

SYLLABI

BTech

IN

COMPUTER SCIENCE AND ENGINEERING



2016

Department of Computer Science & Engineering

JAYPEE UNIVERSITY OF ENGINEERING & TECHNOLOGY

A-B ROAD, RAGHOGARH, DT. GUNA-473226 MP, INDIA

TEACHING SCHEME
Bachelor of Technology (B.Tech.)
Branch – CSE

Year/Sem: Ist Year/Ist Sem

SN	New Sub Code	Subject	Core/ Elective	L	T	P	Credits
1	14B11HS111	Presentation and Communication Skills	Core	1	2	0	3
2	14B19HS199	English - Audit Course	Core	2	0	0	0
3	14B11MA111	Mathematics-I	Core	3	1	0	4
4	14B11PH111	Physics-I	Core	3	1	0	4
5	14B11EC111	Electrical Circuit Analysis	Core	3	1	0	4
6	14B11CI111	Introduction to Computers and Programming	Core	3	1	0	4
7	14B17PH171	Physics Lab-I	Core	0	0	2	1
8	14B17EC171	Electrical Circuits Lab	Core	0	0	2	1
9	14B17CI171	Computer Programming Lab	Core	0	0	4	2
		Total		15	6	8	23

Year/Sem: Ist Year/IIInd Sem

SN	New Sub Code	Subject	Core/ Elective	L	T	P	Credits
1	14B11HS211	Group and Cooperative Processes	Core	3	0	0	3
2	14B11GE211	Environment Studies	Core	3	0	0	3
3	14B11MA211	Mathematics-II	Core	3	1	0	4
4	14B11PH211	Physics-II	Core	3	1	0	4
5	14B11EC211	Electronic Devices and Circuits	Core	3	1	0	4
6	14B11CI211	Data Structures	Core	3	1	0	4
7	14B17PH271	Electronic Devices and Circuits Lab	Core	0	0	2	1
8	14B17CI271	Data Structures Lab	Core	0	0	2	1
		Total		18	4	4	24

Year/Sem: IIInd Year/IIIrd Sem

SN	New Sub Code	Subject	Core/ Elective	L	T	P	Credits
1	14B11HS311	Managerial Economics	Core	2	1	0	3
2	14B11MA311	Discrete Mathematics	Core	3	1	0	4
3	14B11EC317	Digital Electronics	Core	3	1	0	4
4	14B11CI311	Object Oriented Programming	Core	3	1	0	4
5	14B11CI312	Database Systems	Core	3	1	0	4
6	14B17EC377	Digital Electronics Lab	Core	0	0	2	1

7	14B17CI371	Object Oriented Programming Lab	Core	0	0	2	1
8	14B17CI372	Database Systems Lab	Core	0	0	2	1
9	14B17CI373	Multimedia Development Lab	Core	0	0	2	1
10	14B17CI374	Advanced Programming Lab-I	Core	1	0	2	2
		Total		15	5	10	25

Year/Sem: IIInd Year/IVth Sem

SN	Subject Code	Subject	Core/ Elective	L	T	P	Credits
1	14B11HS411	Financial Management	Core	2	1	0	3
2	14B11MA411	Probability Theory and Random Processes	Core	3	1	0	4
3	14B11CI611	Computer Networks	Core	3	1	0	4
4	14B11CI412	Fundamentals of Algorithms	Core	3	1	0	4
5	14B11EC415	Microprocessors and Controllers	Core	3	1	0	4
6	14B17EC475	Microprocessors and Controllers Lab	Core	0	0	2	1
7	14B17CI671	Computer Networks Lab	Core	0	0	2	1
8	14B17CI472	Algorithms Lab	Core	0	0	2	1
9	14B17CI473	Unix Programming Lab	Core	1	0	2	2
		Total		15	5	8	24

Year/Sem: IIIrd Year/Vth Sem

SN	Subject Code	Subject	Core/ Elective	L	T	P	Credits
1		HSS Elective:	Elective	3	0	0	3
	14B14HS541	Social & Legal Issues					
	14B14HS542	Human Psychology					
	14B14HS543	Professional Ethics					
	14B14HS544	Macro Economics					
2	14B11EC515	Communication Systems	Core	3	1	0	4
3	14B11CI511	Operating Systems	Core	3	1	0	4
4	14B11CI512	Software Engineering	Core	4	0	0	4
5	14B11CI513	Theory of Computation	Core	3	1	0	4
6	14B17EC575	Communication Systems Lab	Core	0	0	2	1
7	14B17CI571	Operating Systems Lab	Core	0	0	2	1
8	14B17CI572	Software Engineering Lab	Core	0	0	2	1
9	14B17CI573	Advanced Programming Lab-II	Core	1	0	2	2
10		DE-1	Elective	3	0	0	3
		Total		20	3	8	27

List of Electives for DE-1			Core/ Elective	L	T	P	Credits
	14B14CI542	Object Oriented Computing	Elective	3	0	0	3
	14B14CI543	Real Time Systems	Elective	3	0	0	3
	14B14CI544	Embedded Systems	Elective	3	0	0	3
	14B14CI545	Logic in Computer Science	Elective	3	0	0	3
	14B14CI546	E-Commerce	Elective	3	0	0	3
	14B14CI547	Advanced Concepts in DBMS	Elective	3	0	0	3
	14B14CI644	Computer Graphics	Elective	3	0	0	3
	14B14CI645	Computer Systems Security	Elective	3	0	0	3

Year/Sem: IIIrd Year/VIth Sem

SN	New Sub Code	Subject	Core/ Elective	L	T	P	Credits
1		HSS Elective:	Elective	3	0	0	3
	14B14HS641	Project Management					
	14B14HS642	Business Environment					
	14B14HS643	Fundamentals of Financial Market					
	14B14HS644	Marketing Management					
2	14B11CI612	Compiler Design	Core	3	1	0	4
3	14B11CI613	Computer Organisation and Architecture	Core	3	1	0	4
4	14B11CI614	Systems and Network Programming	Core	3	1	0	3
5	14B11EC311	Signals and Systems	Core	3	1	0	4
6	14B17CI672	Compiler Design Lab	Core	0	0	2	1
7	14B17CI673	Computer Organisation and Architecture Lab	Core	0	0	2	1
8	14B17CI674	Systems and Network Programming Lab	Core	0	0	2	1
9	14B17CI675	Web Technology Lab	Core	0	0	2	1
10	14B17EC371	Signals and Systems Lab	Core	0	0	2	1
11	14B19CI691	Industrial Training- Audit Course	Core				0
12		DE-2	Elective	3	0	0	3
		Total		18	3	10	26
List of Electives for DE-2			Core/ Elective	L	T	P	Credits
	14B14CI541	Introduction to Software Architecture	Elective	3	0	0	3
	14B14CI548	Software Testing	Elective	3	0	0	3
	14B14CI641	Design and Principles of Operating Systems	Elective	3	0	0	3
	14B14CI642	Software Quality Management	Elective	3	0	0	3
	14B14CI643	Concurrency Control and Security of Databases	Elective	3	0	0	3
	14B14CI646	Human Aspects for Information Technology	Elective	3	0	0	3
	14B14CI647	Graph Algorithms and Applications	Elective	3	0	0	3
	14B14PH611	Material Science	Elective	3	0	0	3

Year/Sem: IVth Year/VIIth Sem

BTech VII semester (B7)							
SN	New Sub Code	Subject	Core/ Elective	L	T	P	Credits
1		HSS Elective:	Elective	3	0	0	3
	14B14HS741	Entrepreneurial Development					
	14B14HS742	Managing & Marketing of Technology					
	14B14HS743	Entrepreneurship and Small Business					
	14B14HS744	Brand Management					
	14B14HS745	Human Resource Management					
	14B14HS746	Total Quality Management					
2	14B19CI791	Project Part I	Core				7
3	14B11CI711	Artificial Intelligence & Applications	Core	3	0	0	3
4	14B17CI771	Artificial Intelligence Lab	Core	0	0	2	1
5		DE-3	Elective	3	0	0	3
6		DE-4	Elective	3	0	0	3
7		DE-5	Elective	3	0	0	3
		Total		15	0	2	23
List of Electives for VII Sem			Core/ Elective	L	T	P	Credits
DE-3							
	14B14CI741	Cryptography and Network Security	Elective	3	0	0	3
	14B14CI742	Network Management	Elective	3	0	0	3
	14B14CI743	Fault Tolerant Computing Systems	Elective	3	0	0	3
	14B14CI744	Introduction to Cognitive Sciences	Elective	3	0	0	3
	14B14CI745	Ad-hoc and Wireless Networks	Elective	3	0	0	3
	14B14EC750	Information Theory and Applications	Elective	3	0	0	3
	14B14CI753	Modelling For Computer Networks	Elective	3	0	0	3
	14B14CI754	Component Based Software Engineering	Elective	3	0	0	3
	14B14CI755	Network Security	Elective	3	0	0	3
DE-4							
	14B14CI746	Image Processing	Elective	3	0	0	3
	14B14CI747	Software Engineering & Management	Elective	3	0	0	3
	14B14CI748	Remote Sensing and GIS	Elective	3	0	0	3
	14B14CI749	Information Retrieval & Data Mining	Elective	3	0	0	3
	14B14CI750	Computation Complexity	Elective	3	0	0	3
	14B14CI751	Introduction to Queueing Networks	Elective	3	0	0	3
	14B14CI752	Data and Information Fusion	Elective	3	0	0	3
	14B14EC748	Mobile Communication	Elective	3	0	0	3

DE-5							
	14B14MA741	Applied Linear Algebra	Elective	3	0	0	3
	14B14MA742	Methods of Applied Mathematics	Elective	3	0	0	3
	14B14MA743	Optimization Techniques	Elective	3	0	0	3
	14B14MA744	Graph theory	Elective	3	0	0	3
	14B14MA745	Game theory	Elective	3	0	0	3
	14B14MA746	Integral Transforms	Elective	3	0	0	3
	14B14PH741	Nano Science & Technology	Elective	3	0	0	3
	14B14PH742	Nonlinear Optics & Optical Communication	Elective	3	0	0	3
	14B14PH743	Characterization Techniques	Elective	3	0	0	3
	14B14PH744	Nonlinear Dynamic Applications	Elective	3	0	0	3
	14B14PH745	Simulation of Semiconductor Devices	Elective	3	0	0	3

Year/Sem: IVth Year/VIIIth Sem

BTech VIII semester (B8)							
SN	New Sub Code	Subject	Core/ Elective	L	T	P	Credits
1		HSS Elective :	Elective	3	0	0	3
	14B14HS841	Knowledge Management					
	14B14HS842	Industrial Psychology					
	14B14HS843	Supply Chain Management					
	14B14HS844	Management of Technology					
	14B14HS845	Strategic Management					
2	14B19CI891	Project Part II	Core				8
3		DE-6	Elective	3	0	0	3
4		DE-7	Elective	3	0	0	3
5		DE-8	Elective	3	0	0	3
6		DE-9	Elective	3	0	0	3
		Total		15	0	0	23
List of Electives for VIII Sem.			Core/ Elective	L	T	P	Credits
DE-6							
	14B14CI841	Introduction to Grid Computing	Elective	3	0	0	3
	14B14CI842	Parallel Computing	Elective	3	0	0	3
	14B14CI843	Data Mining Tools and Applications	Elective	3	0	0	3
	14B14CI844	Distributed Systems	Elective	3	0	0	3

DE-7							
	14B14CI845	Multimedia Security	Elective	3	0	0	3
	14B14CI846	Logic and Function Programming	Elective	3	0	0	3
	14B14CI847	Soft Computing	Elective	3	0	0	3
	14B14CI848	Mobile Computing	Elective	3	0	0	3
	14B14EC835	ATM Networks	Elective	3	0	0	3
DE-8							
	14B14CI849	Introduction to Machine Learning	Elective	3	0	0	3
	14B14CI850	Algorithms Analysis and Design	Elective	3	0	0	3
	14B14CI851	Introduction to Natural Language Processing	Elective	3	0	0	3
	14B14CI852	Introduction to Digital Forensics	Elective	3	0	0	3
	14B14CI853	Neural Network	Elective	3	0	0	3
DE-9							
	14B14CI854	Client Server Computing	Elective	3	0	0	3
	14B14CI855	Storage Area Networks	Elective	3	0	0	3
	14B14EC843	Data Compression	Elective	3	0	0	3
	14B14EC751	Digital T.V.	Elective	3	0	0	3
	14B14MA841	Numerical Techniques	Elective	3	0	0	3
	14B14MA842	Matrix Computation	Elective	3	0	0	3
	14B14MA843	Optimization Methods for Engineering	Elective	3	0	0	3
	14B14MA844	Mathematical Modeling and Computer Simulation	Elective	3	0	0	3
	14B14PH841	Quantum Computing	Elective	3	0	0	3

Total= 195

SYLLABI

Bachelor of Technology (B.Tech.)

Branch - CSE

Year/Sem: 1st Year/I Sem

14B11HSS111 Presentation and Communications Skills

Introduction to Communication, Oral Communication skills: Stress, Rhythm, Intonation, Coherence, Phonetics etc., Listening Skills, Reading Skills: Intensive and Extensive Reading, SQ3R, Vocabulary and morphology, Writing Skills: Letter Writing, Circulars, Notices, Agenda, Minutes, Report Writing, Power point presentation.

14B11PD199 English

Conversational Skills, Vocabulary and comprehension, Functional English Grammar: Noun, Pronoun, Verb, Tenses, Narration, Active and Passive voices, Clause etc., Compositions and Translations.

14B11MA111 Mathematics-I

Partial differentiation, Taylor's series, Maxima and Minima, Jacobians, Double integrals Equations to a line, plane, curve and surfaces, Line and surface integrals, Gradient, divergence and curl, Normal and tangent to a surface, Gauss and Stokes theorems, Differential Equations with constants coefficients, Laplace transforms, Algebra of matrices, Determinants, Gauss elimination method, Rank, Eigen values and vectors, Quadratic forms.

14B11PH111 Physics-I

Physical Optics: Analytical treatment of interference, Intensity distribution of fringe system, Fresnel's biprism, Newton's rings, Diffraction (limited to Fraunhofer class) from Single slit, double slit and Diffraction grating, Polarization, Phenomenological understanding of Birefringence, Principles of use of uniaxial crystals in practical polarizers, compensators and wave plates, Production and analysis of completely polarized light. Optical activity. Relativity: Michelson-Morley experiment, Lorentz transformations, Addition of velocities, Mass variation with velocity, Mass-energy relation.

Radiation: Black body radiation, Wein's law, Rayleigh Jean's law, Planck's law of radiation, Compton scattering.

Atomic Structure: Origin of spectral lines, spin and orbital angular momentum, Quantum numbers, Atoms in magnetic field, Zeeman Effect. Statistical Distributions: Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac distributions and their applications. Lasers: Principle and working of laser, Different types of lasers (He-Ne Laser, Ruby Laser, Semiconductor Laser), Holography.

14B17PH171 Physics Lab-I

Experiments List

1. To study the variation of magnetic field along the axis of Helmholtz Galvanometer and to determine its reduction factor. [set-up no. 1 & 11]
2. To determine the specific rotation of cane sugar solution using Biquartz polarimeter. [set-up no. 2 & 12]
3. To observe Newton's rings and to determine the wavelength of sodium light [Set-up no. 3 & 13]
4. To determine the wavelengths of spectral lines Red, Green and Violet of mercury using plane transmission grating. [set-up no. 4 & 14]
5. To study the presence of energy levels in an atom by Franck-Hertz Experiment. [set-up no. 5 & 15]
6. To determine the resistance per unit length of a Carey Foster's bridge and to obtain the specific resistance of a given wire. [set-up no. 6 & 16]
7. To determine the Planck's constant using solar cell. [set-up no. 7 & 17]
8. To determine the wavelength of sodium light with the help of Fresnel's biprism. [set-up no. 8 & 18]
9. To draw hysteresis loop of a ferromagnetic material & calculate its retentivity and coercivity. [set-up no. 9 & 19]
10. To study ultrasonic waves in aluminium and to obtain Young's modulus for it. [set-up no. 10 & 20]

14B11EC111 Electrical Circuit Analysis

Introduction to circuit elements R, L, C and their characteristics, Different types of sources (like AC and DC, current and voltage, dependent and independent), KCL and KVL, Node and Loop analysis, Star and Delta conversion, Thevenin's and Norton's theorem, Superposition, Reciprocity, Maximum Power Transfer, Graph Theory, Tree and links, planar networks, Ideal opamp as a circuit element, AC waveform analysis frequency, phase, amplitude, peak, RMS and average value of ac waveform.

Single phase ac circuit analysis containing R, L and C, and their combinations, Concepts of impedance, power, active, reactive and apparent power and power factor, Series and parallel resonance, bandwidth and quality factor, Concept of 3-phase ac circuits, star and delta connections, Frequency domain analysis – Laplace transform solution of Integral differential equations, Forced and natural responses, Transient analysis, Concept of two-port Network, Z, Y, transmission (ABCD) and Hybrid parameter, Introduction to electrical filters and transmission line.

14B17EC171 Electrical Circuit Lab

List of Experiments

Experiment No. 1: To familiarization with the Digital multimeter (DMM) and measurement of various signals and circuit elements.

Experiment No. 2: To familiarization with the CRO, Function generator and power supply.

Experiment No. 3: (a) To study & draw the volt-ampere characteristics of the resistor.

(b) To study the loading effect of a voltmeter.

Experiment No. 4: To verify Thevenin's Theorem.

Experiment No. 5: To verify Tellegen's Theorem.

Experiment No. 6: To verify Superposition Theorem.

Experiment No. 7: To verify Reciprocity Theorem.

Experiment No. 8: To verify Maximum Power Transfer Theorem.

Experiment No. 9: To determine the Z parameters of the given two port network.

Experiment No. 10: To determine the Y parameters of the given two port network.

Experiment No. 11: To sketch the transient response of RC Low pass filter.

Experiment No. 12: To sketch the transient response of RC High pass filter.

14B11CI111 Introduction to Computer Programming

Introduction to Programs, Processing programs, Types of Programming Languages, Programming Design tools (Pseudo code and Flowcharts), Program Design, Structured Programming, Problem solving and programming, Quality aspects of structured programs, Testing and Debugging Techniques, Self Learning of Pascal.

14B17CI171 Computer Programming Lab

Initial exercises on MS office, Familiarity with Microsoft word, Familiarity with Microsoft power point, Familiarity with Microsoft excels, Pattern generating problems, Loop Control and Case Control Structures, Arrays and Strings, Functions and Pointers, Structures and Union, Recursion, Dynamic Memory Allocation, linked-lists, File I/O, C Library.

Year/Sem: Ist Year/II Sem

14B11HSS211 Group and Cooperative Process

Group- Behavior, Development, Structure and Process, Team- Types and Contemporary issues, Individual-- Personality, Learning, Perception, Values, Attitudes and Job satisfaction, Assertiveness- Communication Styles, self expression, Social Boldness, Emotional intelligence, Transactional Analysis- Ego states, Life position, Transaction, Stroking, Motivation, Leadership, Conflict and Negotiation.

14B11GE211 Environmental Studies

The Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning, biogeochemical cycles. Natural resources, their consumption & Protection: Water, Land Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Role of an individual in conservation of natural resources, Equitable use of resources.

Pollution- a threat to environment: Air, Water & Land pollution, sources & causes, Space pollution, causes & effects, toxicity limits of pollutants. Critical issues concerning global Environment (Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc.) and the Roots in: Cultural, Social, Political, Commercial, industrial, territorial domains. Biodiversity loss: Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity. Environmental Impact assessment: Objectives of impact assessment, Study of impact parameters, Methods for impact identification, Economics.

Environmental standards & Quality: Air, Water & Soil Quality, Pollutant sampling, pollution control systems, Sustainable building, Urban planning, Disaster Management and Contingency Planning, Modern safety systems. Sustainability & Planned reversal of human destruction to environment: redevelopment of brown fields, energy plantations, social forestry, engineering aspects of Re-use & Recycling, biogas for marginal income groups, organic farming, eco-consumerism, dematerialization, green technologies, eco-tourism. Regulation of technology and innovation, Policy and law: Environmental Laws & Regulations (Different Acts – Environmental Protection Act, Air and Water Acts, Wildlife and Forest Acts), US-EPA, National Environmental Policy. Function of pollution control boards (SPCB and CPCB), their roles and responsibilities, Eco-mark Scheme, Laws relating to Urbana and Rural land use, Ethics.

Case studies: Industry–Environment interface, Field Work: Explore the surrounding flora & fauna (Study of common plants, insects, birds document environmental assets), documentation of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems-pond, river, hill slopes etc.

14B11MA211 Mathematics-II

Second order linear differential equations, Convergence of series, convergence tests, solution in series, Bessel's and Legendre functions, Chebyshev p-omials and orthogonality, Second order partial differential equations and classification, one dimensional, Wave and diffusion equations with their applications, Functions of complex variable, analytical functions and Cauchy-Riemann, Equations. Conformal mapping, Poles and singularities, complex integration, Taylor's and Laurent's series, Cauchy residue theorem, contour integration and their application.

14B11PH211 Physics-II

Electromagnetism: Review of vector calculus, Coulomb's law, Gauss law and its applications, boundary value problems, Biot-Savart law, Ampere's law, Faraday's law of induction, boundary conditions, Electrical and magnetic field in matter, Maxwell's equations in free space and dielectric media. Electromagnetic waves in matter, Derivations of expressions for energy density and energy flux (Poynting vector) in an electromagnetic field, Radiation pressure. Propagation of EM waves through boundary- Reflection, Refraction, Absorption and Total Internal Reflection. Band theory of solids, carrier scattering, effective mass, Electronic conduction in metals, Intrinsic and extrinsic (n- and p-type) semiconductors and their electrical conductivity. Direct and indirect bandgap semiconductors, optical and thermal properties, Hall Effect in semiconductors.

Review of Maxwell-Boltzmann, Fermi Dirac and Bose Einstein distribution functions. Equilibrium carrier concentrations, equilibrium thermal generation, intrinsic carrier concentration, Fermi level, dopants, extrinsic semiconductors, Statistics of donors and acceptors, Drift current; electrical mobility. Device Processing Technology: oxidation, diffusion, ion-implantation, deposition, lithography, etching and interconnect. Integrated-Circuit Technology: understanding at the level of Muller and Kamins of integrated-circuit fabrication processes.

14B11EC211 Electronic Devices and Circuits

Semiconductor Physics: Materials, Intrinsic semiconductors, Covalent bonds, Electron-hole concepts, Random movement of carriers, Hole as a particle, Recombination of electrons and holes, Conductivity of semiconductors. Extrinsic Semiconductors, Donor and acceptor impurities. Semiconductor Diodes: Unidirectional property, PN-junction with no bias, with forward bias and with reverse bias, Transition and diffusion capacitances. V-I characteristics, Comparison of Si and Ge diodes, Temperature effects, Diode resistance (static and dynamic), Diode equation, Ideal diode, Circuit model of a diode. Half-wave and full-wave (centre tap and bridge) rectifiers, PIV rating of diode, Performance of half-wave and full-wave rectifiers, Shunt capacitor filter. Zener diode, Analysis of Zener voltage regulator.

Bipolar Junction Transistor (BJT): BJT Structure, Working of a transistor, Transistor current equation, Collector reverse saturation current, DC alpha of a transistor. The three configurations, CB and CE input and output characteristics, DC load line. Field-Effect Transistor (FET): Junction Field-Effect Transistor (JFET), Basic construction, Pinch-off voltage, Drain saturation current, Output and transfer characteristics. Metal Oxide Semiconductor Field-Effect Transistor (MOSFET): Depletion and Enhancement type MOSFET---Construction, Operation and Characteristics.

Transistor Biasing: Need of biasing, Choice of operating region, Need for bias stabilization, Fixed bias circuit, Analysis of fixed bias circuit, Saturation point. Emitter-feedback bias circuit, its analysis and drawbacks, Emitter-bias circuit, its analysis, Voltage divider bias circuit, approximate analysis, more accurate analysis, Biasing of FET, Bias stabilization of JFET, Biasing MOSFETs.

Transistor Amplifiers: Meaning of amplification, Types of electronic amplifiers, Ideal voltage amplifier, Single stage BJT amplifier, Coupling capacitor, Bypass capacitor, Analysis of BJT amplifier. AC equivalent circuit model of BJT, Hybrid parameters, AC analysis using h-parameters, Frequency response of an RC coupled amplifier, Effect on bandwidth when stages are cascaded.

Feedback in Amplifiers: Basic concepts of feedback, Types of feedback, Voltage gain of feedback amplifier, Effects of negative feedback on amplifier characteristics. Sinusoidal Oscillators: Need of oscillators, Types of oscillators, Positive feedback to produce oscillations, the starting voltage, Tuned collector oscillator, Hartley oscillator, Colpitts oscillator, Clapp oscillator, RC-phase shift oscillator, Wein bridge oscillator, Crystal oscillator. Operational Amplifiers: Schematic symbol of op-amp, Ideal op-amp, Inverting amplifier, Virtual ground, Non-inverting amplifier, Adders, Differential amplifier, Subtractor, Integrator, Voltage Follower. Switching Theory and Logic Design: Number Systems, Boolean Algebra, Logic Gates, Flip-Flops, Counters, Registers

14B17PH271 Electronic Devices and Circuits Lab

List of Experiments

1. To study the dielectric constant and Curie temperature of Ferroelectric ceramics.
2. To study the variation of resistivity of a semiconductor with temperature and to determine the band gap using Four-Probe method.
3. Using solar cell trainer (a) Study voltage and current of a solar cell, (b) Voltage and current in series and parallel combinations, (c) Draw power curve to find maximum power point (MPP) and to obtain efficiency of a solar cell.
4. To study the magnetostriction in metallic rod.
5. To study Hall effect in a P type semiconductor. To determine (i) Hall voltage and Hall coefficient (ii) Number of charge carriers per unit volume (iii) Hall angle and mobility.
6. To study Zener diode characteristics & Transfer Characteristics for a given load.
7. To Implement Clipper Circuit.
8. To Implement Clamper Circuits.
9. To Implement Half-Wave and Rectifier Full-Wave Rectifier with and Without Capacitive Filter.
10. To study Common Emitter Transistor characteristics and to determine h_{ie} and h_{fe} parameters.
11. To Implement Emitter follower
12. To study JFET Characteristics.

14B11CI211 Data Structures

Data centric approach to software development, Problem analysis and Data design, Time and space complexity, Searching, Sorting, Algorithm visualization, Data types and representation, Abstract Data Types, Tagged, Array based, Linked, Indexed, and simulated pointer based storage. Lists, Electronic text, Hypertext, Orthogonal Lists, Sparse matrices List of list, Doubly linked lists, Stack, Recursion removal, Queue, Dequeue, Buffer, Discrete event simulation, Tree, Binary Tree, K-ary Tree, Binary Search Tree, Tree traversal, Graphs and graph traversal, Simple graphics and multimedia data structures, K-d Tree, Quad Tree, Octree.

14B17CI271 Data Structures Lab

Searching, Sorting, Data types and representation, Abstract Data Types, Tagged, Array based, Linked, Indexed, and simulated pointer based storage, Lists, Sparse matrices List of list, doubly linked lists, Stack, Recursion removal, Queue, Dequeue, Tree, Binary Tree, K-ary Tree, Binary Search Tree, Tree traversal, Kd Tree, Quad Tree, Octree, Graphs and graph traversal.

Year/Sem: IInd Year/III Sem

14B11HS311 Managerial Economics

Introduction to Managerial Economics & Macro-economic Concepts: Definition of Economics, Meaning & Scope of Managerial Economics, Micro & Macro Economics, Concept of economic profit, (Opportunity Cost), Concept of Present value. Demand Analysis: Law of demand, Individual & market demand, Determinants of market demand, Marginal Utility theory, Elasticity of demand– Price, Income, Cross, Advertising Theory of Consumer choice using Indifference Curve analysis, Demand forecasting techniques, Delphi, Survey, Time series analysis.

Production Theory and Analysis: Production with one variable, optimal employment of a factor of production, Cobb Douglas production function, Production with two variable inputs, Production Isoquants, Production Isocosts, Optimal employment of two inputs, the expansion path, Basics of Supply, Market Equilibrium. Cost Theory and Analysis: Cost concepts – Opportunity, Explicit, Marginal, Incremental and Sunk, Relation between Production & Cost, Short run cost function, Long run cost function, Special topics -Profit contribution analysis, - Break Even analysis, Operating Leverage.

Pricing under Different Market Structures: Perfect Competition - Determination of Price output relationship in short run, long run, Monopoly Determination of Price output relationship in short run & long run, Price discrimination, Monopolistic Competition- Determination of Price output relationship in short run & long run, Product Differentiation, Oligopoly- Types, Determination of Price output relationship, Kinky demand curve {Stickiness of Price}, Price leadership model.

14B11MA311 Discrete Mathematics

Set theory and Relations, Functions and Algorithms, Logic, Propositional Functions and Quantifiers, Graphs, Trees and Graph Coloring, Sequential representation, Directed graphs and Binary trees, Groups, Rings and Fields, Ordered sets, Lattices and Boolean algebra, Languages, Finite State Automata Grammars and Finite State Machines.

14B11EC413 Digital Electronics

Review of Number system, Binary Codes, Switching mode operation of semiconductor Devices, Digital Logic Families, Combinational Logic Design, Sequential Logic Design, Basic pulse circuits, Introduction to VHDL.

14B17EC473 Digital Electronics Lab

Implementation of DTL and TTL circuits, Verification of logic functions of the TTL ICs, Implementation of combinational digital circuits using MSI Logic, K-map and Boolean function simplification for efficient implementation of digital systems, Implementation of Binary Adders and Subtractor, Implementation of code converters (Gray-to-Binary & Binary-to-Gray), Implementation of magnitude comparators, Implementation of BCD-to-Seven Segment Decoder/Driver, Use of Flip-Flop TTL IC in digital system, Implement the 4-Bit binary counter using 7493, Verification of various logic functions of the TTL ICs using 7493 binary counter and measurement of propagation delay, Use of Multiplexer TTL IC for designing digital systems. Use of Demultiplexer, TTL ICs for designing digital systems, Implementation of shift register, Implementation of Shift register counters, Implementation of Johnson counters with decoding logic.

14B11CI311 Object Oriented Programming

Review of Structured programming in C, Structured versus O-O programming, O-O paradigm, Objects, Classes, Methods, Constructors and destroying objects in C++, Complex objects, object-oriented Analysis of Case Studies using UML diagrams.

File Handling in C++, Friend Functions, Static members functions in C++ and JAVA, Complex Objects and Classes, Inheritance and its form and Multiple Inheritance in C++, Polymorphism and Virtual Functions in C++, RTTI and Casting types in C++, Function and Operator overloading in C++, Namespace and Templates in C++, STL-Container classes, Sequence, Iterator, Algorithms and Functions.

Java fundamentals covering data types, literals, keywords, constants, scope of variable, conversion and casting, JVM, difference between applets and application, Classes Objects Methods, Wrapper Classes in JAVA, Introduction to Swing and Applet, Arrays, Vectors, String and String Buffer in JAVA, Inheritance and Abstract Classes in JAVA, Packages, class path, Interfaces in JAVA, Exception Handling in C++ and JAVA, Basic principles of Software engineering, System analysis, design, testing and debugging, Database Environment, Introduction to Relational Model, ER & EER Modeling, SQL, PL/SQL, Normalization, Database Connectivity and Transaction Processing.

14B17CI371 Object Oriented Programming Lab

Review of Structured programming in C, Objects, Classes, Methods, Constructors and Destructors, File Handling in C++, Friend Functions, Static members function, Complex Objects and Classes, Inheritance and its form and Multiple Inheritances in C++, Polymorphism and Virtual Functions in C++, Function and Operator overloading in C++, RTTI, Namespace, STL and Templates in C++, Object-Oriented Concepts in Java, SQL, PL/SQL.

14B11CI312 Database Systems

Introduction to Databases, Database Environment, Relational Model, Relational Algebra, SQL: Data Manipulation, Data Definition, And Commercial RDMS: MS-Access/Oracle 9i, PL/SQL, ER Modeling: Entity type, Attributes, Relation types, Notations, Extended, ER Features, Normalisation and building normalized databases & Data

Dependencies, Case Study, Database Connectivity: ODBC /JDBC, Transactions, Concurrency, Recovery & Security, Query Processing & Optimization

14B17CI372 Database Systems Lab

SQL queries for the creation of tables and insertion of values into tables, SQL queries for viewing all data and specific data corresponding to a particular row or column in a table, SQL queries for the updation, deletion and dropping of tables, SQL queries for aggregation, range finding etc on the tables, SQL queries for renaming, truncating and destroying the tables, SQL queries for the use of not null, group by, having clause, SQL queries for the computation done on the table data, Exercise on nested SQL queries and sub queries. Use of cursors, triggers, functions and writing pl/sql block, a brief idea about oracle report builder.

14B17CI373 Multimedia Development Lab -I

Multimedia data encoding - Audio, Image, Video, and Animation, Multimedia operating systems - Process management, Inter-process communication and synchronization, Memory management, Device management, Networks – application layer protocol, and synchronization, Multimedia databases- searching algorithms, query languages, user interfaces, Multimedia content security.

Year/Semester: 2nd Year/IV Semester

14B11HS411 Financial Management

Introduction, Scope and Objectives, Basic Financial Concept, Time value of money, Capital budgeting techniques, Cash flows, Long term sources of finances. Concept and measurement of cost of capital, Leverages, EBIT-EPS analysis, Working capital management- Inventory Management, Financial Statement analysis.

14B11MA411 Probability Theory and Random Processes

Random experiments & sample space, events. Three basic approaches to probability, conditional probability, total probability theorem, Baye's theorem, One dimensional random variables (discrete and continuous) and their distributions, bivariate distributions, joint, marginal and conditional distributions characteristic function, covariance and correlation of random variables. Bernoulli, Binomial, Poisson, negative binomial, geometric and probability distributions, Concept of reliability, reliability function, hazard rate function, mean time to failure Introduction and description of random processes, Markov processes, processes with independent increments. Average values of random processes. Stationary processes and computation of their averages. Random walk, Wiener process, Properties of autocorrelation function, ergodic processes Power spectral density function and its properties. Linear systems with random inputs, system in the form of convolution, Gaussian processes, Poisson Processes, Markov chains.

14B11CI611 Computer Networks

Architecture and Layers: OSI and TCP/IP Model, Topology: Ring, Bus, Star and Tree, Switching: Repeaters, Bridges, Hubs, Switches, Routers, and Gateway, Client-Server: LAN, MAN, WAN, 1, 2,3-tier Architecture, Routing Algorithms: Shortest path, Distance Vector and Multicast, Traffic: Congestion Control, Congestion Prevention Policies, Internetworking: Virtual Circuits, Tunneling, and internetwork Routing, Protocols: TCP, IP, IPv6, UDP, HTTP, POP, and HDLC, Security: RSA, Kerberos, and Digital Signature, Network Simulators: Router Sims (Network Visualizer).

14B17CI671 Computer Networks Lab

Architecture and Layers: OSI and TCP/IP Model, Topology: Ring, Bus, Star and Tree, Switching: Repeaters, Bridges, Hubs, Switches, Routers, and Gateway, Client-Server: LAN, MAN, WAN, 1, 2,3-tier Architecture, Routing Algorithms: Shortest path, Distance Vector and Multicast Traffic: Congestion Control, Congestion Prevention Policies, Internetworking: Virtual Circuits, Tunneling, and internetwork Routing, Protocols: TCP, IP, IPv6, UDP, HTTP, POP, and HDLC, Security: RSA, Kerberos, and Digital Signature, Network Simulators: Router Sims (Network Visualizer).

14B11CI411 Fundamentals of Algorithms

Analysis of algorithm: Asymptotic Notation, Sorting and merging Algorithm, Tree and related data Structure: Heap, Priority Queues, B-Tree, AVL, Splay Tree, Red-Black Tree, Threaded Tree, Files: Classification, Record Organization, Retrieval System, External Sorting, Set, Dictionary: Design, Analysis, integration and applications, Fundamental techniques: Divide and Conquer method, Dynamic Programming, Introduction to Greedy Method, Hashing:

technique, collision resolution and analysis, Text Processing: String operation, pattern matching algorithm, tries, text compression, text similarity testing.

14B17CI471 Algorithms lab

Analysis of algorithm: Asymptotic Notation, Sorting and merging Algorithm, Tree and related data Structure: Heap, Priority Queues, B-Tree, AVL, Splay Tree, Red-Black Tree, Threaded Tree, Files: Classification, Record Organization, Retrieval System, External Sorting, Set, Dictionary: Design, Analysis, integration and applications, Fundamental techniques: Divide and Conquer method, Dynamic Programming, Introduction to Greedy Method, Hashing: technique, collision resolution and analysis, Text Processing: String operation, pattern matching, algorithm, tries, text compression, text similarity testing.

14B11EC415 Microprocessor and Controllers

Introduction to Microprocessor: Historical background, Microprocessor and microcontroller based computer systems. 8085 Microprocessor: Introduction, 8085: pin-outs and the pin function, instruction set, bus timings, addressing mode, programming in 8085, programming example, counter and delay, stack and subroutine, basic Interrupt processing, hardware interrupts. I/O Interfacing: Memory organization & Interfacing, I/O interfacing, internal architecture and programming of I/O Chips: 8255, 8254, example of programming of interfacing.

8086 microprocessor: Pin-outs and the pin function, clock generators, bus buffering & latching, ready and wait states, minimum mode versus maximum mode, memory segmentation. Programming in 8086, programming example, Introduction of microcontrollers: A microcontroller's survey, Development system for microcontrollers and case studies. 8051: microcontrollers Hardware, Input/output pins, ports & circuits, External memory, counters & timers, Serial Data input/output, interrupts. 8051 addressing mode: Programming the 8051.

14B17EC475 Microprocessor and Controllers Lab

Assemble language programming using 8085 microprocessor. Programming example- Addition and subtraction 8 bit and 16 bit. Largest and smallest number from series of numbers etc. Assemble language programming using 8086 microprocessor. Programming example- Addition and subtraction 8 bit etc. Interfacing of 8255 and 8254 with 8085 microprocessor.

14B17CI473 UNIX Programming Lab

Introduction to Unix Architecture, Basic UNIX Commands, Filters, Shell Programming (Bash), C programming Basics, Unix System calls, Debugging Using GDB, Installation of Software on Unix Platforms.

Year/Sem: IIIrd Year/V Sem

14B11HS541 Social & Legal Issues

Contract Act, Consumer Laws, Laws of Patent, Company Act, Business ethics and values, Codes of Ethics & Professional Conduct, The place of code of ethics for an Engineer, Ethics in Bio-Tech, Environmental Ethics, Role of Board of Directors, The role of Top Management, Executive Compensation, Legal provisions and SEBI code, Governance mechanism and ethical behaviour, Corporate governance in India, Impact of internet on corporate governance. Intellectual Property Issues (What is Intellectual Property, Copyright law, Software Copyright), Copyright in Cyberspace, Offensive Speech in Cyberspace, pornography, censorship, Bomb-making Information Harassing Speech Online), Liability of service providers. Computer Crimes(Fraud and Embezzlement, Sabotage & Information theft, Intruders, Hacking & Cracking), Computer Crime Laws, Digital Forgery, Cyber Terrorism, Wiretapping, IT Act 2000, ICE Bill.

14B14HS542 Human Psychology

Understanding human experience and behavior: Definition, schools, methods, branches and application of psychology for engineers. Measuring human abilities: Intelligence, Personnel testing; the individual working life. Personality - definition, approaches and theories, Psychological problems of everyday life. Stress and coping; Psychological disorders, human error & Reliability, Work and mental health. Human learning Theories, conflict resolutions, Leadership and management.

14B11EC515 Communication System

Electromagnetic Spectrum, Basic Communication system model and application, Introduction to AMSC, DSB, SSB and vestigial side band AM Communication. Detection of AM signals: Coherent detection, Costas Receiver, Envelop detector. Concepts of FM and PM, narrow band and wideband FM, direct and indirect method of generating FM.

Detection of FM signals: Frequency differentiation, Time differentiation and direct differentiation techniques, PLL and Synchronous detection, AM & FM transmitters. Superheterodyne AM and FM receivers. Pulse Modulation Techniques: Time & Frequency Domain Sampling with aperture effects, Reconstruction of signals. PAM and PTM generation & detection–synchronous & asynchronous. Pulse Code Modulation, quantization and encoding, PCM performance, Log PCM & Companding, Differential Pulse Code Modulation, and PCM hierarchy. Digital Modulation Techniques: Binary and quaternary modulation techniques: FSK, PSK, and DPSK, Probability of Error analysis of Data transmission: Base band receiver, Probability of error analysis– Optimum filter, Matched filter. Coherent & Non-Coherent Reception, Probability of error for FSK, PSK, DPSK, Digital Radio, Mobile Communication.

14B14HS543 Professional Ethics

Introduction, The nature and characteristics of professions, Obligations and professional services, Obligation to clients, professions and third parties. The foundations and norms of professional ethics. The need for separate code of conduct for professionals. The relation between professional and general ethics. Moral conflict and the issue of autonomy of professional ethics. Certain specific issues pertaining to medical ethics, legal ethics, computer ethics and business ethics. Teaching from scriptures and tradition (Geeta, Ramayana, Mahabharata, Upanishads, Vedas, Bible and Quran). Ethical Issues in Capitalism and market systems, Ethics and social responsibility, Ethics and marketing, Ethics in finance, Ethics and human resource, Ethics and Information Technology, Intellectual property rights like designs, patents, trade marks, copy rights,

14B14HS544 Macro Economics

Meaning and Importance of Macro Economics. Concepts of Income, Output and employment – Gross Domestic Product (GDP), GNP, GNI and NNP – methods of measurement of GDP and limitations; monetary policy and fiscal policy, Balance of Payments : Current and Capital Accounts. Disequilibrium in balance of payments and its consequences. Balance of payments, adjustment policies in fixed and flexible exchange rate. Theories of Consumption spending: Absolute, Relative, Permanent Income and Lifecycle hypotheses. Consumption under uncertainty, Price Level at the macro level – WPI and CPI. Theories of Investment spending: Keynesian, Accelerator and Neo-classical, Determination of Money Supply: Functions and Post-war controversy on definition of Money. Theories of Demand for Money: Quantity Theory and Keynes approach. Baumol and Tobin Contributions and Friedman's restatement of quantity theory. IS and LM curves: Derivation, their shifts and rotations. Simultaneous equilibrium of product market and money market.

14B17EC573 Communication System Lab

List of Experiments:

Experiment No1. : DSB Amplitude Modulation & Demodulation

Activity 1: Generate DSB AM signal

Activity 2: Demodulation of DSB AM signal using envelop detector

Experiment No2. : DSB-SC and SSB amplitude modulation and Demodulation

Activity 1: Generate DSB-SC Amplitude Modulated signal and demodulate the generated signal

Activity 2: Generate SSB Amplitude Modulated signal and demodulate the generated signal using product modulator

Experiment No.3: Generate FM modulated signal using VCO IC and measure modulation index

Activity 1: Generate a carrier of frequency 55 kHz using 566 VCO IC

Activity 2: Generate a FM signal having center frequency 55 kHz

Experiment No.4: Phase modulation using FM

Activity 1: Generate a carrier of frequency 55 kHz using 566 VCO IC

Activity 2: Generate a FM signal having center frequency 55 kHz

Activity 3: Design a differentiator to differentiate a 1 kHz triangular signal

Activity 4: Generate a PM signal using FM

Experiment No.5: FM modulation and Demodulation

Activity 1: Generate a FM signal using Varactor Modulator and measure the modulation index.

Activity 2: Demodulate the FM signal using phase lock loop

Activity 3: Demodulate the FM signal using quadrature detector

Experiment No. 6: Determination of Lock & Capture range of NE 565 PLL IC

Activity 1: Determine maximum and minimum frequency of the VCO output

Activity 2: Determine the locking range

Activity 3: Determine the capture range

Experiment No.7: Pulse width modulation & Demodulation

Activity 1: Implement a PWM modulator using 555 timer IC

Activity 2: Demodulate the PWM signal using PWM demodulator

Experiment No.8: Pulse position modulation & Demodulation

Activity 1: Implement a PPM modulator using 555 timer IC

Activity 2: Demodulate the PPM signal using PPM demodulator

Experiment No.9: TDM pulse amplitude modulation and demodulation

Activity 1: Study of TDM pulse amplitude modulation and demodulation with the presence of transmitter clock and channel identification information

Activity 2: Study of TDM pulse amplitude modulation and demodulation with presence of channel identification information only

Experiment No.10: Signal sampling and Reconstruction

Activity 1: Signal sampling using LF398 IC

Activity 2: Effect of sampling frequency

Activity 3: Effect of duty cycle

Activity 4: Implement a second order low-pass filter using 741 IC having higher cutoff frequency $f_h=1.5$ kHz

Activity 5: Reconstruction of the signal from its samples

Experiment No.11: Delta/Sigma Delta Modulation

Activity 1: Delta Modulation

Activity 2: Delta Demodulation

Activity 3: Sigma Delta Modulation

Activity 2: Sigma Delta Demodulation

Experiment No.12: Adaptive Delta Modulation and Demodulation

Activity 1: Adaptive Delta Modulation

Activity 2: Adaptive Delta Demodulation

Experiment No.13: Filter, Noise and Audio Amplifier

14B11CI511 Operating Systems

Introduction, Operating system structure- Monolithic systems, Layered systems, Virtual machines, Client-Server model. Process Management- IPC, RPC, Classical IPC problems, Process scheduling, Processor Allocation- Allocation Model, Design issues for processor allocation algorithms, Threads, Deadlock, Security, Memory Management, TSRs, File System management. Input output management, Disk scheduling, Basics of Real Time Operating Systems and Mobile Operating Systems, Case study of UNIX/LINUX.

14B17CI571 Operating systems Lab

List of Experiments

Experiments that must be performed in this course are listed below:

- (a) Write a program to copy the content of one file to another file using system calls.
(b) Write a program to append contents of one file to another file.
(c) Write a program to display a file on the monitor using system calls. (Also use lseek system call with various options).
- Write a program to read the information contained inside the Super block in ext2 and reiser file system.
- Write a program to read the inode of a given file in inode table.
- (a) Write a program to get information about a given user in multi-user environment from /etc/passwd file.
(b) Read and understand the significance of following configuration files:
/etc/passwd, /etc/fstab, /etc/mstab, /etc/inittab.
- (a) Write a program to create a process and display its process identification number and parent process identification number.
(b) Write a program to print process identification numbers of parent process and ten of its child processes.
(c) Write a program to execute binary executable file for e.g. ls, ls-l, wc, etc.
(d) Write a program for input and output redirection $F1 > P1 > F2$, where P1 is binary executable file.
(e) Write a program to implement $(ls; ls -l) > f1$
- (a) Write a program to implement $who | wc -l$.

- (b) Write a program to implement `ls | sort | wc`.
 - (c) Write a program to implement `(ls | sort) > file`.
7. Write a program that asks you to input the number of processes with their respective CPU times, Arrival times. After inputting the above information the program should ask to enter the choice of the algorithm to calculate the turn around time and waiting time of each process. As per the choice of the user, the program should execute the task. Make suitable assumption wherever necessary.
 - (a) Write a program to catch multiple signals using signal system call.
 - (b) Write a program to implement `setpgrp ()` system call and then `kill ()` system call with different options.
 8. Implement producer-consumer problem using system V semaphores.

14B11CI512 Software Engineering

Interactive Systems, Usability, Introduction to software engineering, Software process models, PSP, TSP Requirement Engineering: Requirement Elicitation, Analysis, Specification, SRS, Formal system development techniques, Analysis and Modeling: Data modeling, Functional modeling Software Architecture and Design: Data design, Architectural Design Process, SADT, OOAD, function-oriented design

UML: Use case diagram, State diagram, Activity Diagram, Class Diagram, Sequence diagram, Collaboration diagram, Deployment Diagram, Event trace diagram, Design Patterns: Structural Patterns, Behavioral Patterns, Creational Patterns

Software Estimation-Estimating Size, Effort and Cost: Metric for Analysis, Metric for Design, COCOMO model, Putnam Model etc., Implementation and Integration: Coding standard and practices, Top-Down and Bottom-up Approach, Verification and Validation, Software Testing: Structural testing, functional Testing, Testing Strategies, Test Case design.

Software Maintenance: Types, Cost of Software, maintenance, Software Maintenance Models

CASE Tool Taxonomy: Business Process Engineering tool, Process modeling and management tool, project planning tool, requirement tracking tool, Metric and management tool, documentation tool, system software tool etc. Introduction to software engineering for web and mobile applications.

14B17CI572 Software Engineering Lab

Basic Structural Modeling, Advance Structural Modeling, Basic Behavioral Modeling, Advance Behavioral Modeling, Architectural Modeling, UML Notation, UML Stranded Elements, Designing Test cases, Test Suits, Rational Unified Process.

14B11CI513 Theory of Computation

Deterministic finite automata; Nondeterministic finite automata; Finite Automata with output; Regular expressions; Regular languages; Equivalence theorem; Myhill-Nerode Theorem; Finite automata minimization; Pumping Lemma for regular languages; Intractable Problems, NP Complete and Hard problem, Context free languages, Non-context-free languages, The Pumping Lemma for CFL, Push down automata, Turing Machines, Halting Problem; Reducibility.

14B14CI542 Object Oriented Computing

Object-Oriented Computing: The OMG Object Model, Interfaces, Classes and Objects, Encapsulation, Inheritance and Polymorphism, Reusability, Overview of Java, ActiveX Controls and Java Beans. Object-Oriented modeling, analysis and design: Modeling System Architecture, The 4 + 1 System View, Introduction to UML (Unified Modeling Language). Distributed Object Computing: TCP/IP Networks, Enterprise Intranets, Network & Client-Server Computing, CORBA, RMI, DCOM, The Java Database Connection (JDBC), Object Databases.

14B14CI543 Real Time Systems

Basic Concepts: Hard versus Soft Real Time System, A reference Model of Real Time System, Real Time Applications. Real Time Scheduling: Clock Driven Scheduling, Priority Driven Scheduling of Periodic Tasks, Scheduling Aperiodic and Sporadic Jobs in Priority Driven Systems.

Real Time Operating Systems: Time Services and Scheduling Mechanisms, Basic Operating System Functions, Processor reserves and Resource Kernel, Open System Architecture, Overview of several commercial and general purpose operating systems.

Multiprocessor and Distributed real time systems: Model of Multiprocessor and distributed systems, Multiprocessor scheduling, Resource Access Control and Synchronization. Resources and Resource Access Control: Assumptions on

Resource and their uses, Resource Contention and Resource Access Control, Non Preemptive Critical Sections, Basic Priority Inheritance Protocol, Basic Priority Ceiling Protocol, Stack Based, Priority Ceiling Protocol.

Real time Communications: Model of Real Time Communications, Priority Based Service Disciplines For Switched Networks, Weighted Round Robin service Disciplines, Medium Access Control Protocols of Broadcast Networks, Internet and Resource Reservation Protocols, Real Time Protocol, Communication in Multicomputer Systems.

14B14CI544 Embedded System

Introduction: Introduction to Real Time Embedded Systems Classification, Characteristics and requirements, Embedded Systems Evolution, Issues and Challenges. Embedded Processors and Memory: Memory Architecture and Devices, Digital Signal Processors, General Purpose Processors Embedded Processors, Memory-Interfacing, System and Processor Architecture: von Neumann, Harvard and their variants.

Embedded Systems: Input-Output Devices and Mechanisms, Interfacing of Memory and Peripheral Devices – Functional and Timing Issues, Bus and Wireless Protocols, ISA bus etc. Timers, Interrupts DMA, USB and IrDA, Analog to Digital and Digital to Analog Converters, Analog Interfacing. Design of Embedded Processors: Application Specific Logic Design using Field Programmable Devices and ASICs, Field Programmable Gate Arrays and Applications, Introduction to Hardware Description Languages

Embedded Communications: Parallel Data Communication, Serial Data Communication, Network Communication.

Embedded System Software: Introduction to Real-Time Systems, Concepts in Real-Time Operating Systems, Real-Time Task Scheduling, Commercial Real-Time Operating Systems, Constraints and Performance Targets. Testing of Embedded System: Testing Embedded Systems, Design for Testability, Built-In-Self Test (BIST) for Embedded System, Boundary Scan Methods and Standards.

14B14CI545 Logic in Computer Science

Communication and Concurrency: Processes as transition systems, operations on these processes (composition, hiding etc.), Bisimulation and observational equivalences. Calculus of mobile systems: pi-calculus. Some theory related to pi calculus. Logics to reason about transition systems, LTL, CTL* and modal mu calculus. Reasoning about Knowledge: Knowledge as modality, axioms of knowledge. Common knowledge, distributed agents exchanging messages, agreeing to disagree. Logical omniscience. Finite Model Theory: Expressiveness of FO and its extensions on finite structures. Games for lower bounds. Connections with complexity classes, role of order on the domain.

Feasible Proofs: Propositional proof systems for tautologies. Simulation and lower bounds on length of proofs for specific systems (e.g. PHP requires superpolynomial length using resolution). Theories of weak arithmetic, provably total functions and relations to complexity theory. Full Abstraction problem for PCF: PCF as an extension of lambda calculus, Operational and denotational semantics and the full abstraction problem, Solutions to the full abstraction problem, Games semantics.

14B14CI546 E-Commerce

Overview of Electronic Commerce, E-Marketplaces: Structure, Mechanisms, Economics, and Impacts, Retailing in Electric Commerce: Products and Services, Consumer Behavior, Online Market Research, and Customer Relationship, e-supply chains, collaborative commerce, and corporate portals, E-commerce Security, Mobile computing and commerce and pervasive computing, Social networks and industry disruptors in the web 2.0 environment

14B14CI547 Advanced Concepts in DBMS

Introduction: Overview of object-oriented concepts and characteristics, Objects, OIDs and reference types, Database design for ORDBMS, Comparing RDBMS, OODMBS, and ORDBMS. Distributed DBMSs-Concepts and Design: Introduction, Homogeneous and heterogeneous databases, Advantages and Disadvantages of DDBMS, Homogeneous and Heterogeneous DDBMSs, Overview of Networking, Functions and Architectures of a DDBMS, Distributed Relational Database Design, Date's Twelve Rules for a DDBMS.

Distributed DBMSs- Advanced Concepts- Distributed Transaction Management, Distributed Concurrency Control, Distributed Deadlock Management, Distributed Database Recovery, Distributed Query Optimization. Replication and Mobile Databases- Introduction to Database Replication, Benefits of Database Replication, Applications of Replication, Basic Components of Database Replication, Database Replication Environments, Synchronous Versus Asynchronous Replication, Introduction to Mobile Databases.

Object DBMS- Advanced Database Applications, Weaknesses of RDBMSs, Object-Oriented Concepts, Storing Objects in a Relational Database, Object-Oriented Database Design, Comparison of Object-Oriented Data Modeling, Conceptual Data Modeling, Object-Oriented Analysis and Design with UML. Object-Oriented DBMSs Concepts-

Introduction to Object-Oriented Data Models and OODBMSs, OODBMS Perspectives, Persistence, Issues in OODBMSs, Advantages and Disadvantages of OODBMSs. Object-Oriented DBMSs Standards and Systems- Object Management Group, Object Data Standard ODMG, Object Store.

Object-Relational DBMSs-Introduction to Object-Relational Database Systems, The Third-Generation Database Manifestos, The Third-Generation Database System Manifesto The Third Manifesto, Postgres - An Early ORDBMS, SQL: 1999 and SQL:2003, Query Processing and Optimization, Object-Oriented Extensions in Oracle, Comparison of ORDBMS and OODBMS.

14B14CI644 Computer Graphics

Introduction, Context and applications; Graphics Pipeline and hardware; Raster Graphics: Output Primitives : Line drawing Algorithms; Circle drawing Algorithms; Ellipse drawing Algorithm; Data structures for modeling of planar objects; Area filling; 2D geometric transformations; Algorithms for clipping; 2D viewing ; 3D concepts; Introduction to 3D object representations; Visible surface detection methods; Illumination models.

14B14CI645 Computer Systems Security

Introduction: need and basic goals for computer security, security threats etc.

Cryptographic building blocks: symmetric and asymmetric key cryptography, cryptographic hash functions, digital signature schemes etc., with representative applications for each.

Operating System Security: low-level protection mechanisms, access control: models for access control, some confidentiality, integrity, and hybrid models of access control such as Bell-La Padula, Biba, Chinese Wall etc., discretionary vs. mandatory access control.

Case Studies: Java access control policy specifications, SELinux security model and implementation. Program flaws: bugs which have security implications such as buffer overflows, race conditions etc.

Malicious code: viruses, worms, Trojan horses; how they work and how to defend against them.

Network Security: problems in network security; kinds of attacks, PKI, key exchange protocols, example protocols such as PGP, Kerberos, IPSEC/VPN, SSL, S/MIME etc.

Protocol vulnerabilities: examples of protocol vulnerabilities such as in TCP/IP, denial of service attacks etc.

Tools for network security such as firewalls and intrusion detection systems.

Year/Semester: 3rd Year/VI Semester

14B14HS641 Project Management

Project Management Basics, Role, attitude and skills of Project manager, Project Lifecycle, Project Environment, 7'S of Project Management., Project Model. Basics of Project Selection, Risk Management. Key Structure of Project Organization, Project Planning, Project Budgeting and cost estimation. Project Scheduling (Importance, PERT/CPM, AOA and AON charts, Probability analysis). Project Control, Project Termination.

14B14HS642 Business Environment

The concept of Business Environment, significance and nature. Environment Scanning: meaning, nature and scope, the process of environmental scanning, Interaction between internal and external environments, basic philosophies of Capitalism and Socialism with their variants. Concepts of Mixed Economy. Overview of Political, Socio-cultural, Legal, Technological and Global environment. An introduction to MRTP, FEMA, SEBI Act, Consumer Protection Act; The changing dimensions of these laws and their impact on business. Philosophy and strategy of planning in India; Industrial Policy in recent years; Policy with regard to small scale industries; the monetary policy and fiscal policy, Stock Exchange-BSE-NSE. Depository system in India (Options, Futures and Derivatives) RBI-Role and functions, banking structure reforms; Narasimha Committee Recommendations, Financial Sector reforms.

E-Banking in India-objectives, trends and practical uses-Recent technological developments in Indian Banking (ATM, Debit and Credit Cards, EMI, EFT) Consumerism, Social Responsibility of business enterprises, New Economic Policy, Globalization, EXIM policy, FDI policy, Multinational Corporation (MNCs) and Transnational Corporations (TNCs), Global Competitiveness.

14B1HS643 Fundamentals of Financial Market

Financial institutions as firms & intermediaries, Financial markets, Lenders and borrowers, The financial system and the real economy, Deposit-taking institutions, Non-deposit-taking institutions, Interest rates. Money market purpose and structure, Money market segments, Money market participants, Money market instruments - Treasury bills and other government securities, Commercial papers, Certificates of deposit, Repurchase agreements, Money market interest rates and yields. Debt market instrument characteristics, Bond market: characteristics & yields, Bond

valuation - Discounted models, Bond duration and risk, Bond analysis. Equity instruments - Common shares, Preferred shares, Private equity, Primary equity market, Secondary equity market structure, Equity market transactions, Equity market characteristics, Stock valuation, Processes of consolidation of stock exchanges. Hedging against risk, Description of derivatives markets, Forward and futures contracts: Principles, valuation, uses, Swaps, Options: definition, components, determinants, Option pricing models.

14B14HS644 Marketing Management

Defining Marketing for the 21st Century, Developing Marketing Strategies and Plans. Gathering Information and Scanning the Environment, Conducting Marketing Research and Forecasting Demand. Creating Customer Value, Satisfaction, and Loyalty, Analyzing Consumer Markets, Analyzing Business Markets, Identifying Market Segments and Targets. Dealing with Competition, Creating Brand Equity, Crafting the Brand Positioning. Setting Product Strategy, Designing and Managing Services, Developing Pricing Strategies and Programs.

14B11CI612 Compiler Design

Introduction, Lexical Analysis, Syntax Analysis. Top down –Recursive Descent, LL (1), Operator Precedence Parsers and Bottom-up Parsers-LR, LALR, Semantic Analysis, Symbol Table Management, Storage Management, Error Handling, Code Optimization, Code Generation, Software tools- LEX, YACC.

14B17CI672 Compiler Design Lab

List of Lab Exercise-

Exercise – 1

Write any simple program in C, compile and execute it. Observe the processes involved in it. Open header files used in above program and locate the functions in this file used by you in your program. Find the use of these header files.

Exercise – 2

Write a program to read and translate integers into numbers.

e.g. 1=ONE

12 = ONE TWO

856 = EIGHT FIVE SIX

Generate an error if the number of digits is more than 3.

Exercise – 3

The following rules define the translation of an English word into pig Latin:

- If the word begins with a nonempty string of consonants, move the initial consonant string to the back of the word and add the suffix AY; e.g., pig come igpay.
- If the word begins with a vowel, add the suffix YAY; e.g., owl becomes owlyay.
- U following a Q is a consonant.
- Y at the beginning of a word is a vowel if it is not followed by a vowel.
- One-letter words are not changed.

Write a C program to generate pig Latin from an English word.

Exercise – 4

Write a translator to convert infix into postfix for a language consisting of sequences of expressions terminated by semicolons. The expressions consist of numbers, identifiers and the operators +, -, *, /, div and mod.

Exercise – 5

Write a compiler for a language having following features:

- Only data type is integer
- Identifiers are max. 32 characters long, must begin with a letter and are composed of letters, digits and underscores
- Literals are strings of digits
- Comments begin with – and end at the end of the current line
- Statement types are –
Assignment
ID: = expression;
Expression is an infix expression constructed from identifiers, literals and the operators + and - parenthesis are allowed
Input/Output
Read (List of Ids);

Write (List of expressions);
Begin, end, read and write are reserved words.
Each statement is terminated by a semicolon
The body of a program is delimited by begin and end
Tokens may not extend across line boundaries

Write separate procedures for scanning, parsing and translation. These procedures should be called from main routine. The compiler will take input a program written in this language and will generate a code corresponding to input program.

Exercise – 6

Design a LEX for any programming language.

Exercise – 7

Design a YACC for above programming language.

14B11CI613 Computer Organization and Architecture

Register transfer and micro-operations, Basic Computer organization and design, Programming the basic computer, Micro-programmed control, Input output organization, Memory organization, Central processing unit, Measures of CPU performance, Multi-processing and pipelining.

14B17CI673 Computer Organization and Architecture Lab

Assembly introductory, Acquainting with the microprocessor architecture using debug, Assemble language programming including modular programming, Input /Output programming, String programs, characters and arithmetic programs, File Operations, Creating Menu Structures, High precision computation, PROJECT-Select any project of choice. Implement basic VHDL programs – logic gates, half adder, full adder, decoders, encoders, multiplexers.

14B11EC311 Signals and Systems

Continuous-time and discrete-time signals, signal energy and power, periodic signals, even-odd signals, exponential and sinusoidal signals, Unit impulse and step functions, continuous and discrete time systems, System classifications. Convolution integral and convolution sum, properties of LTI systems, LTI systems described by differential and difference equation, response of LTI systems.

Fourier series representation of continuous and discrete time signals, properties, Fourier Transform representation of continuous-time and discrete time signals, properties, system characterization by linear constant coefficient difference equation. The Laplace Transform, ROC, properties of Laplace-transform, analysis and characterization of LTI systems using Laplace Transform. The z-transform, ROC and pole-zero-plot, properties of z-transform, analysis and characterization of LTI systems using z-transform, Stability criterion. Introduction to DSP, Random Variable and Random Processes, probability density function, mean, variance, correlation function, power spectral density.

14B17EC371 Signals and Systems Lab

List of Experiments-

Experiment No.1: Signal generation

Experiment No.2: Creating user function for generating delta-function, unit-step function, periodic signal

Experiment No.3: Creating user function for performing signal operation: folding, shifting and signal addition.

Experiment No.4: To verify the linearity and time-invariance of the discrete-time systems.

Experiment No.5: Response of discrete-time LTI systems

Experiment No.6: MATLAB implementation of discrete time LTI systems, Auto and Cross Correlation.

Experiment No.7: MATLAB Implementation of Fourier series

Experiment No.8: Synthesizing continuous time periodic signals using Fourier series.

Experiment No.9: MATLAB implementation of Discrete Time Fourier Transform (DTFT) of signals.

Experiment No.10: MATLAB implementation of Discrete Time Fourier Transform (DTFT) of LTI systems.

Experiment No.11: Poles and zeros of system function $H(s)$

Experiment No.12: MATLAB implementation of z-transform and inverse z-transform of discrete signals.

Experiment No.13: MATLAB implementation of discrete time LTI systems in z-domain.

14B17CI674 System and Network Programming Lab

List of Experiments-

1. (a) Write a program to catch multiple signals using signal system call.

- (b) Write a program to implement `setpgrp()` system call and then `kill()` system call with different options.
- 2. Write a program to implement file server using Pipes.
- 3. (a) Write a program to implement file server using FIFO (with related processes).
(b) Write a program to implement file server using FIFO (with unrelated processes).
- 4. Implement file server using FIFO to handle multiple clients.
- 5. (a) Write a client-server program in which client and server process passes their PID to each other using message queues.
(b) Write simple programs for message queues using `msgget`, `msgctl`, `msgsnd` and `msgrcv` system calls.
(c) Write a program to implement file server using Message Queues.
- 6. Implement TCP echo server (iterative) and client.
- 7. (a) Implement TCP echo server and client (concurrent) and also catch `SIGCHLD` signal to prevent zombies.
(b) Modify TCP client of part (a) such that it establishes five connections with server and server should use `waitpid()` to take termination status of its childs.
- 8. Implement TCP daytime server (iterative & concurrent) and client.
- 9. Implement TCP whois server (iterative & concurrent) and client.
- 10. Implement FTP server and FTP client.
- 11. Implement TCP client and server in which you pass binary structures between them.
- 12. Implement UDP echo server and client.
- 13. Implement UDP daytime server and client.
- 14. Implement UDP whois server and client.
- 15. Write a program using Sun RPC in which client sends an integer value to the server, server squares the value, and write the result to the client.

14B17CI675 Web Technology Lab

Web Basics: Design web pages through coding using HTML and DHTML, Integrated Development Tool: Frontpage2000/DreamWeaver, Browser side scripting using JavaScript with a focus on Event Handling and Validation, Server side scripting: PHP Syntax, variables, loops and constructs, JAVA Graphics, Browser side scripting: Introduction to programming world of XML Technologies. Basic XML Tags, Database Handling with PHP and XML. Connecting to Databases using PHP, PHP files and databases, Advanced XML: XLINK, XQUERY, XPATH, AppML (XML Language for Internet Application), SCHEMA, DTD, DOM, RDF, RSS. AJAX (Asynchronous JavaScript and XML), E4X (New Extension to JavaScript, its Direct support of XML to JavaScript), JAVA Game Programming, XML (XSL, XSLT): 2D, 3D Graphics, Event Handling and Developing Online Games.

14B14CI541 Introduction to Software Architecture

Typical software system structures (architectural styles), techniques for designing and implementing these structures, models for characterizing and reasoning about architectures, and tools architectural modelling. Role of architecture in Software engineering; Enterprise Architectures, Zachman's Framework; Architectural Styles, Design Patterns; Architecture Description Languages; Product-line architectures; Component based development.

14B14CI548 Software Testing

Introduction to Testing, The Oracle Problem, Specification Styles, Boundary Value, Testing, Equivalence Class Testing, Robustness Equivalence, Class Testing, Decision Table-based Testing, Input Space Partitioning, Combinatorial Testing, Graph-Based Testing, Predicate Testing, Regression Testing, Software Maintenance, Version Control Software Refactoring, Test Sequencing, Algebraic Testing, Path Testing, Data Flow Testing, Mutation Testing, Industrial Experiences.

14B14CI641 Design and Principles of Operating Systems

Introduction: Typical application scenarios and role of OS in resource management, operational view of a computer system and a bare-bone OS, Issues in resource management, OS shell and rationale for a OS kernel, the concept of support tools utilities to enhance user productivity

Memory & Resource Management: Motivation for memory management, when and where primary and secondary memory management is needed, compiled code and memory relocation, linking and loading, Processes and primary memory management, memory allocation policies, critique of various policies like first fit, best fit, internal and external fragmentation Secondary memory management, fixed and variable partitions, virtual memory concept, paging and page replacement policies, Page faults, thrashing, and hardware support for paging, TLB scheme segmentation, segmentation with paging. Shared resources, resource allocation and scheduling, resource graph

models, deadlocks, deadlock detection, deadlock avoidance, deadlock prevention algorithms, mutual exclusion, semaphores, wait and signal procedures.

Input Output management: Issues in human centric, device centric and computer centric IO management, input output modes, programmed IO, polling, interrupt mode of IO, various types of interrupts, interrupt servicing, priority interrupts, interrupt vectors, direct memory access (DMA) mode of transfer, setting up DMAs

Real time Systems and Microkernel's: Characteristics of real-time operating systems, classification of real-time systems, Architectures of real-time systems, micro-kernels, scheduling in RTOS, rate monotonic scheduling, priority inversion, RTOS for hand-held devices.

OS and Security: Security breaches, types of attacks, attack prevention methods, security policy and access control, OS design considerations for security, access, policy and access control, OS design considerations for security, access control lists and OS support, internet and general network security.

Distributed Operating System: Fundamentals of Distributed operating system, hardware concepts, software concepts, Communication: pipe, FIFO, Socket, remote procedure call, remote object invocation, message-oriented communication, stream-oriented communication.

14B14CI642 Software Quality Management

Introduction to Software Quality: Quality concepts, Quality Assurance, Quality Planning, Quality control, Software Development Life Cycle, Software process, Software Quality, Views of Quality: user view and designer view, transcendent view and manufacturing view.

Hierarchical models of quality: What are hierarchical models? The hierarchical models of Boehm and McCall, interrelation of quality criteria, a practical evaluation quality modeling. Software Quality Measurement: Measuring quality, software metrics, problems with metrics, an overall measure of software quality. Developments in Measuring Quality: The work of Gilb, The COQUAMO project, current work of metrics, profiles of software quality.

The CASE for Tools and Methods: The growth of software engineering methods, methodologies based upon the waterfall Lifecycle, CASE tools, the contribution of methods and tools to quality, alternative approaches to software development, standards based on the software engineering Lifecycle.

Quality Management Systems: A historical perspective, terms, elements of a quality management system, the key to quality management, a human quality culture, quality in software, the problem of user requirements, a quality management system for software, quality assurance of quality improvement.

The ISO9000 series of quality management standards: The purpose of standards, the ISO9000 series: a generic quality management standard, ISO9000-3: notes for guidance on the application of ISO9001 in software development, the impact of ISO9000 and TickIT. Models and standards for process improvement: The Capability Maturity Model, individual levels of CMM, the role of the CMM, SPICE modeling. Case studies: from kitchens to software: Introduction to case studies, total quality in the kitchen, a software house: Sherwood computer services, does quality deliver benefits?

14B14CI643 Concurrency Control and Security of Databases

Transaction Processing, Serialisability Theory, Two Phase Locking, Centralized Recovery, Distributed Recovery, Security and Security Models, Relational Database Security, Statistical Database Security, Concurrency Control and Multilevel Security, Oracle Security.

14B14CI646 Human Aspects for Information Technology

Human Computer Interaction: Introduction, Context, Wisdom, Problem Solving, Critical and Creative Thinking. Sustainable development and IT, Universal usability. Humanities computing – computer-aided research in literature and language studies, history, philosophy, and other humanities disciplines, leisure computing, humanistic aspects of IT and IT professions, Human centric IT, research methods. Social computing –computer-aided research in social sciences, social aspects of IT and IT professions, relationship and collaboration technology, digital divide, research methods. Risks and liabilities of computer-based systems, technological disasters, software failure, responsibilities towards nature.

Ethics and Technology: Theories of Human Development - Maslow, Perry, Kohlberg, Gilligan, Schwartz, Personality theories, etc. Cyber-ethics - Theories of ethics, Codes of Ethics and Professional Practice, ACM, AITP, IEEE, privacy, regulation.

Introduction to Cyberethics: Concepts, perspective, and Methodological Frameworks, Ethical Concepts and Ethical theories: establishing and justifying a moral systems, Critical Thinking skills and logical arguments: Tools for evaluating Cyberethics issues, Professional Ethics, Codes of conduct, and moral responsibility, Privacy and

Cyberspace, Security in Cyberspace, Cybercrime and Cyber-related crimes, Intellectual property disputes in Cyberspace, Regulating commerce and speech in Cyberspace.

14B14CI647 Graph Algorithm and Applications

Planar graphs: planarity testing, problems that are easier on planar graphs, drawing planar graphs, planar separators, Intersection graphs and related classes: interval and chordal graphs, unit disc graphs, etc., Trees and related graphs: treewidth, series parallel graphs, problems that are easier on these, intro to graph minors.

14B14PH611 Materials Science

Dielectric Materials: Polarization mechanism & Dielectric Constant, Behavior of polarization under impulse and frequency switching, Dielectric loss, Spontaneous polarization, piezoelectric effect; Applications of Dielectric Materials, Magnetic Materials: Concept of magnetism, Classification– dia, para, Ferro, antiferro and ferri-magnetic materials, Their properties and Applications; Hysteresis; Magnetic Storage and Surfaces.

Polymers and Ceramics: Various types of Polymers and their applications; Optical/ Mechanical behavior and Processing of Polymers; Structure, Types, Properties and Applications of Ceramics; Mechanical behavior and Processing of Ceramics, Superconducting Materials: Meissner effect, Critical field, type-I and type-II superconductors; Field penetration and London equation; BCS Theory, High temperature Superconductors and their Applications.

Nuclear Materials: Materials for Nuclear power generation, Reactors, Nuclear fuel, Optical Fibers and Laser communication: Light propagation in fibers and Graded Index fibers, Numerical Aperture and Attenuation, Single and Multimode fibers and their propagation characteristics, Low loss fibers, Connectors, Splicing and Splice loss. Couplers; Applications of Laser in various fields including Optical Communication using Optical Cables, Display Devices, Fluorescent Materials.

Year/Sem IVth Year/VII Sem

14B14HS741 Entrepreneurial Development

Concept of Entrepreneurship, Entrepreneurial Development Agencies, Business Planning, Entrepreneurial Development Programmes, Economic Development and Entrepreneurial growth, Importance of small scale industries.

14B14HS741 Managing and Marketing Technology

Understanding Marketing Management, Developing marketing strategies and capturing marketing insights, Strategic Planning and the marketing Process, Assessing opportunities in a dynamic marketing environment, The Marketing Environment, Managing and Marketing Information, Consumer and Business Buyer Behaviour, Developing marketing strategies and capturing marketing insights, Product and service strategy, Pricing products: Pricing considerations and strategies, Marketing Channels and Integrated-Marketing Communications, Managing marketing and growth.

14B14HS743 Entrepreneurship and Small Business

Entrepreneurship-Enterprise: Conceptual issues, Entrepreneurship vs. Management, Roles and functions of entrepreneur in relation to the enterprise and in relation to the economy. Entrepreneurship is an interactive process between the individual and the environment. The process of setting up a small business: Preliminary screening and aspects of the detailed study of the feasibility of the business idea and financing/non-financing support agencies to familiarize themselves with the policies/programs and procedures and the available schemes. Management roles and functions in a small business. Designing and re-designing business process, location, layout, operations planning and control.. The pros and cons of alternative growth options: internal expansion, acquisitions and mergers, integration and diversification, Crisis in business growth. Brief introduction to Single-Entry system of record keeping. Sources of risk/venture capital, fixed capital, working capital and a basic awareness of financial services such as leasing and factoring. The contemporary perspectives on Infrastructure Development, Product and Procurement Reservation, Marketing Assistance, Subsidies and other Fiscal and Monetary Incentives. National state level and grass-root level financial and non-financial institutions in support of small business development.

14B14HS744 Brand Management

Customer-Based Brand Equity, Brand Positioning. Choosing Brand Elements to Build Brand Equity, Designing Marketing Programs to Build Brand Equity, Integrating Marketing Communications to Build Brand Equity, Leveraging Secondary Brand Associations to Build Brand Equity. Developing a Brand Equity Measurement and

Management System, Measuring Sources of Brand Equity: Capturing Customer Mindset, Measuring Outcomes of Brand Equity: Capturing Market Performance. Designing and Implementing Branding Strategies, Introducing and Naming New Products and Brand Extensions, Managing Brands over Time, Managing Brands over Geographic, Boundaries and Market Segments.

14B14HS745 Human Resource Management

Human Resource Management: Meaning, Nature and Scope, HRM functions and objectives, evolution of HRM environment. Human resource development in India: evolution and principles of HRD Vs personnel functions, Role of HR managers. Strategic Human Resource Management: Nature of strategies and strategic management, strategic management process. Environment scanning, strategy formulation, implementation and evaluation. Human Resource Planning: Definition, purposes, processes and limiting factors. Human resources information system (HRIS): HR Accounting and audit, Job analysis- job description, job specification. Training and Development: purpose, methods and issues of training and management development programmes.

Performance Appraisal: definition, purpose of appraisal, procedures and techniques including 360 degree performance appraisal. Job evaluation and Compensation administration: nature and objectives of compensation, components of pay structure in India, Wage policy in India. Discipline and Grievance Procedures: definition, disciplinary procedure, grievance handling procedures. Industrial relations: nature, importance and approaches to industrial relations.

14B14HS746 Total Quality Management

Basics of Total Quality, Total Quality Management, TQM -Thinkers and Thoughts, Quality Awards. Cost of Quality, Team work for Quality, Total Employee Involvement Customer Satisfaction. Quality Circles, Kaizen, Six Sigma, People CMM, Benchmarking. Control of Accuracy and Precision, Process Capability, Statistical Process Control, Quality Function Deployment, Quality Management Systems, Design of Experiments (Taguchi Technique), FMEA, Total Productivity Maintenance. ISO: 9000 series, ISO: 14000 series.

14B11CI711 Artificial Intelligence and Applications

Introduction to AI and intelligent agents, Problem solving, Problem spaces and blind search techniques, informed search techniques, Constraint satisfaction problems, Knowledge representation and reasoning techniques, Logic programming, Logical agents, Game playing, Planning, Learning, Reasoning under uncertain situations, Expert systems, Decision support systems, Domain specific AI applications.

14B19CI791 Project Part-I

Title of the Project- This should be carefully decided by the student after discussing with the project supervisor or the guide. Explain the relevance and importance of the project, Write a brief (1 or 2 pages) introduction of the project explaining its relevance and importance. Requirements - Based on academic needs, the current technological pursuits and finding or knowing what the customers/markets need or require. Write in steps the project requirements. Feasibility Study- The general requirements were listed in section-3 and therefore the feasibility study may start. The feasibility study of project must be completed within 4 weeks. Scope/Objectives: By doing the project feasibility, the uncertainties and ambiguities are reduced. The team is now definite about Resources, Confidence, Viability, Realizability, Inadequacy and many such factors.

Requirement Analysis: Now one by one these requirements are to be analyzed and so as to generate general design inputs. Activity Time Schedule: Draw a suitable representation that indicates the proposed manner of execution of the project - starting from the start to the completion date. Detail Design - start of system and Subsystem level design, Design from the conceptual level block schematic, a detail architectural layout, indicate every subsystem and within them identify every small entity. Draw functional block schematics, data flow diagrams for every small entity, Write the algorithms, the pseudo code for every function calls, the subroutines, the recursions.

14B17CI771 Artificial Intelligence Lab

Introduction to AI and intelligent agents, Problem solving, Problem spaces and blind search techniques, informed search techniques, Constraint satisfaction problems, Knowledge representation and reasoning techniques, Logic programming, Logical agents, Game playing, Planning, Learning, Reasoning under uncertain situations, Expert systems, Decision support systems, Domain specific AI applications.

14B14CI741 Cryptography and Network Security

Foundation of Security & Cryptography: OSI security architecture, Classical encryption techniques, Mathematical Tools for Cryptography: Finite fields, number theory, Block Ciphers: Design principles, Data encryption standard, advanced encryption standard, multiple encryption and Triple DES, Block cipher modes of operation. Public Key Cryptography: RSA, Key management, Diffie-Hellman key exchange, Elliptic curve Arithmetic, Elliptic curve cryptography. Message authentication and Hash functions. Hash and MAC algorithms: Secure hash algorithm, HMAC. Digital Signature, Certificates & Standards. Authentication Applications: Kerberos, X.509 authentication service. Electronic Mail Security: PGP, S/MIME. IP Security Protocols. System Security: Computer virus, Firewall & Intrusion detection, trusted systems, Security investigation. Introduction to Trusted Computing.

14B14CI742 Network Management

Data Communications and Network Management Overview, Review of Computer Network Technology, Basic Foundations of Network management, standards, models and languages, SNMP v1 Organization and Information models, SNMP v1 Communication and functional Models, SNMP v2, SNMP v3, SNMP management RMON, Broadband Network Management: ATM Networks, Broadband Network Management: TMN, Network Management Tools and systems and applications, Network Management applications, Web Based Management.

14B14CI743 Fault Tolerant Computing Systems

System model - error, failure, faults, software fault tolerance, Byzantine agreement, fail-stop processors, stable storage, reliable and atomic broadcasting, process resiliency, data resiliency & recovery, commit protocols, reliability modeling & performance evaluation, crash recovery in databases, and voting methods.

14B14CI744 Introduction to Cognitive Science

History: What is Cognitive Science, Philosophy: Foundations of Cognitive Science, Cognitive Psychology: The Architecture of the Mind, Artificial Intelligence: Search, Control and Learning. Linguistics: The Representation of Language. Neuroscience: Brain and Cognition. Language Acquisition, Semantics, Natural Language Processing and Vision. Problems: Deduction, reasoning, problem solving, Knowledge representation, Planning, Learning, Natural language processing, Motion and manipulation, Perception, Social intelligence. Approaches: Cybernetics and brain simulation, Symbolic, Sub-symbolic, Statistical Integrating the approaches. Tools: Search and optimization, Logic Probabilistic methods for uncertain reasoning, Classifiers and statistical learning methods, Genetic algorithms.

14B14CI745 Ad-hoc and Wireless Networks

Ad-hoc Wireless Networks: Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet; MAC Protocols for Ad Hoc Wireless Networks: Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols; Routing Protocols for Ad Hoc Wireless Networks: Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Power-Aware Routing Protocols; Multi-cast routing in Ad Hoc Networks: Wireless Networks: Issues in Designing a Multicast Routing Protocol, Classifications of Multicast Routing Protocols, Energy-Efficient Multicasting, Multicasting with Quality of Service Guarantees, Application-Dependent Multicast Routing; Security Protocols for Ad Hoc Wireless Networks: Security in Ad Hoc Wireless Networks, Network Security Requirements. Issues and Challenges in Security Provisioning. Network Security Attacks. Key Management. Secure Routing in Ad Hoc Wireless Networks; Energy Management in Ad Hoc Wireless Networks: Classification of Energy Management Schemes, Transmission Power Management Schemes, System Power Management Schemes.

14B14CI753 Modelling for Computer Networks

Overview of Computer Network: Review of Data Link and Transport Layer Communication, Data link layer protocols and services overview, Flow handling and flow control, Error handling. Modeling: Importance of Modeling, Need Techniques Classification and limitations, Linear and Non Linear Growth Models Decay Models, Model Building, Simple Models, Complex models, Exact mathematical solution to communication networks, Mathematical Analysis. Queues Time Analysis: Waiting time for Queues, Interarrival and Service Times and their variability, Obtaining the average time spent in the queue. Routing Models: Internet Routing Fundamentals, Distance Vector Routing and Link State Routing, Modeling Random Routing Procedures. Simulation: Introduction to Simulation, Types of Simulators, Discrete Event Simulators, Simulating Networks Topologies.

14B14CI754 Component Based Software Engineering

Introduction-Component definition, Definition of a Software Component and its elements, The Component Industry Metaphor, Component Models and Component Services, An example specification for implementing a temperature

regulator Software Component. The Case for Components- The Business Case for components, COTS Myths. CBSE implementation in Java 8.

Planning Team Roles for CBD, Common High-Risk Mistakes, and CBSE Success Factors: Integrating Architecture, Process, and Organization. Software Engineering Practices - Practices of Software Engineering, From Subroutines to Subsystems: Component-Based Software Development, Case study of Car Navigation System.

The Design of Software Component Infrastructures - Software Components and the Modelling (UML), Component Infrastructures, Business Components, Components and Connectors, An OPEN process for CBD, Designing Models of Modularity and Integration. Software Architecture, Software Architecture Design Principles, Product-Line Architectures.

The Management of Component-Based Software Systems - Measurement and Metrics for Software Components, Implementing a Practical Reuse Program for Software Components, Selecting the Right COTS Software, Building instead of Buying, Software Component Project Management, The Trouble with Testing Components, Configuration Management and Component Libraries, The Evolution, Maintenance and Management of CBS.

Component Technologies - Overview of the CORBA Component Model, Overview of COM+, Overview of the EJB Component Model, Bonobo and Free Software GNOME Components, Choosing between COM+, EJB, and CCM, Event-driven component based architecture, Software Agents as Next Generation Software Components.

14B14CI755 Network Security

Introduction to cryptography, Attacks, Services, and Mechanisms, Security Attacks, Security Services, A Model for Internet work Security, Key exchange protocols, Diffie-Hellman and its variants, Man in the middle attack, PKI and certificate based key exchange, Key management, Protocol weakness in TCP/IP and other protocols, Various types of attacks, Security protocol at application level: PGP, SHTTP, SSH, etc. Security protocol at socket level: SS/TSL, Security protocol at network level: IPsec, Security protocol for remote connections through dial-up etc: PPTP, L2TP, Firewall and packet filtering, Proxy or application level gateways as security devices, Virtual private networks, Intrusion detection system, Privacy protection and anonymity services, Electronic payment system.

14B14CI746 Image Processing

Introduction and Digital Image Fundamentals: Digital Image Representation, Fundamental Steps in Image Processing, Elements of Digital image processing systems, Sampling and quantization, some basic relationships like neighbors, connectivity, Distance measure between pixels, Imaging Geometry. Image Transforms: Discrete Fourier Transform, Some properties of the two-dimensional Fourier transform, Fast Fourier transform, Inverse FFT.

Image Enhancement: Spatial domain methods, Frequency domain methods, Enhancement by point processing, Spatial filtering, Lowpass filtering, Highpass filtering, Homomorphic filtering, Colour Image Processing.

Image Restoration: Degradation model, Diagonalization of Circulant and Block-Circulant Matrices, Algebraic Approach to Restoration, Inverse filtering, Wiener filter, Constrained Least Square Restoration, Interactive Restoration, Restoration in Spatial Domain. Image Compression: Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Error free comparison, Lossy compression, Image compression standards.

Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation. Representation and Description: Representations schemes like chain coding, Polygonal Approximation, Signatures, Boundary Segments, Skeleton of region, Boundary description, Regional descriptors, Morphology. Recognition and Interpretation: Elements of Image Analysis, Pattern and Pattern Classes, Decision-Theoretic Methods, Structural Methods, Interpretation.

14B14CI747 Software Engineering Management

Agile: Agile development, Classification of methods, Agile principals, Agile project management, SCRUM, XP, EVO and UP Method overview, Life cycle, Work product, role and services, Common mistakes and misunderstandings, Process mixture, Adoption strategy. Requirement Management: Requirement management planning, Requirement Elicitation, Requirement Specification, Requirement Validation, Requirement change management.

Aspect Oriented Programming: Motivation and basic concepts, Join point models, Aspect's join point model, Other potential join point models, Inter-type declarations, Implementation, Comparison to other programming paradigms, Adoption risks, Implementations.

Software Architecture and Design Patterns: Introduction, Architecture Designs, Architectural Patterns, Creational patterns, Structural patterns, Behavioral patterns. Software Configuration management: Revision Control, Change management, Change item, Base line and audit. Software Quality Management: Quality concepts, Quality Assurance, Quality Planning, Quality control, Software measurement And metrics, Object oriented Testing.

Risk Management: Risk strategies, Risk Identification, Risk projection, Risk Mitigation, monitoring and Management.

Software reengineering and maintenance: Reverse engineering, Forward engineering, Restructuring, Reengineering Process Model.

14B14CI748 Remote Sensing and GIS

A brief history of remote sensing for earth observation: History of photography, Digital images, Evolution of platforms, Sensor Characteristics. Remote Sensing Basics: Remote Sensing Data Collection, Remote Sensing Process, Earth Observations, Electromagnetic Radiation, Atmospheric Energy-Matter Interactions. Frame Captured Sensors and Line Scanners: Frame Capture, Photographic Cameras, Digital Cameras, Videography, Scanners, Across-track Scanners, Along-track Scanners, Hyperspectral Scanners.

Satellite-based Sensors in Visible and Infrared Wavelengths: Low-spatial Resolution Sensors, Medium-spatial Resolution Sensors, High-spatial Resolution Sensors, Active Sensors: Radar and Lidar, Active Microwave (RADAR) Remote Sensing: Radar Interferometry, Passive Microwave Radiometers, Lidar, Lidar Principles, Lidar-derived Vegetation Information, Lidar-derived Urban Information, Sonar:Side-scan sonar, Multibeam sonar, Global Seafloor Topography. Aerial Imagery Visual Interpretation: Nature of Aerial Images, Ground Verification and Processing, Control Points, Ground Truthing, GIS Integration: Raster to Vector, Image Formats. Remote Sensing Applications: Agriculture, Forestry, Geology, Oceanography, Archaeology, Military, Urban Infrastructure.

14B14CI749 Information Retrieval & Data Mining

Introduction to Information Retrieval, Boolean Retrieval: Processing Boolean queries, Boolean models versus ranked retrieval. XML Retrieval: Basic XML concepts, challenges and evaluation of XML Retrieval. Probabilistic Information Retrieval: Probability Theory, Ranking Principle, Binary Independence Model, Tree structured dependencies, Web graph and Page Rank. Pattern Matching Algorithm: Some String Matching Algorithm.

Introduction to Data mining: data mining, Relational Databases, Data Ware houses, its applications and issues.

Data Preprocessing: Characteristics of Data Preprocessing, Data Cleaning, Data Integration, Data measuring techniques, Data reduction. Representation of data set using Box plot, Quintiles. Data Generalization, Data Warehousing, and On-line Analytical Processing, Association Rule Mining and Frequent Patterns: Basic concepts and a road map, Scalable frequent item set mining methods, mining various kinds of association rules.

Classification and prediction: classification and prediction, Classification by decision tree induction, Bayesian classification, Rule-based classification, Classification by back propagation, Frequent-pattern-based classification, other classification methods, and Prediction, Accuracy and error measures. Cluster Analysis: A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Methods, Clustering High-Dimensional Data, Constraint-Based Clustering, Link-based clustering, Outlier Analysis.

14B14CI750 Computational Complexity

Complexity Classes, NP and co-NP, Results on structure of NP-complete sets, Sparse NP-hard sets, Basic Inclusions and Separations, Nondeterministic Space Classes, Logarithmic Space, A PSPACE complete problem, Polynomial Hierarchy, PH through Alternating Quantifiers, Universal Relations, Probabilistic Classes, Schwartz-Zippel Lemma and BPP, BPP and its relationship with other Complexity Classes.

14B14CI751 Introduction to Queueing Networks

Introduction, Basic Queueing Theory, Analysis of M/G/1 Queue in Equilibrium, Advanced Queueing Theory, Fundamentals of Queueing Networks, Advanced Queueing Networks, Simulation Techniques for Queues and Queueing Networks.

14B14CI752 Data and Information Fusion

Multiple sources/sensors/modalities Fusion: Registration of data from similar sources, approaches to data fusion from similar and heterogeneous data, Feature selection and combination methods: Feature extraction, dimensionality reduction, Randomized generation and selection of feature sets, Feature selection and combination approaches, Classifier Ensemble Generation, Selection and Combination approaches: Classifier diversity, diversity versus fusion accuracy, Homogeneous and heterogeneous classifier ensembles generation, selection and fusion, Parallel and serial fusion approaches, Optimal fusion rule selection: theoretical and empirical approaches Classifier selection: local context, and classifier competence regions, Role of data distributions in classification, Context-aware clustering for estimating distributions, Optimal classifier ensemble generation based on estimated data distribution.

14B14EC748 Mobile Communications

Introduction to mobile communication, scope and application, Mobile communication system evaluation, Basic concepts, 1G, 2G, Evolved 2G & 3G, IMT2000, Multiple access technologies: FDMA, TDMA, CDMA, Spread Aloha multiple accesses, GSM standards, GSM Architecture, Typical call flow sequences in GSM, GSM radio aspects Radio interface, Protocols Localization and Calling, Hand over, CDMA cellular standards, CDMA security aspects, Key features of CDMA, Diversity techniques, Power control, Soft handoff, System capacity & Soft capacity, Mobile data communication. Switching Techniques, Circuit switched data services, Packet switch data services, Wireless local area networks, Wireless ATM (WATM), Wireless application protocol (WAP), Bluetooth, User Scenarios in Bluetooth, Bluetooth Architecture, Link Manager Protocol, Mobile network layer, Mobile IP, Physical layer, Mac layer, Services, Networking in WLL.

14B14EC750 Information Theory and Application

Review of probability theory, Definition and interpretation of information, Entropy, mutual information. Shannon Theorem, source encoding, Shannon-Fano Coding, Huffman Coding, coding efficiency, redundancy, source with finite memory. Communication Channel, Discrete Channel with discrete noise, Shannon's, second fundamental theorem, coding for memory-less noisy channels. Discrete channels with continuous noise, Continuous channel with continuous, noise, channel capacity theorem. Application of information theory in channel coding, detection and estimation, problem in communication.

14B14MA741 Applied linear Algebra

Subspaces, linear dependence and independence, span of a set, bases and dimension. Direct sum and complement. Definition, Algebra of linear transformations, isomorphism, representation by matrices. Rank and nullity theorem and its consequences. Change of basis. Inverse of linear transformation, linear functional, Transpose. Application to system of linear equations. Metric and normed spaces. Inner product and Inner product spaces. Orthogonality. Orthonormal basis. Gram-Schmidt orthogonalization. Expansion. Orthogonal and unitary matrices. Modal matrix and diagonalization. Similarity Transformation, Powers and functions of matrices. Eigen systems of real symmetric, orthogonal, Hermitian and unitary matrices. Quadratic forms. Positive definite matrices. Computation of eigen values. Norm of matrix. Condition number. Application to solving ordinary differential equations.

14B14MA742 Methods of applied Mathematics

Functional and its variation, Stationary values of a functional, Euler-Lagrange equations, Some special cases, Brachistochrone problem and its history, examples, more general cases, constraints and Lagrange multipliers, variable end points. Sturm-Liouville problems, vibration problems, Hamilton principle, Lagrange equations. Method of weighted residuals, Collocation, Galerkin and Ritz methods. Fredholm and Volterra type of integral equations, Relationship with differential equations, Green's function, Fredholm equation with separable kernel, iterative methods, Singular integral equations, Abel's equation Numerical methods. Finite element method, one dimensional problems, Ritz and Galerkin's methods, various type of elements and their shape functions, Stiffness matrix, Assembly of equations, Handling of the boundary conditions. Two dimensional problems, Triangular & rectangular elements, Stiffness matrices and assembly, simple three dimensional elements, comparison of FEM and FDM.

14B14MA743 Optimization Techniques

Formulation of Linear Programming (LP) and Non-Linear Programming Problems (NLPP) and their Graphical Solutions, Simplex Method, Sensitivity Analysis, Duality, Dual Simplex Method, Integer Linear Programming Problems, Transportation Problems, Assignment Problems, Introduction to NLPs, Kuhn-Tucker Conditions, Quadratic Programming Problem and their solution.

14B14MA744 Graph Theory

Graphs and Trees: Incidence and degree, Isomorphism, Subgraphs and union of graphs, Connectedness, Walks, Paths and circuits, Components, Connectedness Algorithm, Shortest path Algorithms, Eulerian graph, Hamiltonian graph- necessary and sufficient conditions, Traveling salesman problem, Bipartite graphs, Properties of trees, Centre of a tree, Rooted and binary trees, Spanning trees, Fundamental circuits, Spanning trees of a weighted graph, cutsets and cut-vertices, Fundamental cutsets, connectivity, separable graphs, Network flows, Max-flow Min-cut theorem. Planar Graphs: Combinational and geometric duals, Kuratowski's graphs, Detection of planarity, thickness and crossings, Matrix representations of graphs, Incidence matrices, Adjacency matrices and their properties, Chromatic number, Chromatic polynomial, the five color theorem, the four problem. Directed Graphs: Binary relations, directed graphs and Connectedness, Directed trees, Arborescence, Polish method, Tournaments, Counting labeled trees, Cayley's theorem, Counting methods, Polya Theory, Applications of graphs in Computer Science.

14B14MA745 Game Theory

Definition and explanation of some important term in games. Characteristic of game theory. Major limitation of game theory. Co-operative and Non co-operative games, zero-sum & nonzero-sum games. Examples: Types of strategies: pure strategies and mixed strategies. Maximin and minimax principles. Fundamental theorem of game. Saddle point (Equilibrium) point, rules of determining a saddle point. Optimal strategies and value of the game. (2x2) two -person zero-sum without saddle points, value of a game, fair and strictly determinable games. Definition of Convex set, Convexity of set of optimal strategies.

Games in coalitional form of n-Person, constant- sum games, Concept of core of a game. Concept of dominance in games, Inferior and superior strategies, dominance property. Generalized dominance property. Reduction of size of game. Graphical method for (2xn) and (mx2) games. Algebraic method for the solution of a general Game. Iterative method for approximate solution of a game. Symmetric games. Linear Programming, Canonical and standard forms. Simplex method, Duality in linear programming, principles of duality. Importance of duality. Solution of two-person, zero-sum game by transforming into linear programming. Prisoner's dilemma (Examples). Elementary concept of Shapely value and nucleolus in games.

14B14MA746 Integral Transforms

Introduction to integral transforms, Generalized integral transforms, Special functions: Gamma function, Bessel function, Jacobi function, Introduction and Evaluation of Mellin Transforms, Complex variable methods and applications, Introduction and Evaluation of Hankel Transforms, Finite Hankel Transforms and their applications, Continuous Time Wavelet Transform, CWT as an operator, Inverse CWT Transform, Discrete Wavelet Transform and Orthogonal Wavelet Decomposition.

14B14PH741 Nanoscience and Technology

Introduction, Synthesis of nanomaterials: different approaches of synthesis (Physical Techniques and Chemical Techniques). Characterization techniques of nanomaterials: SEM, STM, AFM, X-ray diffraction. etc. Properties of nanomaterials: Electronic, Magnetic, Optical, Chemical and Mechanical properties. Applications of Nanomaterials: Applications in memory and electronic devices, for magnetic recording, sensors, interfaces.

14B14PH742 Nonlinear Optics and Optical Communication

Fundamental Concepts: Review of electromagnetic field theory, in particular electromagnetic waves in vacuum and linear media, energy of electromagnetic waves. Origin of refractive index through simple classical Lorentz Oscillator model, normal and anomalous dispersion. Propagation of light in anisotropic media, electro-optic, acousto-optic and magneto-optic effects. Elementary Nonlinear Optics: Extension of Lorentz model in the nonlinear domain, description of nonlinear optical interactions, nonlinear susceptibility of a Classical Anharmonic Oscillator. Second harmonic generation, sum and difference frequency generation, properties of nonlinear susceptibility, Self-focussing phenomenon etc.

Fiber Optics: Geometrical optics description of light propagation through a fiber, numerical aperture its physical significance. Propagation of electromagnetic waves in medium with variable refractive index. Explicit analytical treatment of parallel plate wave guide, TEM, TE and TM modes of a fiber. Material dispersion and attenuation of pulses, pulse broadening. Single and multimode fibers, fiber bandwidth and dispersion management, Erbium-doped fiber amplifier. Isolators, connectors and splices. Characterization techniques including Optical time-domain reflectometer (OTDR). Some Contemporary Developments in the Field: Optical solitons in nonlinear optical fibers, cross-phase modulation (XPM) self-phase modulation (SPM), group velocity dispersion (GVD), four wave mixing (FWM) etc. A brief introduction to materials with negative index of refraction.

14B14PH743 Characterization Techniques

Introduction: Quantization of energy, Regions of the electromagnetic spectrum, Representation of spectra, Basic elements of practical spectroscopy, The width and intensity of spectral lines. Infrared & Raman Spectroscopy: Vibration of diatomic molecules, Simple Harmonic Oscillator, Anharmonic oscillator, Vibration rotation spectra of diatomic molecules, Vibration of polyatomic molecules, Analysis of Infrared techniques. Raman effect, Molecular polarisability, Rotational and vibrational Raman Spectra, Structure determination from Raman and Infrared spectroscopy.

Nano-Lithography: Lithography, Serial and parallel mode resist exposure, lithographic patterns, photo-lithography-coating, exposing, developing, etching, stripping, photolithography approaches- X-ray lithography, electron beam lithography. X-ray crystallography: Bonding in solids, Types of crystals, Miller Indices, Reciprocal lattice, X-ray diffraction, structural analysis with theoretical program such as retvield and applications.

Differential Scattering Calorimetry: DTA, TGA, DSC analysis of metal, semiconductor, insulator, polymer, alloys, and ceramic compounds. Atomic Force Microscopy: contact, non-contact and tapping mode of force measurement, surface roughness, atomic force measurement, particle size analysis. Electron Microscopy: Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM). Spin Resonance Spectroscopy: Interaction between spin and magnetic field, Nuclear Magnetic Resonance (NMR). Chemical shift, Analysis by NMR technique, NMR applications. Electron spin resonance spectroscopy (ESR) and applications.

14B14PH744 Nonlinear Dynamic Applications

First-order systems: First-order ordinary differential equations, flows on the line, autonomous systems, geometrical conceptions, fixed points and their stability, linear stability analysis, existence and uniqueness, potential formulation in an autonomous equation, the logistic equation (of an arbitrary degree of nonlinearity), power laws and exponential growth with saturation effects, bifurcations, flows on the circle, the uniform oscillator, the nonuniform oscillator and the overdamped oscillator.

Two-dimensional systems: Second-order ordinary differential equations, plane autonomous systems, the phase portrait and phase trajectories, coupled first-order autonomous dynamical systems, equilibrium points, linearised approximation near equilibrium points, the general solution of linearised autonomous dynamical systems and classification scheme for equilibrium points, Hamiltonian systems, closed paths and limit cycles, homoclinic and heteroclinic trajectories, Poincare-Bendixson theorem, Lienard systems, further concepts in bifurcation.

Chaos: Lorenz equations, one-dimensional maps, intermittency, Liapunov exponent, fractals, strange attractors. Practical problem-solving exercises: Nonlinearity leaves its imprint manifestly when the collective character of a system as a whole is qualitatively different from the sum of its individual components (a usual example of which is that one's pleasure is not necessarily doubled, when one listens to two favourite songs simultaneously).

Realistic physical systems are almost always nonlinear in character, and in many cases their nature is not very easy to decipher. Practical problems involving nonlinearity embrace a vastly diverse range comprising mechanically oscillating systems (such as a pendulum), lasers, biological cycles, electrical circuits, growth and decline in the population of species (the predator-prey model), spread of epidemics, spread of technological innovations astrophysical and laboratory fluid flows, cosmology, chemical oscillators, complex networks, economic growth and stagnation of industrial organisations, and even individual and collective human emotions like love and war. Examples like these would be studied as a part of the course, and related exercises would be worked on.

Numerical data pertaining to some illustrative problems would be analysed, and the universal character (e.g. a power law or exponential behaviour) of the given problem would be identified. Some of these exercises would involve numerical techniques like the Runge-Kutta algorithm (preferably coded in FORTRAN in a Linux environment), and model fitting of numerical data with the help of graph plotting software (e.g. Gnuplot).

14B14PH745 Simulation of Semiconductor Devices

Goal of modeling and history of device modelling, Fundamental Properties, Poisson's equation, Continuity equation Carrier transport, Basic semiconductor equation, Physical parameters modelling, Analytical investigation about the basic semiconductor equations, Discretization of the Basic semiconductor Equation include finite difference, finite elements approaches, solution of the system of nonlinear algebraic equation, Newton's Methods and extension, Iterative methods.

Year/Sem: IVth Year/VIII Sem

14B14HS841 Knowledge Management

Introduction, Types of Knowledge, Knowledge workers, Valuing knowledge, Communities of Practice, Content management, Creativity and Innovation, Knowledge management strategies, Business process and the process-oriented organization, Information and communication technologies (ICT), Management of intellectual capital, Different level of Knowledge management, Organizational culture, Developing human capital, Building and managing the knowledge repository.

14B14HS842 Industrial Psychology

Definitions & Scope of Industrial Psychology, Major influences on industrial Psychology- Scientific management and human relations schools Hawthorne Experiments. Motivation : Theories of Motivation: Early and Contemporary views, Three level Work Motivation Model, Motivating a Diverse Workforce, Stress management: Understanding Stress and Its Consequences, Causes of Stress, Managing Stress, Leadership: Style and Theories of Leadership-Trait, Behavioural and Situational Theories. Fatigue, Boredom, Accidents and safety, Job Analysis, Job Satisfaction, Recruitment and Selection – Different types of recruitment and selection tests, Reliability & Validity of recruitment

tests. Group Dynamics: Definition, Stages of Group Development, Group Cohesiveness, Formal and Informal Groups, Group Processes and Decision Making, Dysfunctional Groups, Organizational culture : Organisational Culture: Concept, Characteristics, Elements of Culture, Implications of Organisation culture, Process of Organisational Culture.

14B14HS843 Supply Chain Management

Introduction: Basic Concept & Philosophy of Supply Chain Management; Essential features, Various flows (cash, value and information), Key Issues in SCM, benefits and case examples. Logistics as part of SCM, Logistics costs, different models, logistics sub-system, inbound and outbound logistics, bullwhip effect in logistics, Distribution and warehousing management, Purchasing & Vendor management: Centralized and decentralized purchasing, functions of purchase, department and purchase policies. Use of mathematical model for vendor rating/evaluation, single vendor concept, management of stores, accounting for materials. Concept, various costs associated with inventory, various EOQ models, buffer stock (tradeoff between stock out/working capital cost), lead time reduction, re-order point/re-order level fixation, exercises –numerical problem solving , ABC, SDE/VED Analysis, Just-In-Time & Kanban System of Inventory management. Role of Computer/IT in Supply Chain Management, CRM Vs SCM, Benchmarking concept, Features and Implementation, Outsourcing-basic concept, Value Addition in SCM-concept of demand chain management.

14B14HS845 Strategic Management

Introduction, Strategic Management, Business Policy, Corporate Strategy, Basic Concept of Strategic Management, Mission, Vision, Objectives, Impact of globalization, Basic Model of Strategic Management, Strategic Decision Making, Impact of Internet and E-Commerce, Role of Strategic Management in Marketing, Finance, HR and Global Competitiveness. Environmental Scanning, Industry Analysis, Competitive Intelligence ETOP Study, OCP, SAP Scanning, Corporate Analysis, Resource based approach, Value-Chain Approach, Scanning Functional Resources, Strategic Budget and Audit.

SWOT Analysis, TOWS Matrix, Various Corporate Strategies: Growth/Expansion, Diversification, Stability, Retrenchment & Combination Strategy. Process of Strategic Planning, Stages of corporate development, Corporate Restructuring, Mergers & Acquisitions, Strategic Alliances, Portfolio Analysis, Corporate Parenting, Functional Strategy, BCG Model, GE 9 Cell, Porters Model: 5 Force and Porters Diamond Model, Strategic Choice. Strategy Implementation through structure, through Human Resource Management: through values and ethics. Mc Kinsey's 7S Model, Organization Life Cycle, Management and Control, Activity based Costing, Strategic Information System.

14B19CI891 Project Part-II

Module-1: Design from the conceptual level block schematic, a detail architectural layout, indicate every subsystem and within them identify every small entity.

Module-2: Draw functional block schematics, data flow diagrams for every small entity, Write the algorithms, the pseudo code for every function calls, the subroutines, the recursions.

Module-3: Convert all above designs (at the entity, subsystems, system levels) into programs.

Module-4: Execute or Run the programs step by step for each module, subsystem or any other entity considered necessary for the purpose of debugging and performance evaluation and design validation. Finally integrate all subsystems so as to realize the over system.

Module-5: Perform all system level test, evaluate the results and compare with the project scope/objects and the requirements.

Module-6: Project Completion Report with complete documentation.

14B14CI841 Introduction to Grid Computing

Overview: The history and evolution of Grid computing, basic concepts of Grid Computing and requirements, Data Centre's, Metacomputing. Grid Architectures and Technologies: Technologies and Architectures for Grid Computing, Issues in Data Grids, Recent Technological trends in Large Data Grids, World Wide grid computing Activities, Organizations and Projects, Web Services and SOA, Open Grid Services Architecture (OGSA), WSRF and Globus Toolkit, Storage Resource Broker.

14B14CI842 Parallel Computing

Introduction: Paradigms of parallel computing: Synchronous - vector/array, SIMD, Systolic; Asynchronous - MIMD, reduction paradigm. Need for Higher-Performance computers, Methods used to achieve Higher Performance, Classifying Architectures Hardware taxonomy: Flynn's classifications, Handler's classifications. Abstract parallel

computational models: Combinational circuits, Sorting network, PRAM models, Interconnection RAMs. Parallelism approaches - data parallelism, control parallelism, Models of Parallel Computation: Processor organization, Processor arrays, Multiprocessors and Multi-computers.

Performance Matrices: Laws governing performance measurements. Matrices - speedups, efficiency, utilization, communication overheads, single/multiple program performances, bench marks. Parallel Processors: Taxonomy and topology - shared memory multiprocessors, distributed memory networks. Processor organization- Static and dynamic interconnections. Parallel Programming & Designing Parallel Algorithms: Developing algorithms for Processor Arrays, Shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming. Sorting on different models of SIMD. Matrix Multiplication: Matrix multiplication for different models of Processor arrays and multiprocessors. Scheduling and Parallelization: Scheduling parallel programs. Loop scheduling. Parallelization of sequential programs. Parallel programming support environments.

14B14CI843 Data Mining Tools and Applications

An overview of data mining: Data Mining: applications, Knowledge discovery, Challenges, Data mining tasks, Examples. Data: Different types of data, Quality of data, Data preprocessing methods. Measures of similarity and dissimilarity of data, The Iris data sets, Summary statistics, Visualization: Motivations, General concepts, Techniques of visualization, Visualizing higher dimensional data, Overview of OLAP and multidimensional data analysis.

Basic concepts of classification: Definition, Descriptive and Predictive modeling, General, approach to solving a classification problem, Decision Trees, Model over fitting Evaluating the performance of a classifier, Methods for Comparing classifiers. Alternative techniques of classification: Rule based classifier, nearest neighbor, classifiers, Bayesian classifiers, artificial neural networks. Association analysis: Basic concepts: Problem Definition ,Frequent Item set generation, Rule generation, compact item sets, Alternative methods for generating frequent item sets. Evaluation of association patterns. Cluster analysis: Basic concepts and algorithms: K means, Agglomerative hierarchical clustering, DBSCAN, Cluster evaluation.

14B14CI844 Distributed Systems

Introduction: Introduction to distributed systems, Definition of distributed systems, goals, hardware concepts, software concepts, the client-server model. Communication: Layered protocols, remote procedure call, remote object invocation, message-oriented communication, stream-oriented communication. Processes: Threads, clients, servers, code migration, software agents. Naming: Naming entities, location mobile entities, removing unreferenced entities. Synchronization: Clock synchronization, logical clocks, global state, election algorithms, mutual exclusion, and distributed transaction. Security: Secure channels, access control, security management, Examples: Kerberos, Sesame, electronic payment systems.

14B14CI845 Multimedia Security

Introduction: Overview of Multimedia Systems, Secured Multimedia, Digital Rights Management Systems, and Technical Trends. Multimedia Content Security: Multimedia Compression Technologies and Standards, Multimedia Encryption, Multimedia Authentication, Multimedia Forensics. Introduction to Digital Watermarking: Overview of Digital Watermarking, Types of Digital Watermarking, Requirements of Watermarking, Digital watermarking and cryptography, Basic principles of watermarking, Applications of digital watermarking, Evaluation parameter of Watermarking.

Digital Watermarking in Various Domains: Overview, introduction to Watermarking in Various Domains, Orthogonal transforms, KL Transform, Discrete Cosine Transform based Watermarking, Discrete Wavelet Transform based Watermarking, and Fractional Fourier Transform based Watermarking, Reference Watermarking, Singular Value Decomposition in Watermarking: Introduction, Eigen values and Eigenvectors, Singular Value Decomposition, Singular Vectors in watermarking, principal component in watermarking, Hybrid Watermarking, Problem with Hybrid Watermarking, Adaptive Watermarking. Voice over IP security: Internet Protocol (IP), User Datagram Protocol (UDP), Real-Time Transport Protocol (RTP), RTP Payload, Packet Analysis, Network Security Issues and Solutions.

14B14CI846 Logic and Function Programming

Formal Languages, Basic syntax, standard I/O, data manipulation, flow control, Pointer manipulation, dynamic memory management, Error handling and debugging, Functional Programming, Scheme, Repetition through recursion, not iteration, Stateless programming, Logic Programming, Prolog, Concurrent programming, Process creation and communication, Multithreaded programming, synchronization.

14B14CI847 Soft Computing

Basics of Soft Computing, Fundamental of Neural Networks, Back-propagation Networks, Associative Memory, Adaptive Resonance Theory, Fuzzy Set Theory, Fuzzy Systems, Fundamentals of Genetic Algorithms, Genetic Modeling, Integration of Neural Networks, Fuzzy Logic, and Genetic Algorithms.

14B14CI848 Mobile Computing

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS. Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications. Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, file system, disconnected operations. Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment. 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.

14B14EC835 Mobile Computing

ISDN: Introduction, Standards, Protocol architecture, Connections, Addressing, interworking, UNI, Services: Bearer Services and Tele services, Basic and Supplementary Services. Frame Relay: Background, Protocol and services, SS-7: Architecture. ATM: Overview, Principle, Standards, Protocol, Transmission of ATM cells, ATM Adaptation Layer. Traffic and Congestion Control: Requirements for ATM Traffic and Congestion Control, ATM Services categories, ATM Traffic-Related Attributes. B-ISDN: Standards, Architecture, Services, Protocol Reference model SONET/SDH: Overview, Standards, Protocol. ATM based broadband Networks: Introduction, Hardware architecture, Software architecture, Switching principle and requirement, Transmission Networks.

14B14CI849 Introduction to Machine Learning

Introduction: Natural vs. Machine learning, Types of Learning. Inductive Classification: Concept Learning and General-to-Specific Ordering. Decision Tree Learning: Properties, Top-down Induction, Entropy, Overfitting, Other Issues. Artificial Neural Networks: Perceptron learning, Multilayer N/w, Backpropagation, Applications. Experimental Evaluation: Inductive hypotheses, Types of Tests, Comparing learning Algorithms, Significance Testing.

Bayesian learning: Naïve bayes, regression, Generative model and inference. Computational learning Theory: PAC model, Version Spaces, Complexity, Hypotheses Spaces, VC dimension. Instance based Learning: Distance Metrics, K-nearest neighbor and Variations. Evolutionary learning: Genetic algorithms, Fuzzy models. Support vector machine: Separation, Classification, optimization, applications. Other Learning: Reinforcement, statistical, unsupervised, temporal and explanation based learning. Analytical and Inductive learning: Analytical and Inductive learning.

14B14CI850 Algorithms Analysis and Design

Fundamental Concepts: Model of computation, Features of an algorithm, asymptotic analysis, Amortized Analysis, Proof Techniques. Algorithm Design Techniques: Recursive Procedures, Iterative Procedures, Divide and Conquer, Dynamic Programming, Greedy Approach, Branch and Bound, Backtracking. Network Flow and Matching: Flows and cuts, Maximum Flow, Maximum Bipartite matching, Minimum Cost Flow. Numerical algorithms: Flows and cuts, Maximum Flow, Maximum bipartite matching, Minimum Cost Flow. Geometric algorithms: Convex hull, closest pair, Intersection of line segments, Polygon triangulation. NP Completeness: Polynomial time and intractability, Space and time complexity, Problem Reductions, NP-completeness of satisfiability.

14B14CI851 Introduction to Natural Languages Processing

Natural Language Processing: applications and key issues, The lexicon and morphology, Phrase structure grammars and English syntax, Part of speech tagging, Syntactic parsing , top-down and bottom-up parsing strategies, Semantics, Word Sense Disambiguation, Semantic parsing, Subjectivity and sentiment analysis, Information extraction, Automatic summarization, Information retrieval and Question answering, Machine translation.

14B14CI852 Introduction to Digital Forensics

Introduction to Cybercrime, Understanding Computer Forensics, Data Recovery, Network Forensics, Image Forensics, Cybercrime and Cyberterrorism: Social, Political, Ethical and Psychological Dimensions, Case Studies on Digital Forensics.

14B14CI853 Neural Networks

Introduction, Neuron Model and Network Architectures, An Illustrative Example, Perceptron Learning Rule, Background on Linear Algebra, Supervised Hebbian Learning, Background on performance surfaces and optimization, Widrow-Hoff Learning, Backpropagation, Associative Learning, Competitive Networks.

14B14CI854 Client-Server Computing

Introduction: Client/Server Fundamentals, Driving forces behind client/server business perspective, Layered communication protocols, Enterprise computing Advantages & Disadvantages of client/server. Components of Client/Server Applications (Client) : The Role of the Client , Client Services, Request for Service , Remote Procedure Call (RPC), Message Services, Network Services, Application Services, Database Services, Types of Client, FAT, THIN, HYBRID.

Components of Client/Server Applications (Server): The Role of the Server, Server Functionality, Request Processing, File Services, Communications Services, Security Services, The Network Operating System, The Server Operating System. Components of Client / Server architecture (Connectivity): Open systems interconnection (OSI), Inter Process Communication, Interface Technology, Wide area Network Technology, Client/Server Systems development software, Platform Migration and Reengineering of Existing Systems, Client Server System development methodology, Client Server Systems development hardware, PC level processing units, Unit Workstation, server hardware, Mirrored disk, RAID, Disk array, CDROM, WORM, Network interface cards (NIC).

Applying Client/Server in Businesses: Reasons for adopting client/server technology, Benefits obtained from adopting client/server technology, a sensible approach towards client/server technology, Limitations for the client/server technology, Golden Rules of Client/Server Implementation. The Future of Client/Server Computing: Enabling Technologies, Expert Systems, Geographic Information Systems, Point-of-Service (POS), Imaging, Electronic Document Management, Multimedia, Electronic Data Interchange, Case Studies.

14B14CI855 Storage Area Networks

Introduction: Storage Networks, Fundamentals of Storage, Fiber channels, Network attached storage devices and its software requirements, Storage area networks and its H/W & S/W, Storage area networking solutions, Network attached storage solutions, Managing storage area networks, Securing storage area networks.

14B14EC843 Data Compression

Introduction, Math Preliminaries for Lossless Compression, Huffman Coding, Arithmetic Coding, Mathematical Preliminaries for Lossy Coding, Scalar Quantization, Vector Quantization, Math for Transforms, Subbands, and Wavelets, Transform Coding, Subband Coding, Wavelet Method.

14B14EC751 Digital T. V.

Analog TV: Elements of a visual communication system, Human Visual System: color sensitivity, gamma, spatial/temporal resolution, Basic concepts, Black & White TV signals, Raster scan concept, Interlacing (vs. progressive scanning), Frame and Field, Time Domain-SYNC: vertical and horizontal; composite (Active) video signal Spectrum Standards: RS 170, CCIR. Introduction to Colorimetry: Color TV Signals, Component: R G B; L-U-V; L-I-Q; L-Cr-Cb, Luma/Luminance, Composite, Gamma-Correction, Interleaving, Chroma/Chrominance, Color Subcarrier (fsc), Standards: NTSC (RS 170A), PAL, SECAM, Color Bar. Introduction to Digital TV: Digitizing Video Component, Digital Composite, Digital Aspect Ratios, Features & Benefits, Signal processing, Introduction to ATSC, Need for Data Compression, Information Theory Concepts, Visual Psychophysics, Predictive Coding, Motion Estimation, Motion Compensation, Transform Coding, Subband Coding, Vector Quantization, etc., JPEG: Baseline Processing, Variable Length Coding.

MPEG-1 & 2 Standard: Functional Block Diagrams, Syntax and Semantics, Video Compression, Audio Compression, System Layer, MPEG-1-2 Audio and AAC vs. AC-3, System Layer, Program and Transport Streams, Comparison Between MPEG-1 & 2, MPEG-2 Distribution: Optical Recording of the MPEG-2 Data Stream, DTV-Broadcast/ATSC. Satellite and Cable TV Distribution: DSP vs. Dedicated MPEG-1-2 IC's, Hardware vs. Software Solutions, Clock Recovery and Synchronization Issues, Sampling Strategies and Structures, CCIR-601 4:2:2 and 4:2:0; Interlaced/Non-interlaced VLSI Implementation, MPEG Processing Architecture and Implementation, Architectural choices, Format

Conversion, Limitations of Source Coding, Major Artifacts Associated with Video Compression, Subjective Evaluations of Digitally Compressed Video, MPEG-4-7 and Applications.

14B14MA841 Numerical Techniques

Solution of linear systems of equations- Direct and iterative methods, Eigen values and eigenvectors. Interpolation and Approximation. Numerical differentiation. Numerical integration. Solution of a single and a system of non-linear equations. Initial and boundary value problems in ODE. Numerical solutions of partial differential equations by finite difference method.

14B14MA842 Matrix Computations

Brief recapitulation of vector spaces; Basis and dimension, matrix as a linear transformation from R_n to R_m , Elementary row operations, elementary matrices, row echelon forms, Linear system of equations, Gauss elimination, LU decomposition, Inversion of a matrix, Block matrices, inversion by partitioning, Iterative methods, Eigen values and Eigen vectors, modal matrix, linear-independence of eigenvectors, diagonalization, Power and inverse power methods, Eigen systems of a Hermitian matrix, Jacobi method, Q-R algorithm, Generalized eigen value problem, Quadratic form, positive definite form, reduction to canonical form, powers and functions of matrices, application to solve discrete dynamical systems $x(t+1) = A x(t)$, $x(0) = x_0$ and a system of differential equations of the form $dx/dt = A x$, $x(0) = x_0$. Inner products in R_n and C_n , Norm of a vector and a matrix, compatibility, Induced norm, Spectral radius, Gershgorin's theorem, Condition number, Ill-conditioned system.

14B14MA843 Optimization Methods for Engineering

Introduction and concept of optimization, Optimization problems in chemical engineering, Heat exchanger, reactor, fluid flow, separation chain, inventory Control, Analytical methods for unconstrained single variable optimization, Various Numerical methods applicable to optimization of chemical processes. Graphical solution, Simplex method, Duality and dual simplex, Integer programming (Branch and bound only), brief review of Transportation problem, Assignment problem, EOQ single item static model, Static model with price breaks, Static model with shortage permitted Cost model, Aspiration level model Games of pure strategy, Games of mixed strategy: Solution of a 2×2 Game by mixed strategy.

14B14MA844 Mathematical Modelling and Computer Simulation

System Models–System, Components and Model, System Environments, Type of Activities, Continuous and Discrete System, System Modeling, Type of Model. System Simulation- Introduction , The Power of Simulation, Technique of Simulation, Advantage of Simulation, Basic Nature of simulation , Comparison of Analytical and Simulation Method, Real Time Simulation, Hybrid Simulation, Monte Carlo Simulation, Distributed Lag Models, Cobweb Model, Simulation of pure pursuit problem. Simulation of Continuous Systems - Introduction, Mathematical Modeling Tool, Analog versus Digital Simulation, Simulation of a Water Reservoir, Simulation of Servo System, Simulation of an Autopilot. Simulation of Discrete Systems - Discrete System, Simulation of Discrete System, Discrete Event Simulators , Components of Discrete Event Simulation , How Discrete Event Simulation works, Overview of Discrete System, Fixed time Step versus Events to Event Model, Random Number Generator.

Stochastic Processes- Simulation of Queuing Models - Introduction , Queuing Theory , Arrival Time Distribution , Transient State and Steady State , Assumption and Performance Measures For Queuing System , Classification of Queuing Models , Simulation of Single Server Queuing Model, Simulation of Multiple Server Queuing Model , Simulation of a Telephone System. Simulation of Inventory System -Introduction, Elements of Inventory System, and Classification of Inventory Cost Related to Inventory, Notifications for Inventory System, Size Of Demand and EOQ, Different Inventory Model, Simulation Model of Inventory System.

Simulation of PERT and CPM Network-Introduction, History of PERT and CPM, Components of PERT- CPM Network, Network Construction Using CPM and PERT, Step of Network Construction, Drawing the CPM/PERT Network, Gantt Chart, Limitations of PERT and CPM, Comparison of CPM and PERT, Simulation of PERT and CPM Network. System Dynamics - Introduction , System Dynamics Diagram and Notations , Feedback Diagram, Stock and Flow Diagram , Exponential Growth Models, Exponential Decay Models, Logarithmic Model, A one-Sector Inventory Model. Simulation Language– Introduction, Features of Structured Simulation languages, Continuous Simulation, Language, Different Type of Continuous Simulation Languages, Discrete Simulation Language, Different Type of discrete Simulation Languages.

14B14PH841 Quantum Computing

Introduction: Definitions of classical information, Quantum information and their differences. Thermodynamics and statistical mechanics: Introduction to thermodynamics; First and second law of thermodynamics; Microstates and Macro states; Entropy, Conditional entropy; Entropy as a measure of disorder (up to $S = k \ln(\omega)$). Classical theory of information: Basic ideas of classical information theory; Measures of information (information content and entropy); Maxwell's Demon; Data compression; The binary symmetric channel; error correcting codes; Classical theory of computation; Universal computer; Turing machine; Computational complexity; Uncomputable functions; Shortcomings of classical information theory and necessity of information theory.

Introduction to quantum mechanics: Basic ideas of quantum mechanics; Probability interpretation; Measurement problem; Hilbert space; Schrödinger equation. Quantum information: Qubit; Quantum gates; No cloning theorem (Why quantum information can't be perfectly copied); Dense coding; Quantum teleportation; Quantum data compression; Quantum cryptography; The universal quantum computer; Universal gate; Church-Turing principle; Quantum algorithms; Simulation of Physical systems; Shor's factorization algorithm; Grover's search algorithm; Experimental quantum information processors; Quantum error correction. Basic ideas of quantum computers and intelligent machines. Summary of entire course and a short of introduction to the present goals of quantum information technology.