEE, CS & IT
3CS7A	Electonic Devices Lab			3	3	45	30	75	CS,IT
3CS8A	Data Structures Lab			3	4	60	40	100	CS,IT
3CS9A	Digital Electronics Lab			2	3	30	20	50	CS,IT
3CS10A	C++ Programming			3	4	45	30	75	CS,IT
3CS11A	Unix Shell Programming			2	3	30	20	50	CS,IT
3CSDC	Discipline & extra Curricular Activities							50	
	Total	18	1	13				1000	

IV	**Computer Science and Engineering**	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject	L	T	P		IA	TE	Total	Common with
4CS1A	Microprocessors and Interfaces	3			3	20	80	100	CS,IT
4CS2A	Dicrete Mathematical Structures	3	1		3	20	80	100	CS,IT
4CS3A	Statistics and Probability Theory	3			3	20	80	100	CS,IT
4CS4A	Software Engineering	3			3	20	80	100	CS,IT
4CS5A	Principles of Communication	3			3	20	80	100	CS,IT
4CS6A	Principles of Programming Languages	3			3	20	80	100	CS,IT
4CS7A	Microprocessor Lab			3	3	60	40	100	CS,IT
4CS8A	Communication Lab			3	3	60	40	100	CS,IT
4CS9A	Computer Aided Software Engineering Lab			3	4	60	40	100	CS,IT
4CS10A	Business Entrepreneurship Development			2	3	30	20	50	
4CSDC	Discipline & extra Curricular Activities							50	
	Total	18	1	11				1000	

V	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
5CS1A	Computer Architecture	3			3	20	80	100	CS, IT
5CS2A	Digital Logic Design	3	-		3	20	80	100	
5CS3A	Telecommunication Fundamentals	3	-	-	3	20	80	100	CS, IT
5CS4A	Database Management Systems	3			3	20	80	100	CS, IT
5CS5A	Operating Systems	3	-		3	20	80	100	CS, IT
5CS6.1A	Advanced Data Structure	3	-		3	20	80	100	CS, IT
5CS6.2A	Digital Signal Processing								CS, IT
5CS6.3A	Information Theory & Coding								CS, IT
5CS7A	DataBase Lab			3		60	40	100	CS, IT
5CS8A	System Design in UML Lab.	-	-	3		45	30	75	
5CS9A	Operating Systems Simulation Lab			3		60	40	100	CS, IT
5CS10	Digital Hardware Design Lab			3		45	30	75	CS, IT
5CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VI	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
6CS1A	Computer Networks	3	-		3	20	80	100	CS, IT
6CS2A	Design and Analysis of Algorithms	3	-		3	20	80	100	CS, IT
6CS3A	Theory Of Computation	3			3	20	80	100	CS, IT
6CS4A	Computer Graphics and Multimedia Techniques	3			3	20	80	100	
6CS5A	Embedded System Design	3	-		3	20	80	100	
6CS6.1A	Advance Topics in Operating Systems	3	-		3	20	80	100	CS, IT
6CS6.2A	Artificial Intelligence								
6CS6.3A	Human Computer Interface								CS, IT
6CS7A	Java Programming Lab			3		45	30	75	CS, IT
6CS8A	Computer Graphics & Multimedia Lab			2		30	20	50	
6CS9A	Design and Analysis of Algorithms Lab.			3		60	40	100	CS, IT
6CS10A	Embedded System Design Lab.			2		45	30	75	
6CS11A	Humanities and Social Sciences			2		30	20	50	CS, IT
6CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VII	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
7CS1A	Cloud Computing	3	-		3	20	80	100	
7CS2A	Information System Security	3			3	20	80	100	CS, IT
7CS3A	Data Mining & Ware Housing	3			3	20	80	100	CS, IT
7CS4A	Computer Aided Design for VLSI	3	-		3	20	80	100	
7CS5A	Compiler Construction	3			3	20	80	100	
7CS6.1A	Advance DataBase Management Systems	3	-		3	20	80	100	
7CS6.2A	Robotics								
7CS6.3A	Data Compression Techniques								
7CS7A	Web Development Lab			2		30	20	50	
7CS8A	VLSI Physical Design Lab			3		45	30	75	
7CS9A	Compiler Design Lab			3		45	30	75	
7CSPR	Project-I			2		50		50	CS, IT
7CSTR	Practical Training*			2			100	100	CS, IT
7CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VIII	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
8CS1A	Mobile Computing	3			3	20	80	100	CS, IT
8CS2A	Digital Image Processing	3	-		3	20	80	100	CS, IT
8CS3A	Distributed Systems	3			3	20	80	100	
8CS4.1A	Hardware Testing & Fault Tolerance	3	-		3	20	80	100	CS, IT
8CS4.2A	Real Time Systems								CS, IT
8CS4.3A	Information Retrieval								CS, IT
8CS5A	Unix Network Programming & Simulation Lab			3		60	40	100	
8CS6A	FPGA Lab.			3		60	40	100	
8CS7A	Digital Image Processing lab			2		30	20	50	CS, IT
8CSPR	Project-II			2		120	80	200	CS, IT
8CSSM	Seminar			2		60	40	100	CS, IT
8CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		12	0	12				1000	

3CS1A ELECTRONIC DEVICES & CIRCUITS (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Mobility and conductivity, charge densities in a semiconductor, Fermi Dirac distribution, carrier concentrations and fermi levels in semiconductor, Generation and recombination of charges, diffusion and continuity equation, Mass action Law, Hall effect. Junction diodes, Diode as a ckt. element, load line concept, clipping and clamping circuits, Voltage multipliers.
II	Transistor characteristics, Current components, Current gains: alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE,CC and CB amplifiers. Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.
III	SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY : Analysis of BJT and FET, RC coupled amplifiers. Frequency response, midband gain, gains at low and high frequency. Miller's Theorem. Cascading Transistor amplifiers, Emitter follower. JFET, MOSFET, Equivalent circuits and biasing of JFET's & MOSFET's. Low frequency CS and CD JFET amplifiers. FET as a voltage variable resistor. Source follower.
IV	FEEDBACK AMPLIFIERS : Classification, Feedback concept, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Analysis of voltage-series, voltage-shunt, current- series and current-shunt feedback amplifier. Stability criterion.
V	OSCILLATORS : Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Astable, monostable and bistable multivibrators. Schmitt trigger.

Text/References:

1. Electronic devices & circuits theory By R.L. Boylestad, Louis Nashelsky ,Pearson education
2. Integrated Electronics By Millman Halkias, T.M.H
3. Electronic devices & circuits By David Bell, Oxford Publications
4. Grob's Basic Electronics By Schultz, T.M.H.

3CS2A DATA STRUCTURES & ALGORITHMS (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Definition & characteristics of algorithms, structures. Difficulties in estimating exact execution time of algorithms. Concept of complexity of program. Asymptotic notations: Big-Oh, theta, Omega- Definitions and examples, Determination of time and space complexity of simple algorithms without recursion. Representing a function in asymptotic notations viz $5n^2-6n=\theta(n^2)$ Arrays: Array as storage element, Row major & column major form of arrays, computation of address of elements of n dimensional array.
II	Arrays as storage elements for representing polynomial of one or more degrees for addition & multiplication, sparse matrices for transposing & multiplication, stack, queue, dequeue, circular queue for insertion and deletion with condition for over and underflow, transposition of sparse matrices with algorithms of varying complexity (Includes algorithms for operations as mentioned). Evaluation of Expression: Concept of precedence and associativity in expressions, difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion.
III	Linear linked lists: singly, doubly and circularly connected linear linked lists-insertion, deletion at/ from beginning and any point in ordered or unordered lists. Comparison of arrays and linked lists as data structures. Linked implementation of stack, queue and dequeue. Algorithms for of insertion, deletion and traversal of stack, queue, dequeue implemented using linked structures. Polynomial representation using linked lists for addition, Concepts of Head Node in linked lists. Searching: Sequential and binary search
IV	Non-Linear Structures: Trees definition, characteristics concept of child, sibling, parent child relationship etc, binary tree: different types of binary trees based on distribution of nodes, binary tree (threaded and unthreaded) as data structure,

	insertion, deletion and traversal of binary trees, constructing binary tree from traversal results. Threaded binary Tree. Time complexity of insertion, deletion and traversal in threaded and ordinary binary trees. AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion. Application of trees for representation of sets.
V	Graphs: Definition, Relation between tree & graph, directed and undirected graph, representation of graphs using adjacency matrix and list. Depth first and breadth first traversal of graphs, finding connected components and spanning tree. Single source single destination shortest path algorithms. Sorting: Insertion, quick, heap, topological and bubble sorting algorithms for different characteristics of input data. Comparison of sorting algorithms in term of time complexity. NOTE: 1. Algorithm for any operation mentioned with a data structure or required to implement the particular data structure is included in the curriculum.

Text/References:

1. An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH
2. Data Structures in C/C++, Horowitz, Sawhney, Galgotia
3. Data Structures in C/C++, Tanenbaum, Pearson
4. Data Structures in C++, Weiss, Parson

3CS3A DIGITAL ELECTRONICS (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	NUMBER SYSTEMS, BASIC LOGIC GATES & BOOLEAN ALGEBRA: Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vica-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion.
II	DIGITAL LOGIC GATE CHARACTERISTICS: TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET. Interfacing logic families to one another.
III	MINIMIZATION TECHNIQUES: Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-Mc Klusky minimization techniques.
IV	COMBINATIONAL SYSTEMS: Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, demultiplexer, encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.
V	SEQUENTIAL SYSTEMS: Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops. Counters : Asynchronous (ripple), synchronous andsynchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications. Registers: buffer register, shift register.

Text/References:

1. Digital integrated electronics, By Herbert Taub, Donald L. Schilling, TMH
2. Digital Logic and Computer Design By M. Morris Mano, Pearson
3. Modern Digital Electronics By R.P. Jain, TMH
4. Fundamentals of Digital circuits By A. Anand kumar, PHI
5. Digital circuit design By S. Salivahanan, Sarivazhagan, Vikas publications

3CS4A LINUX AND SHELL PROGRAMMING

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction: Logging in, changing password (*passwd* command only), *man, xman, info* commands to access on line help. Simple commands like *ls, cp, mv, grep, head, tail, sort, uniq, diff, echo, date, which, whereis, whatis, who, finger w* (option and variations included). Directory commands, access permissions, changing access permissions for files and directories, hard & symbolic links. Environment and path setting.
II	vi editor: Creating and editing files, features of vi, insertion deletion, searching, substitution operations, yank, put, delete commands, reading & writing files, *exrc* file for setting parameters, advance editing techniques. vim(improved vi). Programming utilities: Compiling & linking C, C++ programs, *make* utility, debugging C programs using *gdb*, system call.
III	Introduction to X-window system: x-window as client/ server system, concept of window manager, remote computing & local displays, *xinitrc* file, customize X work environment and applications, customizing the *fvwm* window manager.
IV	Shell: Meaning and purpose of shell, Introduction to types of shell. The command line, standard input and standard output, redirection, pipes, filters special characters for searching files and pathnames. Bourne Again SHell: shell script-writing and executing, command separation & grouping, redirection, directory stack manipulation, processes, parameters & variables, keyword variables.
V	Shell Programming: Control structures, the *Here* document, expanding *NULL* or *USET* variables, Builtins, functions, history, aliases, job control, filename substitution. source code management- RCS and CVS. *awk* utility.

Text/References:

1. A practical Guide to Linux, Sobell, Pearson.
2. A Practical Guide to Linux Commands, Editors, and Shell Programming, Sobell, Pearson.
3. A Practical Guide to Fedora and Red Hat Enterprise Linux, Sobell, 5e, Pearson
4. Harley Hahn: Guide to Unix & Linux, TMH

5. Blum, Bresnahan, Linux Command and Shell Scripting Bible, Wiley India, 2nd Ed.

3CS5A OBJECT ORIENTED PROGRAMMING (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction: Review of structures in C, accessing members of structures using structure variables, pointer to structures, passing structures to functions, structures as user defined data types.
II	Introduction to programming paradigms- (Process oriented and Object oriented). Concept of object, class, objects as variables of class data type, difference in structures and class in terms of access to members, private and public Basics of C++: Structure of C++ programs, introduction to defining member functions within and outside a class, keyword *using*, declaring class, creating objects, constructors & destructor functions, Initializing member values with and without use of constructors, simple programs to access & manipulate data members, *cin* and *cout* functions. Dangers of returning reference to a private data member, constant objects and members function, composition of classes, friend functions and classes, using *this* pointer, creating and destroying objects dynamically using *new* and *delete* operators. Static class members, container classes and iterators, proxy classes. members of a class, data & function members. Characteristics of OOP- Data hiding, Encapsulation, data security.
III	Operator overloading: Fundamentals, Restrictions, operator functions as class members v/s as friend functions. Overloading stream function, binary operators and unary operators. Converting between types.
IV	Inheritance: Base classes and derived classes, protected members, relationship between base class and derived classes, constructors and destructors in derived classes, public, private and protected inheritance, relationship among objects in an inheritance hierarchy, abstract classes, virtual functions and dynamic binding, virtual destructors.
V	Multiple inheritance, virtual base classes, pointers to classes and class members, multiple class members. Templates, exception handling.

Text/References:

1. How to Program C++, Dietel, Pearson
2. Mastering C++ By K.R.Venugopal, TMH
3. Object Oriented Programming in C++ By Robert Lafore, Pearson
4. Object Oriented Design & Modelling, Rambaugh, Pearson

3CS6A Advanced Engineering Mathematics (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3, Tutorial: 1**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction: Engineering application of optimization, Statement and classification of optimization problem, single variable and multivariable optimization with and without constraints.
II	Linear Programming: Formulation of Linear Programming problem, Graphical Approach, General Linear Programming problem, Simplex Method. Duality in Linear Programming and Transportation Problems.
III	Elements of Number Theory: Divisibility and Euclid Algorithm, Primes and the Sieve of Eratosthenes, testing for primes, Prime Number Theorem, Euler's, Fermat's Little theorems, Congruences, Computing Inverse in Congruences, Legendre and Jacobi Symbols, Chinese Remainder Theorem, Algebraic Structures in Computing (Definitions, properties and Elementary Operations Only): Groups, subgroup, order of group, cyclic group, ring, field, division algorithm, polynomial over a field. Galois Field
IV	LAPLACE TRANSFORM: Laplace transform with its simple properties. Inverse Laplace transform, convolution theorem (without proof), solution of ordinary differential equation with constant coefficient, solution of partial differential equation having constant coefficient with special reference to diffusion, Heat conduction and wave equation. Boundary value problems
V	NUMERICAL ANALYSIS: Difference operators forward, backward, central, shift and average operators and relation between them. Newton's and Gauss forward and backward interpolation formula for equal interval, Stirling's formula for central difference. Lagrange's Interpolation formula and Inverse Interpolation. Numerical differentiation by Newton's, Gauss and Sterling's formula. Numerical Integration by Simpson's one third and there eight rule. Numerical Integration of ordinary differential equation of first order by Picard's method, Euler's and modified Euler's method, Milne's method and Runga-Kutta fourth order method. Solution of difference equation.

Text/References:

1. Elementary Number Theory with applications: Thomas Koshy, 2nd Ed., Elsevier.
2. Operation Research By Kanti Swaroop, P. K. Gupta & Manmohan, Sultan chand & sons
3. Integral Transform By Dr. R.K. Gupta, A.R. Vashishtha, Krishna Prakashan Mandir Meerut

4. Calculus of Finite Differences & Numerical Analysis By Dr. Gupta & Malik Krishna Prakashan Mandir Meerut

5. 3CS7A ELECTRONIC DEVICES LAB (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 75** **[Sessional/Mid-term (45) & End-term (30)]**

S. No.	**List of Experiments**
1	Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.
2	Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
3	Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.
4	Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of I_{dss} & V_p
5	Application of Diode as clipper & clamper
6	Plot gain- frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.
7	Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
8	Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.
9	Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
10	Plot and study the characteristics of small signal amplifier using FET.
11	Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
12	Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
13	To plot the characteristics of UJT and UJT as relaxation.
14	To plot the characteristics of MOSFET and CMOS.

3CS8A DATA STRUCTURES LAB (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1	Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays upto 4-dimensions.
2	Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.
3	Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.
4	Represent a sparse matrix using array. Implement addition and transposition operations using the representation.
5	Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6	Repeat exercises 2, 3 & 4 with linked structures.
7	Implementation of binary tree with operations like addition, deletion, traversal.
8	Depth first and breadth first traversal of graphs represented using adjacency matrix and list.
9	Implementation of binary search in arrays and on linked Binary Search Tree.
10	Implementation of insertion, quick, heap, topological and bubble sorting algorithms.

3CS9A DIGITAL ELECTRONICS LAB (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Three (3) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

S. No.	**List of Experiments**
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gates with 2, 3, & 4 inputs).
2	To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3	To realize an SOP and POS expression.
4	To realize Half adder/ Subtractor & Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables.
5	To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor & basic Full Adder/ Subtractor.
6	To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer
7	Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display.
8	Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table
9	Construct a divide by 2,4 & 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10	Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However, experiment Nos. 1-4 are to be performed on bread board only.

3CS10A C++ PROGRAMMING (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Practical Hrs.: 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (45) & End-term (30)]**

S. No.	**List of Experiments**
1	To write a simple program for understanding of C++ program structure without any CLASS declaration. Program may be based on simple input output, understanding of keyword using.
2	Write a C++ program to demonstrate concept of declaration of class with public & private member, constructors, object creation using constructors, access restrictions, defining member functions within and outside a class. Scope resolution operators, accessing an object's data members and functions through different type of object handle name of object, reference to object, pointer to object, assigning class objects to each other.
3	Program involving multiple classes (without inheritance) to accomplish a task. Demonstrate composition of class.
4	Demonstration Friend function friend classes and this pointer.
5	Demonstration dynamic memory management using new & delete & static class members.
6	Demonstration of restrictions an operator overloading, operator functions as member function and/ or friend function, overloading stream insertion and stream extraction, operators, overloading operators etc.
7	Demonstrator use of protected members, public & private protected classes, multi-level inheritance etc.
8	Demonstrating multiple inheritance, virtual functions, virtual base classes, abstract classes

3CS11A UNIX SHELL PROGRAMMING (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Four (3) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

S. No.	**List of Experiments**
1.	Use of Basic Unix Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.
2.	Commands related to inode, I/O redirection and piping, process control commands, mails.
3.	Shell Programming: Shell script exercises based on following (i) Interactive shell scripts (ii) Positional parameters (iii) Arithmetic (iv) if-then-fi, if-then-else-fi, nested if-else (v) Logical operators (vi) else + if equals elif, case structure (vii) while, until, for loops, use of break (viii) Metacharacters (ix) System administration: disk management and daily administration
4.	Write a shell script to create a file in $USER /class/batch directory. Follow the instructions (i) Input a page profile to yourself, copy it into other existing file; (ii) Start printing file at certain line (iii) Print all the difference between two file, copy the two files at $USER/CSC/2007 directory. (iv) Print lines matching certain word pattern.
5.	Write shell script for- (i) Showing the count of users logged in, (ii) Printing Column list of files in your home directory (iii) Listing your job with below normal priority (iv) Continue running your job after logging out.
6.	Write a shell script to change data format .Show the time taken in execution of this script
7.	Write a shell script to print files names in a directory showing date of creation & serial number of the file.
8.	Write a shell script to count lines, words and characters in its input(do not use wc).

9.	Write a shell script to print end of a Glossary file in reverse order using Array. (Use awk tail)
10.	Write a shell script to check whether Ram logged in, Continue checking further after every 30 seconds till success.

4CS1A MICROPROCESSOR AND INTERFACES (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Introduction to Microprocessors, microcontroller; 8085 Microprocessor Architecture, pin description, Bus concept and organization; concept of multiplexing and demultiplexing of buses; concept of static and dynamic RAM, type of ROM, memory map.
II	Software architecture registers and signals, Classification of instruction, Instruction set, addressing modes, Assembly Language Programming and Debugging, Programming Technique, instruction Format and timing.
III	Advance Assembly Language Programming, Counter and time delay; types of Interrupt and their uses, RST instructions and their uses, 8259 programmable interrupt controller; Macros, subroutine; Stack- implementation and uses with examples; Memory interfacing.
IV	8085 Microprocessor interfacing:, 8255 Programmable Peripheral Interface, 8254 programmable interval timer, interfacing of Input/output device, 8279 Key board/Display interface.
V	Microprocessor Application: Interfacing scanned multiplexed display and liquid crystal display, Interfacing and Matrix Keyboard, MPU Design; USART 8251, RS232C and RS422A, Parallel interface- Centronics and IEEE 488 .

Text/References:

1. Microprocessor architecture, programming, and applications with the 8085 By Ramesh S. Gaonkar
2. Introduction to Microprocessor By Aditya P. Mathur, TMH
3. Microprocessor & Interfaceing By Douglas V. Hall, TMH
4. Microprocessor & Peripheral By A.K.Ray, K.M. Bhurchandi, TMH

4CS2A DISCRETE MATHEMATICAL STRUCTURES

(Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3, Tutorial:1**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Sets: Definition and types, Set operations, Partition of set, Cardinality (Inclusion-Exclusion & Addition Principles), Recursive definition of set. Functions: Concept, Some Special Functions (Polynomial, Exponential & Logarithmic, Abslute Value, Floor & Ceiling, Mod & Div Functions), Properties of Functions, Cardinality of Infinite Set, Countable & Uncountable Sets, The Pigeonhole & Generalized Pigeonhole Principles, Composition of Functions.
II	Relations: Boolean Matrices, Binary Relation, Adjacency Matrix of Relation, Properties of Relations, Operations on Relations, The Connectivity Relations, Transitive Closure-Warshall's Algorithm, Equivalence relations- Congruence Relations, Equivalence Class, Number of Partitions of a Finite Set, Partial & Total Orderings.
III	Proof Methods: Vacuous, Trivial, Direct, Indirect by Contrapositive and Contradiction, Constructive & Non-constructive proof, Counter example. The Division Algorithm, Divisibilty Properties (Prime Numbers & Composite Numbers), Principle of Mathematical Induction, The Second Principle of Mathematical Induction, Fundamental Theorem of Arithmetic. Algorithm Correctness: Partial Correctness, Loop Invariant. Testing the partial correctness of linear & binary search, bubble & selection sorting.
IV	Graph Theory: Graphs – Directed, Undirected, Simple,. Adjacency & Incidence, Degre of Vertex, Subgraph, Complete graph, Cycle & Wheel Graph, Bipartite & Complete Bipartite Graph, Weighed Graph, Union of Simple Graphs. Complete Graphs. Isomorphic Graphs, Path, Cycles & Circuits Euclerian & Hamiltonian Graphs. Planar Graph: Kuratowski's Two Graphs, Euler's Formula, Kuratowski's Theorem. Trees: Spanning trees- Kruskal's Algo, Finding Spanning Tree using Depth First Search, Breadth First Search, Complexity of Graph, Minimal Spanning Tree.
V	Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Inverse & Contrpositive, Biconditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments.

Text/References:

1. Discrete Mathematics with Applications, Koshy, ELSEVIER
2. Discrete Mathematical Structures By Lipschutz & Lipson, TMH
3. Discrete Mathematical Structures, Kolman et.al, Pearson

4CS3A STATISTICS & PROBABILITY THEORY (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3, Tutorial:1**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction & Discrete random variables Sample space, events, algebra of events, Bernoulli's trials, Probability & Baye's theorem. Random variable & their event space, probability generating function, expectations, moments, computations of mean time to failure, Bernoulli & Poisson processes.
II	Discrete & continuous distributions Probability distribution & probability densities: Binomial, Poisson, normal rectangular and exponential distribution & their PDF's, moments and MGF's for above distributions.
III	Correlation & Regression Correlation & regression: Linear regression, Rank correlation, Method of least squares Fitting of straight lines & second degree parabola. Linear regression and correlation analysis.
IV	Queuing Theory Pure birth, pure death and birth-death processes. Mathematical models for M/M/1, M/M/N, M/M/S and M/M/S/N queues.
V	Discrete Parameter Markov chains: M/G/1 Queuing model, Discrete parameter birth-death process.

Text/References:

1. Probability, Statistics & Random Process By T. Veerajan, TMH
2. Fundamental of Mathematical Statistics By S.C.Gupta and V.K. Kapoor, Sultanchand & sons.
3. Statistics and Probability Theory By Jain & Rawat ,CBC
4. Statistics and Probability Theory By Schaum's, T.M.H.

4CS4A SOFTWARE ENGINEERING (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	System Analysis: Characteristics, Problems in system Development, System Level project Planning, System Development Life cycle (SDLC), computer system engineering & system analysis, modeling the architecture, system specification.
II	Software & its characteristics: Software Development, Process Model, Prescriptive model, The water fall model, Incremental Process Modes, Evolutionary process model, specialized process model.
III	Requirement Analysis: Requirement analysis tasks, Analysis principles, Software prototyping and specification data dictionary finite state machine (FSM) models. Structured Analysis: Data and control flow diagrams, control and process specification behavioral modeling, extension for data intensive applications.
IV	Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation, coding – Programming style, Program quality, quantifying program quality, complete programming example
V	Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling Object Oriented Design: OOD concepts and methods class and object definitions, refining operations, Class and object relationships, object modularization, Introduction to Unified Modeling Language

Text/References:

1. Software Engineering By Roger S. Pressman, TMH
2. Software Engineering Fundamental By Ali Behforooz, Frederick J Hudson, Oxford University Press
3. Software Engineering By Ian Sommerville
4. Software Engineering Concepts By **Richard E. Fairley** (Mcgraw-Hill)

4CS5A PRINCIPLES OF COMMUNICATION (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	ANALOG MODULATION: Concept of frequency translation. Amplitude Modulation: Description of full AM, DSBSC, SSB and VSB in time and frequency domains, methods of generation & demodulation, frequency division multiplexing (FDM). Angle Modulation: Phase and frequency modulation. Descriptions of FM signal in time and frequency domains, methods of generation & demodulation, pre- emphasis & de-emphasis, PLL.
II	PULSE ANALOG MODULATION: Ideal sampling, Sampling theorem, aliasing, interpolation, natural and flat top sampling in time and frequency domains. Introduction to PAM, PWM, PPM modulation schemes. Time division multiplexing (TDM)
III	PCM & DELTA MODULATION SYSTEMS: Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Matched filter detection. Error probability in PCM system.
IV	DIGITAL MODULATION: Baseband transmission: Line coding (RZ, NRZ), inter symbol interference (ISI), pulse shaping, Nyquist criterion for distortion free base band transmission, raised cosine spectrum. Pass band transmission: Geometric interpretation of signals, orthogonalization. ASK, PSK, FSK, QPSK and MSK modulation techniques, coherent detection and calculation of error probabilities.
V	SPREAD-SPECTRUM MODULATION: Introduction, Pseudo-Noise sequences, direct-sequence spread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hop spread spectrum (FHSS). Application of spread spectrum: CDMA.

Text/References:

1. Principles of communication systems By Taub Schilling, T.M.H.
2. Fundamentals of communication systems By Proakis & Salehi, Pearson education
3. Communication Systems by Simon Haykin, John Wiley
4. Communication Systems (Analog and Digital) By R.P. Singh, S.D. Sapre, T.M.H.
5. Modern Digital & Analog Communication By B.P. Lathi, Oxford Publications

6. Digital & Analog Communication Systems By K.S. Shanmugam, John Wiley

4CS6A PRINCIPLES OF PROGRAMMING LANGUAGES

(Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Programming Language: Definition, History, Features. Issues in Language Design: Structure and Operation of computer, Programming Paradigms. Efficiency, Regularity. Issues in Language Translation: Syntax and Semantics.
II	Specifications and Implementation of Elementary and Structured Data Types. Type equivalence, checking and conversion. Vectors and Arrays, Lists, Structures, Sets, Files.
III	Sequence control with Expressions, Conditional Statements, Loops, Exception handling. Subprogram definition and activation, simple and recursive subprogram, subprogram environment.
IV	Scope – Static and Dynamic, Block structures, Local Data and Shared Data, Parameters and Parameter Transmission. Local and Common Environments, Tasks and Shared Data.
V	Abstract Data type, information hiding, encapsulation, type definition. Static and Stack-Based Storage management. Fixed and Variable size heap storage management, Garbage Collection.

Text/References:

1. Programming languages: design and implementation, Terrence W. Pratt., Pearson
2. Programming languages: concepts and constructs, Ravi Sethi, ISBN 9780201590654.
3. Programming Language Pragmatics, Scott, ELSEVIER

4CS7A MICROPROCESSOR LAB (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Practical Hrs.: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1	Add the contents of memory locations XX00 &XX01 & place the result in memory location XX02.
2	Add the 16 bit numbers stored in memory location & store the result in another memory location.
3	Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverse order.
4	Write a program to Swap two blocks of data stored in memory.
5	Write a program to find the square of a number.
6	Write a main program & a conversion subroutine to convert Binary to its equivalent BCD.
7	Write a program to find largest & smallest number from a given array.
8	Write a program to Sort an array in ascending & descending order.
9	Write a program to multiply two 8 bit numbers whose result is 16 bit.
10	Write a program of division of two 8 bit numbers.
11	Generate square wave from SOD pin of 8085 & observe on CRO.
12	Write a program to perform traffic light control operation.
13	Write a program to control the speed of a motor.

4CS8A COMMUNICATION LAB (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1	Harmonic analysis of a square wave of modulated waveform Observe the amplitude modulated waveform and measures modulation index. Demodulation of the AM signal
2	To modulate a high frequency carrier with sinusoidal signal to obtain FM signal. Demodulation of the FM signal
3	To observe the following in a transmission line demonstrator kit : i. The propagation of pulse in non-reflecting Transmission line. ii. The effect of losses in Transmission line. iii. The resonance characteristics of al half wavelength long x-mission line.
4	To study and observe the operation of a super heterodyne receiver
5	To modulate a pulse carrier with sinusoidal signal to obtain PWM signal and demodulate it.
6	To modulate a pulse carrier with sinusoidal signal to obtain PPM signal and demodulate it.
7	To observe pulse amplitude modulated waveform and its demodulation.
8	To observe the operation of a PCM encoder and decoder. To consider reason for using digital signal x-missions of analog signals.
9	Produce ASK signals, with and without carrier suppression. Examine the different processes required for demodulation in the two cases
10	To observe the FSK wave forms and demodulate the FSK signals based on the properties of (a) tuned circuits (b) on PI.L.
11	To study & observe the amplitude response of automatic gain controller (AGC).

4CS9A COMPUTER AIDED SOFTWARE ENGINEERING LAB
(Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Computer Science and Engineering **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

For the instructor: Assign any two projects two a group of exactly two students covering all of the experiments from given experiment list. Each group is required to prepare the following documents for projects assigned to them and develop the software using software engineering methodology.

1. Problem Analysis and Project Planning Thorough study of the problem- identify project scope, infrastructure.
2. Software Requirement Analysis- Describe the individual Phases/modules of the project deliverables.
3. Data Modeling Use work products – data dictionary, use case diagrams and activity diagrams, build and test lass diagrams, sequence diagrams and add interface to class diagrams.
4. Software Developments and Debugging.
5. Software Testing – Prepare test plan, perform validation testing coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor.
6. Describe: Relevance of CASE tools, high – end and low – end CASE tools, automated support for data dictionaries, DFD, ER diagrams.

S. No.	**List of Experiments**	**Software Recommended:**
1	Course Registration System	Case Tools: Rational Suite, Win runner, Empirix Languages: C/C++/JDK, JSDK, INTERNET EXPLORER UML Front End: VB, VC++, Developer 2000, .NET Back End: Oracle, MS – Access, SQL Note: Open Source tools will be preferred.
2	Quiz System	
3	Online ticket reservation system	
4	Remote computer monitoring	
5	Students marks analyzing system	
6	Expert system to prescribe the medicines for the given symptoms	
7	Platform assignment system for the trains in a railway station	
8	Stock maintenance	
9	Student Marks Analyzing System	
10	Online Ticket Reservation System	
11	Payroll System	
12	Export System	

4CS10A Business Entrepreneurship Development (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Practical Hrs : 2	Examination Time = Three (3) Hours Maximum Marks = 50 [Sessional/Mid-term (30) & End-term (20)]

1. Introduction to Entrepreneurship- Concept and need, Entrepreneurship and innovation, Entrepreneurship and economic growth.
2. Entrepreneurial competencies, Leadership, Decision making, Motivation, Risk taking.
3. Business Enterprise Planning- Identification of business opportunity, Idea generation, Demand estimation, Preparation of project report, Feasibility analysis.
4. Intellectual Property rights, Patents, Taxation- Central excise & Sales tax, VAT.
5. Government Policies for Entrepreneurs, Entrepreneurial career opportunities for Engineers, case studies.

5CS1A COMPUTER ARCHITECTURE (Common to CS & IT)

Class: V Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction to Computer Architecture and Organization. Von Neuman Architecture, Flynn Classification. Register Transfer and Micro operations: Register transfer language, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Bus and memory transfers. Computer Organization and Design: Instruction cycle, computer registers, common bus system, computer instructions, addressing modes, design of a basic computer
II	Central Processing Unit: General register organization, stack organization, Instruction formats, Data transfer and manipulation, program control. RISC, CISC characteristics. Pipeline and Vector processing: Pipeline structure, speedup, efficiency, throughput and bottlenecks. Arithmetic pipeline and Instruction pipeline.
III	Computer Arithmetic: Adder, Ripple carry Adder, carry look Ahead Adder, Multiplication: Add and Shift, Array multiplier and Booth Multiplier, Division: restoring and Non-restoring Techniques. Floating Point Arithmetic: Floating point representation, Add, Subtract, Multiplication, Division.
IV	Memory Organization: RAM, ROM, Memory Hierarchy, Organization, Associative memory, Cache memory, and Virtual memory: Paging and Segmentation.
V	Input-Output Organization: Input-Output Interface, Modes of Transfer, Priority Interrupt, DMA, IOP processor.

Text/References:

1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)

2. Computer Organization and Architecture -John P. Hayes (McGraw -Hill)

3. Computer Organization -V. Carl. Hamacher (McGraw-Hill)

5CS2A Digital Logic Design

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Hardware Description Languages and their use in digital logic design. VHDL: Modelling Concepts, Lexical Elements & Syntax Descriptions, Scalar Data types & Operations, Sequential Statements, Composite Data Types & Operations, Basic Modelling Constructs. Case Study: VHDL Simulation of Ripple Carry, & Look Ahead carry Adders.
II	VHDL: Subprograms, Packages & Use Clauses, Aliases, Resolved Signals, Components & Configurations, Generate Statements, Concurrent Statements. Use of VHDL in simulation and synthesis.
III	Clocked Sequential circuits. Design steps for synchronous sequential circuits. Design of a sequence detector. Moore and Mealy Machines. Design using JK flip-flops and D flip-flops. State reduction, State assignment, Algorithmic State Charts, converting ASM charts to hardware, one-hot state assignment. Considerations of clock skew, set-up time, hold-time and other flip-flop parameters, timing constraints. Programmable Logic Devices. Read-only memory. Boolean function implementation through ROM. PLD, PGA, PLA, PAL, FPGA.
IV	Event-driven Circuits. Design procedure for asynchronous circuits, stable and unstable states, races, race-free assignments. State reduction of incompletely specified machines. Compatibility and state reduction procedure. Hazards in combinational networks. Dynamic hazards, Function Hazards, and Essential Hazards. Eliminating hazards.
V	Field Programmable Gate Arrays: Introduction, Logic Elements & programmability, Interconnect structures & programmability, Extended Logic Elements, SRAM, Flash Memory & Antifuse Configuration, Case Studies of Altera Stratix & Xilinx Virtex-II pro. Technology Mapping for FPGAs: Logic Synthesis, Lookup Table Technology Mapping.

Text Book:

1. Brian Holdsworth and Clive Woods. Digital Logic Design. Newnes (Elsevier). [Available in Indian Edition].
2. Ashenden, The Designer's Guide to VHDL, Elsevier.
3. Stephen D. Brown, et.al., Field Programmable Gate Arrays, Kluwer Academic Publishers.
4. Scott Hauck, André DeHon , Reconfigurable computing: the theory and practice of FPGA based computation, Morgan Kauffman
5. Zvi Kohavi: Switching and Finite Automata Theory. TMH.
6. Parag K. Lala, Practical Digital Logic Design and Testing. PHI
7. Stephen H. Unger, The essence of logic circuits. Wiatrowski & House.

5CS3A TELECOMMUNICATION FUNDAMENTALS (Common to CS & IT)

Class: V Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Data Transmission: Terminology, Frequency, spectrum, bandwidth, analog and digital transmission, Transmission impairments, channel capacity, Transmission Media. Wireless Transmission: Antenna and antenna gain. Network Reference Models (OSI/ISO and TCP/IP) Physical Layer: Line Encoding Schemes. Concept of bit period, effect of clock skew, Synchronous and Asynchronous communication. Data Link Layer: Functions of data link layer and design issues Flow Control: Flow control in loss less and lossy channels using stop-and-wait, sliding window protocols. Performance of protocols used for flow control.
II	Error Control Coding: Error Detection, Two Dimensional Parity Checks, and Internet Checksum. Polynomial Codes, Standardized polynomial codes, error detecting capability of a polynomial codes. Linear codes, performance of linear codes, error detection & correction using linear codes. Data Link Control: HDLC & PPP including frame structures. MAC sublayer: Channel Allocation Problem, Pure and slotted Aloha, CSMA, CSMA/CD, collision free multiple access. Throughput analysis of pure and slotted Aloha. Ethernet Performance.
III	Wireless LAN: Hidden node and Exposed node Problems, RTS/CTS based protocol, 802.11 Architecture, protocol stack, Physical layer, MAC Sublayer. Bluetooth Architecture and Protocol Stack Data Link Layer Switching: Bridges (Transparent, Learning and Spanning Tree), Virtual LANs
IV	Multiplexing: Frequency division, time division (Synchronous and statistical) multiplexing. ADSL, DS1 and DS3 carriers. Multiple Accesses: TDMA frame structure, TDMA Burst Structure, TDMA Frame efficiency, TDMA Superframe structure, Frame acquisition and synchronization, Slip rate in digital terrestrial networks. Switching: Qualitative description of Space division, time division and space-time-space division switching.
V	Spread Spectrum Techniques: Direct sequence(DSSS) & frequency hopping(FHSS); Performance consideration in DSSS & FHSS; Code division Multiple access (CDMA): frequency & channel specifications, forward & reverse CDMA channel, pseudo noise(PN) sequences, m-sequence, gold sequence, orthogonal code, gold sequences, Walsh codes, synchronization, power control, handoff, capacity of CDMA system, IMT-2000, WCDM

Text/References:

1. Stallings, Data and computer communication, 8th ed. Pearson
2. Tri.T.Ha, Digital Satellite Communications, 2/e, Tata McGraw Hill
3. Alberto Leon-Garcia, Indra Widjaja, COMMUNICATION NETWORKS, 2nd ed., TMH
4. Wireless Communications, 2/e, Rappaport, PHI

5. Analysis of Computer and Communication Networks, ISBN: 0387744363, Fayez Gebali, 2008, Springer-verlag, 1st Ed.

5CS4A DATABASE MANAGEMENT SYSTEMS (Common to CS & IT)

Class: V Sem. B.Tech	**Evaluation**
Branch: Computer Engg. Schedule per Week **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	INTRODUCTION TO DATABASE SYSTEMS: Overview and History of DBMS. File System v/s DBMS .Advantage of DBMS Describing and Storing Data in a DBMS. Queries in DBMS. Structure of a DBMS.
II	ENTITY RELATIONSHIP MODEL: Overview of Data Design Entities, Attributes and Entity Sets, Relationship and Relationship Sets. Features of the ER Model- Key Constraints, Participation Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Data Base, Design with ER Model-Entity v/s Attribute, Entity vs Relationship Binary vs Ternary Relationship and Aggregation v/s ternary Relationship Conceptual Design for a Large Enterprise.
III	RELATIONSHIP ALGEBRA AND CALCULUS**:** Relationship Algebra Selection and Projection, Set Operations, Renaming, Joints, Division, Relation Calculus, Expressive Power of Algebra and Calculus.
IV	SQL QUERIES PROGRAMMING AND TRIGGERS: The Forms of a Basic SQL Query, Union, Intersection and Except, Nested Queries ,Correlated Nested Queries, Set-Comparison Operations, Aggregate Operators, Null Values and Embedded SQL, Dynamic SQL, ODBC and JDBC, Triggers and Active Databases.
V	SCHEMA REFINEMENT AND NORMAL FORMS: Introductions to Schema Refinement, Functional Dependencies, Boyce-Codd Normal Forms, Third Normal Form, Normalization-Decomposition into BCNF Decomposition into 3-NF.

References:

1. H.f. Korth and Silberschatz: Database Systems Concepts, McGraw Hill
2. Almasri and S.B. Navathe: Fundamentals of Database Systems,
3. C.J. Date: Data Base Design, Addison Wesley
4. Hansen and Hansen : DBM and Design, PHI

5CS5A OPERATING SYSTEMS (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Introduction and need of operating system, layered architecture/logical structure of operating system, Type of OS, operating system as resource manager and virtual machine, OS services, BIOS, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader. Process management- Process model, creation, termination, states & transitions, hierarchy, context switching, process implementation, process control block, Basic System calls- Linux & Windows. Threads- processes versus threads, threading, concepts, models, kernel & user level threads, thread usage, benefits, multithreading models.
II	Interprocess communication- Introduction to message passing, Race condition, critical section problem, mutual exclusion with busy waiting- disabling interrupts, lock variables, strict alteration, Peterson's solution, TSL instructions, busy waiting, sleep and wakeup calls, semaphore, monitors, classical IPC problems. Process scheduling- Basic concepts, classification, CPU and I/O bound, CPU scheduler- short, medium, long-term, dispatcher, scheduling:- preemptive and non-preemptive, Static and Dynamic Priority, Co-operative & Non-cooperative, Criteria/Goals/Performance Metrics, scheduling algorithms- FCFS, SJFS, shortest remaining time, Round robin, Priority scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, Fair share scheduling.
III	Deadlock- System model, resource types, deadlock problem, deadlock characterization, methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock. Memory management- concepts, functions, logical and physical address space, address binding, degree of multiprogramming, swapping, static & dynamic loading- creating a load module, loading, static & dynamic linking, shared libraries, memory allocation schemes- first fit, next fit, best fit, worst fit, quick fit. Free space management- bitmap, link list/free list, buddy's system, memory protection and sharing, relocation and address translation.
IV	Virtual Memory- concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, demand paging, pre-paging, working set model, page fault frequency, thrashing, page replacement algorithms- optimal, NRU, FIFO, second chance, LRU, LRU-approximation clock, WS clock; Belady's anomaly, distance string; design issues for paging system- local versus global allocation policies, load control, page size, separate instruction and data spaces, shared pages, cleaning policy, TLB (translation look aside buffer) reach, inverted page table, I/O interlock, program structure, page fault handling, Basic idea of MM in Linux & windows.
V	File System- concepts, naming, attributes, operations, types, structure, file organization & access(Sequential, Direct ,Index Sequential) methods, memory mapped files, directory structures- one level, two level, hierarchical/tree, acyclic graph, general graph, file system mounting, file sharing, path name, directory operations, overview of file system in Linux & windows. Input/Output subsystems- concepts, functions/goals, input/output devices- block and character, spooling, disk structure & operation, disk attachment, disk storage capacity, disk scheduling algorithm- FCFS, SSTF, scan scheduling, C-scan schedule.

Text/Reference Books:

1. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall.
4. DM Dhamdhere: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
5. Charles Crowly: Operating System A Design – Oriented Approach, Tata McGraw Hill.

5CS6.1A ADVANCED DATA STRUCTURE (Common to CS & IT)

Class: V Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	ADVANCED TREES: Definitions, Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees. Dynamic Order Statistics, Interval Tree; Dictionaries.
II	MERGEABLE HEAPS: Mergeable Heap Operations, Binomial Trees, Implementing Binomial Heaps and its Operations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap, Implementing Fibonacci Heap.
III	GRAPH THEORY DEFINITIONS: Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut- Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs. GRAPH THEORY ALGORITHMS: Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.
IV	SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting and merging network sorter. Priority Queues and Concatenable Queues using 2-3 Trees. Operations on Disjoint sets and its union-find problem, Implementing Sets.
V	NUMBER THEORITIC ALGORITHM: Number theoretic notions, Division theorem, GCD, recursion, Modular arithmetic, Solving Modular Linear equation, Chinese Remainder Theorem, power of an element, Computation of Discrete Logarithms, primality Testing and Integer Factorization.

Text/References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.

2. Horowitz and Sahani: Fundamental of Computer algorithms.

3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley

4. Brassard : Fundamental of Algorithmics, PHI.

5CS6.2A DIGITAL SIGNAL PROCESSING

Class: V Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	INTRODUCTION : Discrete time signals and systems, properties of discrete time systems, Linear time invariant systems - discrete time. Properties of LTI systems and their block diagrams. Convolution, Discrete time systems described by difference equations.
II	Fourier Transform: Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. Z-transform: The region of convergence for the Z-transform. The Inverse Z-transform. Properties of Z transform.
III	SAMPLING: Mathematical theory of sampling. Sampling theorem. Ideal & Practical sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq. domain. Sampling of discrete time signals.
IV	THE DISCRETE FOURIER TRANSFORMS (DFT): Properties of the DFT, Linear Convolution using DFT. Efficient computation of the DFT: Decimation–in-Time and Decimation-in frequency FFT Algorithms.
V	FILTER DESIGN TECHNIQUES: Structures for discrete-time systems- Block diagram and signal flow graph representation of LCCD (LCCD – Linear Constant Coefficient Difference) equations, Basic structures for IIR and FIR systems, Transposed forms. Introduction to filter Design: Butterworth & Chebyshev.IIR filter design by impulse invariance & Bilinear transformation. Design of FIR filters by Windowing: Rectangular, Hamming & Kaiser.

Text/References:

1. Oppenheim, Discrete-Time Signal Processing, 2/e, Pearson Education
2. Proakis, Digital Signal Processing, 4/e, Pearson Education
3. S.K.Mitra, Digital Signal Processing, 2/e, Tata McGraw Hill

5CS6.3A INFORMATION THEORY & CODING

Class: V Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction to information theory. Uncertainty, Information and Entropy, Information measures for continuous random variables, source coding theorem. Discrete Memory less channels, Mutual information, Conditional entropy.
II	Source coding schemes for data compaction: Prefix code, Huffman code, Shanon-Fane code & Hempel-Ziv coding channel capacity. Channel coding theorem. Shannon limit.
III	Linear Block Code: Introduction to error connecting codes, coding & decoding of linear block code, minimum distance consideration, conversion of non systematic form of matrices into systematic form.
IV	Cyclic Code: Code Algebra, Basic properties of Galois fields (GF) polynomial operations over Galois fields, generating cyclic code by generating polynomial, parity check polynomial. Encoder & decoder for cyclic codes.
V	Convolutional Code: Convolutional encoders of different rates. Code Tree, Trllis and state diagram. Maximum likelihood decoding of convolutional code: The viterbi Algorithm fee distance of a convolutional code.

Text/References

1. Digital Communication, Simon Haykin, Wiley.

5CS7A DATABASE LAB (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs.: 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Stating a database design & application problem.
2. Preparing ER diagram
3. Finding the data fields to be used in the database.
4. Selecting fields for keys.
5. Normalizing the database including analysis of functional dependencies.
6. Installing and configuring the database server and the front end tools.
7. Designing database and writing applications for manipulation of data for a stand alone and shared data base including concepts like concurrency control, transaction roll back, logging, report generation etc.
8. Get acquainted with SQL.

In order to achieve the above objectives, it is expected that each students will chose one problem. The implementation shall being with the statement of the objectives to be achieved, preparing ER diagram, designing of database, normalization and finally manipulation of the database including generation of reports, views etc. The problem may first be implemented for a standalone system to be used by a single user.

All the above steps may then be followed for development of a database application to be used by multiple users in a client server environment with access control. The application shall NOT use web techniques.

One exercise may be assigned on creation of table, manipulation of data and report generation using SQL.

Suggested Tool:

For standalone environment, Visual FoxPro or any similar database having both the database and manipulation language may be used.

For multi-user application, MYSql is suggested. However, any other database may also be used. For front end, VB.Net, Java, VB Script or any other convenient but currently used by industry may be chosen.

Indicative List of exercise:

1. Student information system for your college.

2. Student grievance registration and redressal system.

3. A video library management system for a shop.
4. Inventory management system for a hardware/ sanitary item shop.
5. Inventory management system for your college.
6. Guarantee management system for the equipments in your college.

5CS8A SYSTEM DESIGNS in UML LAB

Class: V Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Practical Hrs : 3	**Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (45) & End-term (30)]**

Objectives:

1. The students shall be able to use following modules of UML for system description, implementation and finally for product development.

   - Capture a business process model.
   - The User Interaction or Use Case Model - describes the boundary and interaction between the system and users. Corresponds in some respects to a requirements model.
   - The Interaction or Communication Model - describes how objects in the system will interact with each other to get work done.
   - The State or Dynamic Model - State charts describe the states or conditions that classes assume over time. Activity graphs describe the workflows the system will implement.
   - The Logical or Class Model - describes the classes and objects that will make up the system.
   - The Physical Component Model - describes the software (and sometimes hardware components) that make up the system.
   - The Physical Deployment Model - describes the physical architecture and the deployment of components on that hardware architecture.

The students are expected to use the UML models, prepare necessary documents using UML and implement a system. Some hardware products like digital clock, digital camera, washing machine controller, air conditioner controller, an elctronic fan regulator, an elementary mobile phone etc. may also be chosen.

The students shall be assigned one problem on software based systems and another involving software as well as hardware.

5CS9A OPERATING SYSTEMS SIMULATION LAB (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

Objectives:

Understand the basic functions of operating systems.

In depth knowledge of the algorithms used for implementing the tasks performed by the operating systems.

Understand & simulate strategies used in Linux & Windows operating systems.

Develop aptitude for carrying out research in the area of operating system.

Suggested Tools:

Operating system simulator- MOSS preferably on Linux platform (Available for free download from http://www.ontko.com/moss/).

Recommended Exercises:

A. Exercises shall be given on simulation of algorithms used for the tasks performed by the operating systems. Following modules of the simulator may be used:

Scheduling

Deadlock

Memory Management Systems

File system simulator

Algorithms described in the text may be assigned. The simulation results such as average latency, hit & Miss Ratios or other performance parameters may be computed.

B. One exercise shall be on simulation of algorithms reported in the recent conferences/ journals and reproducing the results reported therein.

5CS10A DIGITAL HARDWARE DESIGN LAB (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (45) & End-term

Objectives: At the end of course, the students shall be able to

- Should be able to design datapath for digital systems
- Create a digital system using discrete digital ICs
- Design a hard wired / micro-programmed control circuit
- Simulate a digital datapath in Hardware Description Language
- Understand IC descriptions and select proper IC in a given circuit based on its timing characteristics

Suggested Methodology and tools: Hardware description language like Verilog /VHDL can be used for simulation.

The exercise shall involve design of datapath, its simulation and finally realization on breadboard. Library of digital ICs have to be built. Similarly, manuals of Digital IC families have to be placed in the laboratories for reference by students.

Suggested Exercises

- Create a microprocessor from ALU 74181. For this, the students may design a small instruction set and attach necessary registers and suitable control unit to realize a microprocessor.
- Simulate and realize a Cordic calculator.
- Simulate & realize a Four bit Adder
    - Design and simulation of a 4-bit Adder
    - VHDL/Verilog HDL (Hardware description language)
    - Interfacing 7-segment decoder
- Combinational Multiplier
    - 4x4-bit multiplier
    - Binary-to-BCD conversion
    - Timing Constraints
- CRC checksum generator & verifier
- Realizing a carry look ahead adder

6CS1A COMPUTER NETWORKS (Common to CS & IT)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

NOTE: The first 2 lectures shall be devoted to review of the basis architectures and responsibilities of different layers.

Units	Contents of the subject
I	Network layer-design issue, routing algorithms: Distance vector, link state, hierarchical, Broadcast routing. Congestion control: congestion prevention policies, congestion control in Datagram subnets, load shedding, jitter control, Leaky bucket and token bucket algorithms.
II	Internetworking: Differences in networks, Tunneling, Internetwork routing, Fragmentation Network layer in the Internet: IPv4 classful and classless addressing, subnetting Network layer protocols(only working and purpose; packet headers etc. not included), Differences in IPV6 over IPV4. Routing to Mobile Hosts and Mobile IP
III	Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and demultiplexing, crash recovery, introduction to UDP protocol. Principles of Reliable Data Transfer: Reliable data transfer over a perfectly reliable channel, Channel with bit errors and Lossy Channel with bit errors.
IV	Transport Layer in the Internet: Introduction to TCP, TCP service Model, TCP Header and segment structure, TCP connection establishment and release, transmission policy, timer management, Transactional TCP. Mobile TCP TCP Congestion Control: Fairness, TCP delay modeling.
V	Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security. P2P File Sharing: Centralized Directory, Query flooding, exploiting heterogeneity.

Text/References:

1. Tanenbaum; Computer Network, 4th Ed., Pearson.
2. Kurose; Computer Networking, 3rd Ed., Pearson.
3. Peterson, Davie; Computer Networks, 4rd Ed., ELSEVIER

6CS2A DESIGN AND ANALYSIS OF ALGORITHMS(Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: **Computer Engg.** **Schedule per** **Week Lectures:** **3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	BACKGROUND: Review of Algorithm Complexity, Order Notations: definitions and calculating complexity. DIVIDE AND CONQUER METHOD: Binary Search, Merge Sort, Quick sort and Strassen's matrix multiplication algorithms. GREEDY METHOD: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees.
II	DYNAMIC PROGRAMMING: Matrix Chain Multiplication. Longest Common Subsequence and 0/1 Knapsack Problem. BRANCH AND BOUND: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem.
III	PATTERN MATCHING ALGORITHMS: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms. ASSIGNMENT PROBLEMS: Formulation of Assignment and Quadratic Assignment Problem.
IV	RANDOMIZED ALGORITHMS. Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2- SAT. Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity assignment problems.
V	PROBLEM CLASSES NP, NP-HARD AND NP-COMPLETE: Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Cook's Theorem. Proving NP-Complete Problems - Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover and Set Cover Problem.

Text/References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.

2. Horowitz and Sahani: Fundamental of Computer algorithms.

3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley

6CS3A THEORY OF COMPUTATION (Common to CS & IT)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Lectures: 3,	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Finite Automata & Regular Expression: Basic Concepts of finite state system, Deterministic and non-deterministic finite automation and designing regular expressions, relationship between regular expression & Finite automata minimization of finite automation mealy & Moore Machines.
II	Regular Sets of Regular Grammars: Basic Definition of Formal Language and Grammars. Regular Sets and Regular Grammars, closure proportion of regular sets, Pumping lemma for regular sets, decision Algorithms for regular sets, Myhell_Nerod Theory & Organization of Finite Automata.
III	Context Free Languages& Pushdown Automata: Context Free Grammars – Derivations and Languages – Relationship between derivation and derivation trees – ambiguity – simplification of CEG – Greiback Normal form – Chomsky normal forms – Problems related to CNF and GNF Pushdown Automata: Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Pushdown automata and CFL - pumping lemma for CFL - Applications of pumping Lemma.
IV	Turing Machines: Turing machines – Computable Languages and functions – Turing Machine constructions – Storage in finite control – multiple tracks – checking of symbols – subroutines – two way infinite tape. Undecidability: Properties of recursive and Recursively enumerable languages – Universal Turing Machines as an undecidable problem – Universal Languages – Rice's Theorems.
V	Linear bounded Automata Context Sensitive Language: Chomsky Hierarchy of Languages and automata, Basic Definition & descriptions of Theory & Organization of Linear bounded Automata Properties of context-sensitive languages

Text/References

1. Aho, Hopcroft and Ullman, Introduction to Automata Theory, Formal Languages and Computation, Narosa
2. Cohen, Introduction to Computer Theory, Addison Wesley.
3. Papadimitriou, Introduction to Theory of Computing, Prentice Hall.

6CS4A COMPUTER GRAPHICS & MULTIMEDIA TECHNIQUES.

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction to Raster scan displays, Storage tube displays, refreshing, flicking, interlacing, color monitors, display processors, resolution, Introduction to Interactive. Computer Graphics: Picture analysis, Overview of programmer's model of interactive graphics, Fundamental problems in geometry. Scan Conversion: point, line, circle, ellipse polygon, Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm).
II	2D & 3D Co-ordinate system**:** Homogeneous Co-ordinates, Translation, Rotation, Scaling, Reflection, Inverse transformation, Composite transformation. Polygon Representation, Flood Filling, Boundary filling. Point Clipping, Cohen-Sutherland Line Clipping Algorithm, Polygon Clipping algorithms.
III	Hidden Lines & Surfaces: Image and Object space, Depth Buffer Methods, Hidden Facets removal, Scan line algorithm, Area based algorithms. Curves and Splines: Parametric and Non parametric Representations, Bezier curve, B-Spline Curves.
IV	Rendering: Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV
V	Multimedia components, Multimedia Input/Output Technologies: Storage and retrieval technologies, Architectural and telecommunication considerations. Animation: Introduction, Rules, problems and Animation techniques.

Text/References:

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Pearson
2. Hearn and Baker: Computer Graphics, PHI
3. Multimedia Systems Design, Prabhat Andleigh and Thakkar, PHI.

4. Multimedia Information Networking, N.K.Sharda, PHI..

6CS5A EMBEDDED SYSTEM DESIGN

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Introduction to embedded systems hardware needs; typical and advanced, timing diagrams, memories (RAM, ROM, EPROM). Tristate devices, Buses, DMA, UART and PLD's. Built-ins on the microprocessor.
II	Interrupts basics, ISR;Context saving, shared data problem. Atomic and critical section, Interrupt latency. Survey of software architectures, Round Robin, Function queue scheduling architecture, Use of real time operating system.
III	RTOS, Tasks, Scheduler, Shared data reentrancy, priority inversion, mutex binary semaphore and counting semaphore. Inter task communication, message queue, mailboxes and pipes, timer functions, events. Interrupt routines in an RTOS environment.
IV	Embedded system software design using an RTOS. Hard real-time and soft real time system principles, Task division, need of interrupt routines, shared data.
V	Embedded Software development tools. Host and target systems, cross compilers, linkers, locators for embedded systems. Getting embedded software in to the target system. Debugging techniques. Testing on host machine, Instruction set emulators, logic analysers. In-circuit emulators and monitors. Regional

Text Books:

1. John Davies, MSP430 Microcontroller Basics, Elsevier, 2008.
2. Andrew N. Sloss et.al. ARM System Developers Guide, ELSEVIER
3. Muhammad Ali Mazidi et.al., The 8051 Microcontroller & Embedded Systems, Pearson
4. Embedded System Design, A Unified Hardware/Software Introduction, Frank Vahid / Tony Givargis, 2006 reprint, John Wiley Student Edition.

6CS6.1A ADVANCE TOPICS IN OPERATING SYSTEMS (Common to CS & IT)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Operating system structures – policies & mechanism, Structures- monolithic, layered, virtual machines, micro kernel, exokernels, client- server model. Examples from Linux & Windows. Threads Advance Concepts– Libraries- Pthreads, win32 threads, Java threads, Introduction to threading issues, system calls, cancellation, signal handling, thread pool, thread specific data, window threads, Linux threads, Solaris Threads. Message Passing System – Need of Message Passing Systems, design issues, naming, synchronization, Implementation–buffering and delivery; mailboxes; RPC & RMI. Examples Systems – Linux, Windows.
II	File System- file system layouts, file system implementation, contagious allocation, link list allocation, indexed allocation, file allocation table, virtual file system, directory implementation- linear list and hash table. File System reliability and integrity. I/O system: device drivers/ controllers, busses and interfaces- USB, IDE, SCSI, IEEE1394, RAID system, disk caching and buffering, disk management-disk formatting, RAID Structure, boot block, bad block, swap-space management. System Security: Security Problems, Program Threats, System Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Network, Computer Security Classifications. Overview of security in Windows. [4]
III	The Linux OS: Unix Vs Linux, Design Principles, Kernel Structure, components Kernel Modules, Shell- usage, types; An overview of- Process Management, Thread Management and Scheduling, Memory Management, Process Scheduling in Linux, File System structure & implementation, I/O Management, Network File System, Inter-process Communications, Booting and login process, security.[3]
IV	The Window OS: Design Principles, System Components- Hardware Abstraction layer, Kernel, Executives; Environmental Subsystems- MS-DOS Environment, 16-bit Windows Environment, Win32 API, POSIX subsystem; Exception and Interrupts; An overview of-memory management, process management and thread; Process Scheduling in Windows; File Systems: Internal Layout, recovery, Volume Management and Fault Tolerance, FAT and NTFS, Security features, window registry, OS organizations.[3]

V	Multiprocessor Operating Systems: Architecture of Multiprocessor Systems, Overview of Multiprocessor OS, Kernal Structure and Multiprocessing support in Linux & Windows, Process Synchronization- Queued Lock, Spin Lock, Sleep Lock; Process Scheduling. Multimedia Operating System- Introduction to Multimedia & Data Compression- concepts, common graphics file formats, common audio file formats; Video server, Process management- real time scheduling; Multimedia file systems, Multimedia file storage mechanisms, Video sever organization.[2] Mobile Operating System- Windows CE, Palm OS, Symbian OS, JAVA card, Multos.

Text/Reference Books:

1. DM Dhamdhere: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall
4. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
5. Charles Crowly: Operating System A Design – Oriented Approach, Tata McGraw Hill.
6. Bach, Design of Unix Operating Systems.

6CS6.2A ARTIFICIAL INTELLIGENCE

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Lectures: 3	**Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Meaning and definition of artificial intelligence, Various types of production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithms etc, and various types of control strategies.
II	Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and nonmonotonic reasoning.
III	Probabilistic reasoning, Baye's theorem, semantic networks scripts schemas, frames, conceptual dependency and fuzzy logic, forward and backward reasoning.
IV	Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding and natural languages processing.
V	Introduction to learning, Various techniques used in learning, introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

Text Books & References:

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan W. Patterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)
4. Russel & Norvig, Artificial Intelligence: A Modern Approach, Prentice-Hall

6CS6.3A HUMANCOMPUTER INTERFACE (Common to CS & IT)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: Comp. **Engg. Schedule per** **Week Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	The Human: input-output channels, Human memory, thinking, emotions, individual differences, psychology and the design of interactive systems. The Computer: Text entry devices with focus on the design of key boards, positioning, pointing and drawing, display devices. The Interaction: Models of interaction, ergonomics, interaction styles, elements of WIMP interfaces, interactivity, experience, engagement and fun. Paradigms for Interaction.
II	Design Process: The process of design, user focus, scenarios, navigation design screen design and layout, iteration & prototyping. Usability Engineering Design rules: Principles to support usability, standards, guidelines, rules and heuristics, HCI patterns.
III	Evaluation Techniques: Definition and goals of evaluation, evaluation through expert analysis and user participation, choosing an evaluation method. User support, requirement, approaches, adaptive help systems, designing user support systems
IV	Cognitive methods: Goals and task hierarchies, linguistic models, challenges of display based systems, physical and device models, cognitive architectures.
V	Communications and collaborations models: Face to Face communication, conversations, Text based communication, group working. Task Analysis: Differences between task analysis and other techniques, task decomposition, knowledge based analysis, ER based analysis, sources of information and data collection, use of task analysis.

Text/References:

1. Human Computer Interaction; Alan Dix et.al, 3rd ed., Pearson

6CS7A JAVA PROGRAMMING LAB (Common to CS & IT)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. Schedule per Week Practical Hrs.: 3	**Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (60) & End-term**

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Develop an in depth understanding of programming in Java: data types, variables, operators, operator precedence, Decision and control statements, arrays, switch statement, Iteration Statements, Jump Statements, Using break, Using continue, return.
2. Write Object Oriented programs in Java: Objects, Classes constructors, returning and passing objects as parameter, Inheritance, Access Control, Using super, final with inheritance Overloading and overriding methods, Abstract classes, Extended classes.
3. Develop understanding to developing packages & Interfaces in Java: Package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces.
4. Develop understanding to developing Strings and exception handling: String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class. Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally.
5. Develop applications involving file handling: I/O streams, File I/O.
6. Develop applications involving concurrency: Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, and Synchronization.
7. Develop applications involving Applet: Applet Fundamentals, using paint method and drawing polygons.

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Indicative List of exercises:

7. Programs to demonstrate basic concepts e.g. operators, classes, constructors, control & iteration statements, recursion etc. such as complex arithmetic, matrix arithmetic, tower of Hanoi problem etc.
8. Development of programs/projects to demonstrate concepts like inheritance, exception handling, packages, interfaces etc. such as application for electricity department, library management, ticket reservation system, payroll system etc.
9. Development of a project to demonstrate various file handling concepts.
10. Development of a project to demonstrate various applet concepts.

6CS8A Computer graphics & multimedia lab

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Practical Hrs:2**	**Examination Time = Three (3) Hours** **Maximum Marks = 50** **[Mid-term (60) & End-term (40)]**

S. No.	List of Experiment
1	Implementation of Line, Circle and ellipse attributes
2	Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear
3	Composite 2D Transformations
4	Cohen Sutherland 2D line clipping and Windowing
5	Sutherland – Hodgeman Polygon clipping Algorithm
6	Three dimensional transformations - Translation, Rotation, Scaling
7	Composite 3D transformations
8	Drawing three dimensional objects and Scenes
9	Generating Fractal images
10	To plot a point (pixel) on the screen
11	To draw a straight line using DDA Algorithm
12	Implementation of mid-point circle generating Algorithm
13	Implementation of ellipse generating Algorithm
14	To translate an object with translation parameters in X and Y directions
15	To scale an object with scaling factors along X and Y directions
16	To rotate an object with a certain angle about origin
17	Perform the rotation of an object with certain angle about an arbitrary point

6CS9A DESIGN AND ANALYSIS OF ALGORITHMS Lab(Common to CS & IT)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: Comp. Engg. Schedule per Week Practical Hrs : 3	**Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]**

Objectives: Upon successful completion of this course, students should be able to:

- Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains;
- Apply the algorithms and design techniques to solve problems;
- Analyze the complexities of various problems in different domains.

Suggested Tools: For implementation and estimation of running time on various sizes of input(s) or output(s) as the case may be, Linux platform is suggested.

Suggested Exercises:

A. It is expected that teachers will assign algorithms to the students for estimation of time & space complexity. Algorithms reported in various research journals may be chosen by the teachers.

B. Problem on designing algorithms to meet complexity constraints may be assigned. For example, a problem on design, analysis and implementation for transposing a sparse matrix requiring not more than one pass from the original matrix may be assigned.

C. A guide to such problems is given below:

1. Exploring a Binary Heap: Consider a binary heap containing n numbers (the root stores the greatest number). You are given a positive integer k < n and a number x. You have to determine whether the k^{th} largest element of the heap is greater than x or not. Your algorithm must take O(k) time. You may use O(k) extra storage.

2. Merging two search trees: You are given two height balanced binary search trees T and T', storing m and n elements respectively. Every element of tree T is smaller than every element of tree T'. Every node u also stores height of the subtree rooted at it. Using this extra information how can you merge the two trees in time O(log m + log n) (preserving both the height balance and the order)?

3. Complete binary tree as an efficient data-structure:
   You are given an array of size n (n being a power of two). All the entries of the array are initialized to zero. You have to perform a sequence of the following online operations :
   1. (i) Add(i,x) which adds x to the entry A[i].
   2. (ii) Report sum(i,j) = sum of the entries in the array from indices i to j for any 0 < i < j <= n.

It can be seen easily that we can perform the first operation in O(1) time whereas the second operation may cost O(n) in worst case. Your objective is to perform these operations efficiently. Give a data-structure which will guarantee O(log n) time per operation.

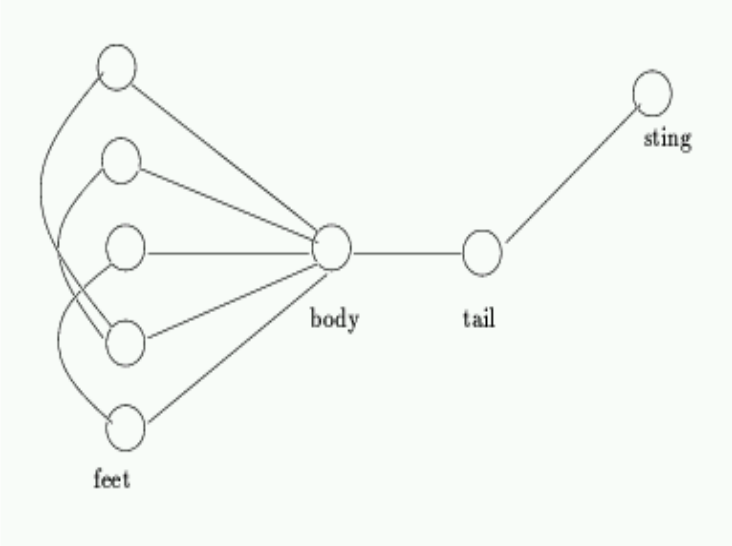
4. Problems on Amortized Analysis
    a. Delete-min in constant time!!! Consider a binary heap of size n, the root storing the smallest element. We know that the cost of insertion of an element in the heap is O(log n) and the cost of deleting the smallest element is also O(log n). Suggest a valid potential function so that the amortized cost of insertion is O(log n) whereas amortized cost of deleting the smallest element is O(1).
    b. Implementing a queue by two stack
    c. Show how to implement a queue with two ordinary stacks so that the amortized cost of each Enqueue and each Dequeue operation is O(1).

5. Computing a spanning tree having smallest value of largest edge weight: Describe an efficient algorithm that, given an undirected graph G, determines a spanning tree of G whose largest edge weight is minimum over all spanning trees of G.

6. Shortest Path Problems:
    i. From a subset of vertices to another subset of vertices
        a. Given a directed graph G(V,E), where edges have nonnegative weights. S and D are two disjoint subsets of the set of vertices. Give an O(|V| log |V| + |E|) time algorithm to find the shortest path among the set of paths possible from any node in S to any node in D.
    ii. Paths in Directed Acyclic Graph
        a. Counting the number of paths
        Given two nodes u,v in a directed acyclic graph G(V,E). Give an O(|E|) time algorithm to count all the paths from u to v.
        b. Path passing through a subset of nodes
        Given two nodes u,v and a set of vertices w_1, w_2,...,w_k in a directed acyclic graph G(V,E). Give an O(|E|) time algorithm to output a path(if exists) from u to v which passes through each of the nodes w_1,...,w_k. If there is no such path then your algorithm must report that "no such path exists".

7. Searching for a friend:
    You are standing at a crossing from where there emerge four roads extending to infinity. Your friend is somewhere on one of the four roads. Youdonotknowonwhichroadheisandhowfarheisfromyou. You have to walk to your friend and the total distance traveled by you must be at most a constant times the actual distance of your friend from you. In terminology of algorithms, you should traverse O(d) distance, where d is the distance of your friend from you.

8. A simple problem on sorted array: Design an O(n)-time algorithm that, given a real number x and a sorted array S of n numbers, determines whether or not there exist two elements in S whose sum is exactly x .
9. Finding the decimal dominant in linear time: You are given n real numbers in an array. A number in the array is called a decimal dominant if it occurs more than n/10 times in the array. Give an O(n) time algorithm to determine if the given array has a decimal dominant.
10. Finding the first one: You are given an array of infinite length containing zeros followed by ones. How fast can you locate the first one in the array?
11. Searching for the Celebrity: Celebrity is a person whom everybody knows but he knows nobody. You have gone to a party. There are total n persons in the party. Your job is to find the celebrity in the party. You can ask questions of the form Does Mr. X know Mr. Y ?. You will get a binary answer for each such question asked. Find the celebrity by asking only O(n) questions.
12. Checking the Scorpion: An n-vertex graph is a scorpion if it has a vertex of degree 1(the sting) connected to a vertex of degree two (the tail) connected to a vertex of degree n-2 (the body) connected to the other n-3 (the feet). Some of the feet may be connected to other feet. Design an algorithm that decides whether a given adjacency matrix represents a scorpion by examining only O(n) entries.



13. Endless list: You are having a pointer to the head of singly linked list. The list either terminates at null pointer or it loops back to some previous location(not necessarily to the head of the list). You have to determine whether the list loops back or ends at a null location in time proportional to the length of the list. You can use at most a constant amount of extra storage.
14. Nearest Common Ancestor:
Given a rooted tree of size n. You receive a series of online queries: "Give nearest common ancestor of u, v ". Your objective is to preprocess the tree in O(n) time to get a data structure of size O(n) so that you can answer any such query in O(log n) time.

6CS10A Embedded System Design Lab.

Class: VI Sem. B.Tech.	**Evaluation**
Branch: Comp. Engg. Schedule per Week Practical Hrs :2	**Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (60) & End-term (40)]**

Course Objectives

Upon successful completion of the course, students will be able to design simple embedded systems and develop related software. Students also learn to work in a team environment and communicate the results as written reports and oral presentations.

Suggested Microcontroller Platform: Texas Instruments MSP430, ARM 9, 68HC12, 8051.

It is assumed that there are 14 weeks in the semester and about 5 to 6 experiments will be carried out. More experiments are provided to bring in variation.

Experiment #0

Get familiar with the microcontroller kit and the development software. Try the sample programs that are supplied to get familiar with the Microcontroller.

Experiment #1

a) Blink an LED which is connected to your microcontroller using the built-in timer in the microcontroller. Assume that the LED should be on for x milliseconds and off for y milliseconds; assume that these values are stored in memory locations X and Y. We should be able to change the value of x and y and rerun the program.

b) Consider an alternate way to program this application. Here, the microcontroller turns the LED on and waits in a busy loop to implement a delay of x milliseconds. Then it turns the LED off and waits in a busy loop to implement a delay of y milliseconds. How do you compare these two solutions?

Experiment #2

Assume that in Experiment #1, the values of x and y have been chosen to be 200 and 500 respectively. When the LED blinking program runs, pressing a key on the keyboard should generate an interrupt to the microcontroller. If the key that has been pressed is a numeric key, the value of x and y must be interchanged by the interrupt service routine. If the key that has been pressed is not a numeric key, then the LED must be turned off for 2 seconds before resuming the blinking.

Experiment #3

If your microcontroller kit has an LCD interface, write a program to display a character string on the LCD. Assume that the string is stored at a location

STRING and consists of alphanumeric characters. The string is null-terminated. Modify your program to scroll the displayed string from left to right.

Experiment #4

Modern microcontrollers usually have an in-built Digital-to-Analog and Analog-to-Digital converter. Use the built-in DAC to generate voltage waveforms such as (a) pulse train (b) triangular waveform (c) sinusoidal waveform. Observe these waveforms on an oscilloscope.

Experiment #5

Your microcontroller may have a built-in temperature sensor. If not, interface an external temperature sensor to the microcontroller. Write a program to take several measurements of temperature at regular intervals and display the average temperature on the LCD display. Test if the readings change when the ambient temperature changes.

Experiment #6

Your microcontroller may have a built-in ADC. Build a voltmeter that can measure stable voltages in a certain range. The measured value must be displayed on the LCD display. Measure the same voltage using a multimeter and record the error in measurement. Tabulate the error for several values of the voltage.

Experiment #7

Build a simple security device based on the microcontroller kit. Interface an external motion sensor to the microcontroller. An alarm must be generated if motion is sensed in a specified region. There must be a provision to record the time at which the intrusion was detected. Similarly, there must be a provision to turn the alarm off by pressing a key.

Experiment #8

A voltage waveform v(t) is available as an input to the microcontroller. We must continuously check the waveform and record the maximum value of the waveform and display the maximum value on the LCD display. Test the program by using a DC supply to generate v(t) and varying the DC value.

6CS11A Humanities and Social Sciences (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs :2	Examination Time = Three (3) Hours Maximum Marks = 50 [Sessional/Mid-term (30) & End-term (20)]

Units	Contents of the subject
I	India-brief history of Indian constitution ,framing-features fundamental rights,duties,directive principles of states,History of Indian National movement,Socio economic growth after independence.
II	Society-Social groups-concepts and types,socialization-concept theory,social control:concept,social problem in contempory India,status and role.
III	The fundamental of Economics-meaning,definition animportance of economics,Logic of choice,central economic problems,positive and normative approaches,economic systems-socialism and capitalism.
IV	Microeconomics-Law of demand and supply,utility approach,indifferencecurves,elasticity of demand & supply and applications,consumer surplus,Law of returns to factors and returns to scale.
V	Macroeconomics- concept relating to National product-National income and its measurement,simple Keynesian theory,simple multiplier, money and banking.Meaning,concept of international trade,determination of exchange rate,Balance of payments.

References:

1. Economics-Lipsey & Chrystal, Oxford Univ.Press,2010
Nordhaus, William, Samuelson,Paul-2009-10

7CS1A Cloud Computing

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Introduction Cloud Computing: Nutshell of cloud computing, Enabling Technology, Historical development, Vision, feature Characteristics and components of Cloud Computing. Challenges, Risks and Approaches of Migration into Cloud. Ethical Issue in Cloud Computing, Evaluating the Cloud's Business Impact and economics, Future of the cloud. Networking Support for Cloud Computing. Ubiquitous Cloud and the Internet of Things
II	Cloud Computing Architecture: Cloud Reference Model, Layer and Types of Clouds, Services models, Data center Design and interconnection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Fractures of cloud programming, Parallel and distributed programming paradigms-MapReduce, Hadoop , High level Language for Cloud. Programming of Google App engine,
III	Virtualization Technology: Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms , Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server , Desktop, Network, and Virtualization of data-center
IV	Securing the Cloud : Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture . Legal issues in cloud Computing. Data Security in Cloud: Business Continuity and Disaster Recovery , Risk Mitigation , Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management
V	*Cloud Platforms in Industry:* Amazon web services , Google AppEngine, Microsoft Azure Design, Aneka: Cloud Application Platform -Integration of Private and Public Clouds *Cloud applications:* Protein structure prediction, Data Analysis, Satellite Image Processing, CRM and ERP ,Social networking . Cloud Application- Scientific Application, Business Application. *Advance Topic in Cloud Computing:* Federated Cloud/InterCloud, Third Party Cloud Services

Recommended Text:

1. " Distributed and Cloud Computing " By Kai Hawang , Geofrey C.Fox, Jack J. Dongarra Pub: Elservier
2. Cloud Computing ,Principal and Paradigms, Edited By Rajkumar Buyya, Jemes Broberg, A. Goscinski, Pub.- Wiley
3. Kumar Saurabh, "Cloud Computing" , Wiley Pub
4. Krutz , Vines, "Cloud Security " , Wiley Pub
5. Velte, "Cloud Computing- A Practical Approach" ,TMH Pub

7CS2A Information System Security (Common to CS & IT)

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Introduction to security attacks, services and mechanism, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), differential and linear cryptanalysis of DES, block cipher modes of operations, triple DES.
II	AES, RC6, random number generation. S-box theory: Boolean Function, S-box design criteria, Bent functions, Propagation and nonlinearity, construction of balanced functions, S-box design.
III	Public Key Cryptosystems: Principles of Public Key Cryptosystems, RSA Algorithm, security analysis of RSA, Exponentiation in Modular Arithmetic. Key Management in Public Key Cryptosystems: Distribution of Public Keys, Distribution of Secret keys using Public Key Cryptosystems. X.509 Discrete Logarithms, Diffie-Hellman Key Exchange.
IV	Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MAC, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm. Remote user Authentication using symmetric and Asymmetric Authentication
V	Pretty Good Privacy. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload in Transport and Tunnel mode with multiple security associations (Key Management not Included). Strong Password Protocols: Lamport's Hash, Encrypted Key Exchange.

Text/References:

1. Stalling Williams: Cryptography and Network Security: Principles and Practices, 4th Edition, Pearson Education, 2006.
2. Kaufman Charlie et.al; Network Security: Private Communication in a Public World, 2nd Ed., PHI/Pearson.
3. Pieprzyk Josef and et.al; Fundamentals of Computer Security, Springer-Verlag, 2008.
4. Trappe & Washington, Introduction to Cryptography, 2nd Ed. Pearson.

7CS3A Data Mining & Ware Housing (Common to CS & IT)

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.
II	Concept Description: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi- Dimensional Association rules from Relational Databases.
III	What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis
IV	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.
V	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

Text Books & References:

1. Data Warehousing in the Real World – Anahory and Murray, Pearson Education.
2. Data Mining – Concepts and Techniques – Jiawai Han and Micheline Kamber.
3. Building the Data Warehouse – WH Inmon, Wiley.

7CS4A COMPUTER AIDED DESIGN FOR VLSI

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Complexity in microelectronic circuit design and Moore's Law, design styles -Full-custom design, standard-cell design, Programmable Logic Devices, Field Programmable Gate Arrays, Design Stages, Computer-Aided Synthesis and Optimizations, design flow and related problems.
II	Boolean functions and its representations – co-factor, unite, derivatives, consensus and smoothing; tabular representations and Binary Decision Diagram (BDD), OBDD, ROBDD and Bryant's reduction algorithm and ITE algorithm. Hardware abstract models – structures and logic networks, State diagram, data-flow and sequencing graphs, hierarchical sequencing graphs. Compilation and behavioral optimizations.
III	Architectural Synthesis – Circuit description and problem definition, temporal and spatial domain scheduling, synchronization problem. Scheduling algorithms - ASAP and ALAP scheduling algorithms, scheduling under constraints, relative scheduling, list scheduling heuristic. Scheduling in pipelined circuits.
IV	Resource Sharing & Binding in sequencing graphs for resource dominated circuits, sharing of registers and busses; binding variables to registers. Two-level logic optimization principles – definitions and exact logic minimizations. Positional cube notations, functions with multi-valued logic. List-oriented manipulations.
V	Physical Design. Floor planning – goals and objectives. Channel definition, I/O and power planning. Clock Planning. Placement – goals and objectives. Placement algorithms. Iterative improvement algorithms. Simulated Annealing. Timing-driven Placement. Global routing – goals and objectives. Global routing methods. Timing-driven global routing. Detailed Routing – goals and objectives. Left-edge algorithm. Constraints and routing graphs. Channel routing algorithms. Via minimization. Clock routing, power routing, circuit extraction and Design Rule Checking.

Text Books:

1. S.H. Gerez. Algorithms VLSI Design Automation. Wiley India. (Indian edition available.)
2. Michael John Sebastian Smith. Application-Specific Integrated Circuits. Addison-Wesley. (Low-priced edition is available.)
3. G.D. Micheli, Synthesis and optimization of digital circuits, TMH.

References:

1. http://www.fie-conference.org/fie98/papers/1002.pdf
2. S. Sait and H. Youssef. VLSI Physical Design Automation: Theory and Practice.

7CS5A COMPILER CONSTRUCTION

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Compiler, Translator, Interpreter definition, Phase of compiler introduction to one pass & Multipass compilers, Bootstrapping, Review of Finite automata lexical analyzer, Input, buffering, Recognition of tokens, Idea about LEX: A lexical analyzer generator, Error handling.
II	Review of CFG Ambiguity of grammars, Introduction to parsing. Bottom up parsing Top down parsing techniques, Shift reduce parsing, Operator precedence parsing, Recursive descent parsing predictive parsers. LL grammars & passers error handling of LL parser. LR parsers, Construction of SLR, Conical LR & LALR parsing tables, parsing with ambiguous grammar. Introduction of automatic parser generator: YACC error handling in LR parsers.
III	Syntax directed definitions; Construction of syntax trees, L-attributed definitions, Top down translation. Specification of a type checker, Intermediate code forms using postfix notation and three address code, Representing TAC using triples and quadruples, Translation of assignment statement. Boolean e xpression and control structures.
IV	Storage organization, Storage allocation, Strategies, Activation records, Accessing local and non local names in a block structured language, Parameters passing, Symbol table organization, Data structures used in symbol tables.
V	Definition of basic block control flow graphs, DAG representation of basic block, Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code generation from DAG.

Text/References:

1. Aho, Ullman and Sethi: Compilers, Addison Wesley.

2. Holub, Compiler Design in C, PHI.

7CS6.1A ADVANCE DATABASE MANGEMENT SYSTEMS

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Query Processing and Optimization: Overview of Relational Query Optimization, System Catalog in a Relational DBMS, Alternative Plans, Translating SQL, Queries into Algebra, Estimating the Cost of a Plan, Relational Algebra Equivalences, Enumeration of Alternative Plans. [2]
II	Object Database Systems: Motivating Examples, Structured Data Types, Operations On Structured Data, Encapsulation and ADT's, Inheritance, Objects, OIDs and Reference Types, Database Design for an ORDBMS, ORDBMS Implementation Challenges, ORDBMS, Comparing RDBMS, OODBMS, and ORDBMS.
III	Parallel and Distributed Databases: Architectures for Parallel, Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Parallel Query Optimization, Distributed DBMS Architectures, Storing Data in a Distributed DBMS, Distributed Catalog Management, Distributed Query Processing, Updating Distributed Data, Introduction to Distributed Transactions, Distributed Concurrency Control, Distributed Recovery. [2]
IV	Database Security and Authorization: Introduction to Database Security, Access Control, Discretionary Access Control- Grant and Revoke on Views and Integrity Constraints, Mandatory Access Control- Multilevel Relations and Polyinstantiation, Covert Channels, DoD Security Levels, Additional Issues Related to Security- Role of the Database Administrator, Security in Statistical Databases, Encryption. [2]
V	POSTGES: POSTGRES user interfaces, sql variations and extensions, Transaction Management, Storage and Indexing, Query processing and optimizations, System Architectures. XML: Motivation, Structure of XML data, XML Document Schema, Querying and Transformation, Application Program Interface to XML, Storage of XML Data, XML applications. [2]

Text/References

1. Elmasri R and Navathe SB, Fundamentals of Database Systems, 3rd Edition, Addison Wesley,2000.
2. Connolly T, Begg C and Strachan A, Database Systems, 2nd Edition, Addison Wesley, 1999
3. Ceri Pelagatti , Distributed Database: Principles and System - (McGraw Hill)
4. Simon AR, Strategic Database Technology: Management for the Year 2000, Morgan Kaufmann, 1995
5. A. Silversatz, H. Korth and S. Sudarsan: Database Cocepts 5th edition, Mc-Graw Hills 2005.

7CS6.2A Robotics

Class: Vll Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Unit	Contents
I	Introduction -- brief history, types, classification and usage, Science and Technology of robots, Some useful websites, textbooks and research journals.
II	Elements of robots -- joints, links, actuators, and sensors Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors
III	Introduction, Direct and inverse kinematics problems, Examples of kinematics of common serial manipulators, workspace of a serial robot, Inverse kinematics of constrained and redundant robots, Tractrix based approach for fixed and free robots and multi-body systems, simulations and experiments, Solution procedures using theory of elimination, Inverse kinematics solution for the general 6R serial manipulator.
IV	Degrees-of-freedom of parallel mechanisms and manipulators, Active and passive joints, Constraint and loop-closure equations, Direct kinematics problem, Mobility of parallel manipulators, Closed-from and numerical solution, Inverse kinematics of parallel manipulators and mechanisms, Direct kinematics of Gough-Stewart platform.
V	Linear and angular velocity of links, Velocity propagation, Manipulator Jacobians for serial and parallel manipulators, Velocity ellipse and ellipsoids, Singularity analysis for serial and parallel manipulators, Loss and gain of degree of freedom, Statics of serial and parallel manipulators, Statics and force transformation matrix of a Gough-Stewart platform, Singularity analysis and statics.

Text Books :

1. Mittal and Nagrath, Robotics and Control, Tata McGraw-Hill Education, 2003.

2. Fred G. Martin, Robotic Explorations: A Hands On Introduction to Engineering, Pearson Education, 2001.

7CS6.3A Data Compression Techniques

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Compression Techniques: Lossless, lossy, measure of performance, modeling & coding. Lossless compression: Derivation of average information, data models, uniquely decodable codes with tests, prefix codes, Kraft-Mc Millan inequality. Huffman coding: Algorithms, minimum variance Huffman codes, optimality, length extended codes, adaptive coding, Rice codes, using Huffman codes for lossless image compression.
II	Arithmetic coding with application to lossless compression. Dictionary Techniques: LZ77, LZ78, LZW Predictive coding: Burrows-Wheeler Transform and move-to-front coding, JPEG-LS Facsimile Encoding: Run length, T.4 and T.6
III	Lossy coding- Mathematical preliminaries: Distortion criteria, conditional entropy, average mutual information, differential entropy, rate distortion theory, probability and linear system models. Scalar quantization: The quantization problem, uniform quantizer, Forward adaptive quantization, non-uniform quantization-Formal adopting quantization, companded Quantization Vector quantization: Introduction, advantages, The Linde-Ruzo-Grey algorithm, lattice vector quantization.
IV	Differential encoding – Introduction, Basic algorithm, Adaptive DPCM, Delta modulation, speech and image coding using delta modulation. Sampling in frequency and time domain, z-transform, DCT, DST, DWHT, quantization and coding of transform coefficient.
V	Sub band coding: Introduction, Filters, Basic algorithm, Design of Filter banks, G.722, MPEG. Wavelet based compression: Introduction, wavelets multi-resolution analysis and the scaling function implementation using filters.

Text Books & References:

1. Sayood K: Introduction to Data Compression: ELSEVIER 2005.

7CS7A Web Development Lab

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Practical Hrs: 2**	**Examination Time = Three (3) Hours** **Maximum Marks = 50** **[Mid-term (60) & End-term (40)]**

S. No.	List of Experiment
1	. Creation of HTML Files
2	Working with Client Side Scripting : VBScript, JavaScript
3	Configuration of web servers: Apache Web Server, Internet Information Server (IIS)
4	Working with ActiveX Controls in web documents
5	Experiments in Java Server Pages: Implementing MVC Architecture using Servlets, Data Access Programming (using ADO), Session and Application objects, File System Management
6	Working with other Server Side Scripting: Active Server Pages, Java Servlets, PHP
7	Experiments in Ajax Programming
8	Developing Web Services
9	Developing any E-commerce application (Mini Project)
10	Application Development in cloud computing Environment
11	Experiment Using Open Source Tool e.g. ANEKA

7CS8A VLSI PHYSICAL DESIGN LAB

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 75** **[Sessional/Mid-term (45) & End-term (30)]**

VLSI Physical Design Automation is essentially the research, development and productization of algorithms and data structures related to the physical design process. The objective is to investigate optimal arrangements of devices on a plane (or in three dimensions) and efficient interconnection schemes between these devices to obtain the desired functionality and performance. Since space on a wafer is very expensive real estate, algorithms must use the space very efficiently to lower costs and improve yield. In addition, the arrangement of devices plays a key role in determining the performance of a chip. Algorithms for physical design must also ensure that the layout generated abides by all the rules required by the fabrication process. Fabrication rules establish the tolerance limits of the fabrication process. Finally, algorithms must be efficient and should be able to handle very large designs. Efficient algorithms not only lead to fast turn-around time, but also permit designers to make iterative improvements to the layouts. The VLSI physical design process manipulates very simple geometric objects, such as polygons and lines. As a result, physical design algorithms tend to be very intuitive in nature, and have significant overlap with graph algorithms and combinatorial optimization algorithms. In view of this observation, many consider physical design automation the study of graph theoretic and combinatorial algorithms for manipulation of geometric objects in two and three dimensions. However, a pure geometric point of view ignores the electrical (both digital and analog) aspect of the physical design problem. In a VLSI circuit, polygons and lines have inter-related electrical properties, which exhibit a very complex behavior and depend on a host of variables. Therefore, it is necessary to keep the electrical aspects of the geometric objects in perspective while developing algorithms for VLSI physical design automation. With the introduction of Very Deep Sub-Micron (VDSM), which provides very small features and allows dramatic increases in the clock frequency, the effect of electrical parameters on physical design will play a more dominant role in the design and development of new algorithms.

(Source: Algorithms For VLSI Physical Design Automation, by Naveed A. Sherwani).

The exercise should be such that the above objectives are met.

Automation tools such as Synopsis/ Cadence are available in the area. However, to begin, the students shall be assigned exercises on route optimization, placement & floor planning. Small circuits may be taken & algorithms implemented. At a later stage, the students may use tools and design more complex circuits.

7CS9A COMPILER DESIGN LAB

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 75** **[Sessional/Mid-term (60) & End-term (40)]**

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Develop an in depth understanding of system programming concept. Lexical analysis, syntax analysis, semantics analysis, code optimization, code generation. Language specification and processing

2. Develop an Understanding of Scanning by using concept of Finite state automaton. Parse tree and syntax tree, Top down parsing (recursive decent parsing, LL (1) parser) Bottom up parsing (operator precedence parsing) .Managing symbol table, opcode table, literal table, pool table

3. Develop an Understanding of Intermediate code form: Three address code, Polish notation (Postfix strings)

4. Develop an Understanding of Allocation data structure. Heaps

5. Develop an Understanding about Language processor development tools: LEX, YACC. Language processing activities (Program generation and execution)

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Indicative List of exercises:

1. Write grammar for a fictitious language and create a lexical analyzer for the same.
2. Develop a lexical analyzer to recognize a few patterns in PASCAL and C (ex: identifiers, constants, comments, operators etc.)
3. Write a program to parse using Brute force technique of Top down parsing
4. Develop on LL (1) parser (Construct parse table also).
5. Develop an operator precedence parser (Construct parse table also)
6. Develop a recursive descent parser
7. Write a program for generating for various intermediate code forms

   i) Three address code ii) Polish notation
8. Write a program to simulate Heap storage allocation strategy
9. Generate Lexical analyzer using LEX
10. Generate YACC specification for a few syntactic categories
11. Given any intermediate code form implement code optimization techniques

Reference

V.V Das, Compiler Design using FLEX and YACC, PHI

8CS1A MOBILE COMPUTING (Common to CS & IT)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Mobile computing: Definitions, adaptability issues (transparency, Environmental Constraints, application aware adaptation), mechanisms for adaptation and incorporating adaptations. Mobility management: mobility management, location management principle and techniques, PCS location management Scheme.
II	Data dissemination and management: challenges, Data dissemination, bandwidth allocation for publishing, broadcast disk scheduling, mobile cache maintenance schemes, Mobile Web Caching. Introduction to mobile middleware.
III	Middleware for application development: adaptation, Mobile agents. Service Discovery Middleware: Service Discovery & standardization Methods (universally Unique Identifiers, Textual Description & using interfaces), unicast Discovery, Multicast Discovery & advertisement, service catalogs, Garbage Collection, Eventing.
IV	Mobile IP, Mobile TCP, Database systems in mobile environments, World Wide Web and mobility
V	Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Text/References:

1. Frank Adelstein, Sandeep Gupta, Golden Richard III, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, TMH.
2. Principles of mobile computing Hansmann & Merk., Springer
3. Mobile communications Jochen Schiller , Pearson
4. 802.11 wireless networks Matthew S.Gast, O'REILLY.
5. Wireless LANs: Davis & McGuffin, McGraw Hill
6. Mobile Communications Handbook by Jerry D. Gybson
7. Mobile Communications Handbook by R

8CS2A Digital Image Processing (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	**Introduction to Image Processing:** Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation
II	**Image Transformation & Filtering:** Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms
III	**Image Restoration:** Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering
IV	**Image Compression:** Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression
V	**Image Segmentation & Representation:** Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors, Regional

References:

1. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.

Boyle and Thomas: Computer Vision - A First Gurse 2nd Edition, ISBN 0-632-028-67X, Blackwell

Science 1995.

2. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.

3. Pakhera Malay K: Digital Image Processing and Pattern Recogination, PHI.

4. Trucco&Verri: Introductory Techniques for 3-D Computer Vision, Prentice Hall, Latest Edition

5. Low: Introductory Computer Vision and Image Processing, McGraw-Hill 1991, ISBN 0-07-707403-3.

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8CS3A DISTRIBUTED SYSTEMS

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Distributed Systems: Features of distributed systems, nodes of a distributed system, Distributed computation paradigms, Model of distributed systems, Types of Operating systems: Centralized Operating System, Network Operating Systems, Distributed Operating Systems and Cooperative Autonomous Systems, design issues in distributed operating systems. Systems Concepts and Architectures: Goals, Transparency, Services, Architecture Models, Distributed Computing Environment (DCE).[1.2] Theoretical issues in distributed systems: Notions of time and state, states and events in a distributed system, time, clocks and event precedence, recording the state of distributed systems.[2]
II	Concurrent Processes and Programming: Processes and Threads, Graph Models for Process Representation, Client/Server Model, Time Services, Language Mechanisms for Synchronization, Object Model Resource Servers, Characteristics of Concurrent Programming Languages (Language not included).[1] Inter-process Communication and Coordination: Message Passing, Request/Reply and Transaction Communication, Name and Directory services, RPC and RMI case studies.[1]
III	Distributed Process Scheduling: A System Performance Model, Static Process Scheduling with Communication, Dynamic Load Sharing and Balancing, Distributed Process Implementation.[1] Distributed File Systems: Transparencies and Characteristics of DFS, DFS Design and implementation, Transaction Service and Concurrency Control, Data and File Replication.[1,2] Case studies: Sun network file systems, General Parallel file System and Window's file systems. Andrew and Coda File Systems [2,3]
IV	Distributed Shared Memory: Non-Uniform Memory Access Architectures, Memory Consistency Models, Multiprocessor Cache Systems, Distributed Shared Memory, Implementation of DSM systems.[1] Models of Distributed Computation: Preliminaries, Causality, Distributed Snapshots, Modeling a Distributed Computation, Failures in a Distributed System, Distributed Mutual Exclusion, Election, Distributed Deadlock handling, Distributed termination detection. [1]
V	Distributed Agreement: Concept of Faults, failure and recovery, Byzantine Faults, Adversaries, Byzantine Agreement, Impossibility of Consensus and Randomized Distributed Agreement.[1] Replicated Data Management: concepts and issues, Database Techniques, Atomic Multicast, and Update Propagation.[1] CORBA case study: Introduction, Architecture, CORBA RMI, CORBA Services.[3]

Text Books:

1. Distributed operating systems and algorithm analysis by Randy Chow and T. Johnson, Pearson
2. Operating Systems A concept based approach by DM Dhamdhere, TMH
3. Distributed Systems- concepts and Design, Coulouris G., Dollimore J, and Kindberg T., Pearson

8CS4.1A Hardware Testing and Fault Tolerance

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Overview of hardware testing. Reliability and Testing, Difference between Verification and Testing, Concepts of fault models, test pattern generation and fault coverage. Types of tests – exhaustive testing, pseudo-exhaustive testing, pseudo-random testing, and deterministic testing. Test Application. Design for Test. Testing Economics. Defects, Failures and Faults. How are physical defects modeled as faults. Stuck-at faults, Single stuck-at-faults multiple stuck-at faults, bridging faults, delay faults, transient faults.
II	Relation between VLSI Design and Testing. a) Design Representation for the purpose of testing – Representation in the form of mathematical equations, tabular format, graphs, Binary Decision Diagrams, Netlists, or HDL descriptions. b) Recap of VLSI Design Flow and where testing fits in the flow. Importance of Simulation and Fault Simulation. Compiled and event-driven simulation. Parallel and deductive fault simulation. Using fault simulation to estimate fault coverage and building a fault dictionary
III	Combinational Test Pattern Generation. D-algorithm. Critical Path Tracking. PODEM algorithm for test generation. Testing sequential circuits. Functional and deterministic ATPG for sequential circuits and the associated challenges. Motivation for Design for Testability. Test Points, Partitioning for Testability. Scan Testing. Scan Architectures. Cost of Scan Testing. Boundary Scan Testing. Board-level testing. Boundary-scan Architecture and various modes of operation.
IV	a) Built-in Self Test. Pseudo-random test generation. Response Compaction. Random pattern-resistant faults. BIST architectures – Circular BIST, BILBO, STUMPS. b) Testing of Memories – Fault models, Functional tests for memories, Memory BIST. c) Testing of microprocessors.
V	Hardware fault tolerance. Failure Rate, Reliability, Mean Time to Failure. Different kinds of redundancy schemes for fault-tolerance (Space, Time, and Information Redundancy). N-modular Redundancy. Watch Dog Processors, Byzantine Failures. Information Redundancy – parity codes, checksums, m-of-n codes. RAID architectures for disk storage systems. Fault tolerance in interconnection networks. Fault-tolerant routing techniques.

Text Book:

1. Samiha Mourad and Yervant Zorian. Principles of Electronic Systems. Wiley Student Editon. [Available in Indian Edition].
2. Koren and C. Mani Krishna. Fault-Tolerant Systems. Elsevier. (Indian Edition Available.)

Text/References:

1. Abramovici, M., Breuer, M. A. and Friedman, A. D. Digital systems testing and testable design. IEEE press (Indian edition available through Jayco Publishing house), 2001.2. Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits by Bushnell and Agrawal, Springer, 2000.

8CS4.2A REAL TIME SYSTEMS

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction: Definition, Typical Real Time Applications, concept of tasks, types of tasks and real time systems, block diagram of RTS, and tasks parameters -Release Times, execution time, period, Deadlines, and Timing Constraints etc. RTS requirements.
II	Reference Models for Real Time Systems: processors and Resources, Temporal Parameters of Real-Time Workload, Periodic and Aperiodic Task Model, Precedence Constrains and Data Dependency, Other Types of Dependencies, Functional Parameters, Resource Parameters. Real Time Scheduling: classification of Real Time Scheduling, scheduling criteria, performance metrics, schedulability analysis, Introduction to Clock Driven scheduling, Weighted Round Robin Approach and Priority Driven Approach. Dynamic Versus Static systems, Offline Versus Online Scheduling.
III	Periodic tasks scheduling: Clock Driven Scheduling – definition, notations and assumption, scheduler concepts, general scheduling structure, cyclic executives. Priority Driven Scheduling; notations and assumption, fixed priority verses dynamic priority, fixed priority scheduling algorithms (RM and DM) and their schedulability analysis, concept of schedulability tests – Inexact and exact schedulability tests for RM and DM, Optimality of the RM and DM algorithms, practical factors.
IV	Aperiodic task scheduling; assumption and approaches, server based and non-server based fixed priority scheduling algorithms – polling server, deferrable server , simple sporadic server, priority exchange, extended priority exchange, slack stealing. Introduction to scheduling of flexible computations –flexible applications, imprecise computation model and firm deadline model.
V	Resources Access Control: Assumptions on Resources and their usage, Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, priority inversion problem, need of new resource synchronization primitives/protocols for RTS, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority- Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

Text & References:

1. J.W.S.Liu: Real-Time Systems, Pearson Education Asia
2. P.D.Laurence, K.Mauch: Real-time Microcomputer System Design, An Introduction, McGraw Hill
3. C.M. Krisna & K. G. Shim- Real time systems- TMH

8CS4.3A AInformation Retrieval (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Knowledge Representation: Knowledge representation, Basics of Prepositional logic, Predicate logic, reasoning using first order logic, unification, forward chaining, backward chaining, resolution Production rules, frames, semantic networks scripts.
II	Ontology Development: Description logic-taxonomies, Topic maps Ontology, Definition expressing ontology, logically ontology representations, – XML, RDF, RDFS, OWL, OIL, ontology development for specific domain, ontology engineering, Semantic web services.
III	Information Retrieval Modeling: Information retrieval, taxonomy, formal characterization, classic information retrieval, set theoretic model, algebraic model, probabilistic model, structured text, retrieval models, models for browsing, retrieval performance evaluation, keyword based querying, pattern matching, structural queries, query operations.
IV	Text and Multimedia Languages and Properties: Introduction, metadata, markup languages, multimedia. Text operations: document preprocessing, document clustering text Compressionbasic concepts - statistical methods. Indexing and searching: inverted files, suffix trees, signature file, Boolean queries, sequential searching, pattern matching.
V	Recent Trends in IR: Parallel and distributed IR, multimedia IR, data modeling, query languages, A generic Multimedia indexing Approach, one dimensional time series, two dimensional color images, Automatic feature extraction. Web Searching, Characterizing the Web, Search Engines, Browsing, Meta searchers, Searching using hyperlinks

TEXT BOOKS :

1. Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education, Second edition, 2003. (UNIT I)

2. Michael C. Daconta, Leo J. Obart and Kevin J. Smith,”Semantic Web – A Guide to the Future of XML, Web Services and Knowledge Management”, Wiley Publishers, 2003 (UNIT II)

3. Ricardo Baeza-Yates, BerthierRibeiro-Neto, “Modern Information Retrieval”, Addison Wesley, 1999. (UNITs III, IV & V)

REFERENCES

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, Third edition, 2003

2. Christopher D. Manning, PrabhakarRaghavan and HinrichSchutze, “Introduction to Information Retrieval”, Cambridge University Press, 2008.

8CS5A UNIX NETWORK PROGRAMMING & SIMULATION LAB

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs.: 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

Objectives:

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

- Understand various distributions of Unix viz. BSD, POSIX etc.
- Write client/server applications involving unix sockets involving TCP or UDP involving iterative or concurrent server.
- Understand IPV4 & IPV6 interoperability issues
- Use fork( ) system call.
- Understand the network simulator NS2 and Simulate routing algorithm on NS2 (Available on http://www.isi.edu/nsnam/ns/).

Suggested Platform: For Socket Programming- Linux, For NS2 Any of Microsoft Windows or Linux (In case of Microsoft, Virtual environment cygwin will also be required).

Suggested Exercises

S.No.	**List of Experiments**
1.	Write two programs in C: hello_client and hello_server • The server listens for, and accepts, a single TCP connection; it reads all the data it can from that connection, and prints it to the screen; then it closes the connection • The client connects to the server, sends the string "Hello, world!", then closes the connection
2.	Write an Echo_Client and Echo_server using TCP to estimate the round trip time from client to the server. The server should be such that it can accept multiple connections at any given time.
3.	Repeat Exercises 1 & 2 for UDP.
4.	Repeat Exercise 2 with multiplexed I/O operations
5.	Simulate Bellman-Ford Routing algorithm in NS2

References:

- **Stevens, Unix Network Programming, Vol-I**

8CS6A FPGA LAB.

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1.	Fundamental Theory Introduction to DSP architectures and programming Sampling Theory, Analog-to-Digital Converter (ADC), Digital-to-Analog Converter (DAC), and Quantization; Decimation, Interpolation, Convolution, Simple Moving Average; Periodic Signals and harmonics; Fourier Transform (DFT/FFT), Spectral Analysis, and time/spectrum representations; FIR and IIR Filters;
2.	Design (Simulation) using MATLAB/ Simulink Simulate the lab exercises using MATLAB/Simulink
3.	Implementation using pure DSP, pure FPGA and Hybrid DSP/FPGA platforms Digital Communications: On-Off- Keying (OOK), BPSK modulation, and a simple transceiver design Adaptive Filtering: Echo/Noise Cancellation, Least Mean Square (LMS) algorithm (2 weeks) Wireless Communications: Channel coding/decoding, Equalization, Simple Detection Algorithm, OFDM Speech Processing: Prediction Algorithms, Speech Classification and Synthesis

8CS7A Digital Image Processing lab(Common to Comp. Engg. & Info. Tech)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Practical Hrs: 2**	**Examination Time = Three (3) Hours** **Maximum Marks = 50** **[Mid-term (60) & End-term (40)]**

S. No.	List of Experiment
1	Color image segmentation algorithm development
2	Wavelet/vector quantization compression
3	Deformable templates applied to skin tumor border finding
4	Helicopter image enhancement
5	High-speed film image enhancement
6	Computer vision for skin tumor image evaluation
7	New Border Images