COURSE STRUCTURE AND SYLLABUS

FOR

4-YEAR B. TECH. COMPUTER SCIENCE & ENGINEERING

Effective from 2012-2013 Batch

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
INDIAN SCHOOL OF MINES
DHANBAD- 826 004, JHARKHAND
<table>
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<tr>
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PS: Courses written in bold faces represent Capsule Courses/Courses offered by other departments.

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**Capsule Course**

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### LIST OF ELECTIVES FOR VII SEMESTER B. TECH - CSE

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### VIII SEMESTER B. TECH - CSE

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### LIST OF ELECTIVES FOR VIII SEMESTER B. TECH - CSE

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CORE COURSE SYLLABI OF I & II SEMESTER

AMC 11101 MATHEMATICS- I [3–1–0]

**Calculus-I:** Successive differentiation of one variable and Leibnitz theorem, Taylor’s and Maclaurin’s expansion of functions of single variable, Functions of several variables, partial derivatives, Euler’s theorem, derivatives of composite and implicit functions, total derivatives, Jacobian’s, Taylor’s and Maclaurin’s expansion of functions of several variables, Maxima and minima of functions of several variables, Lagrange’s method of undetermined multipliers, Curvature and asymptotes, concavity, convexity and point of inflection, Curve tracing.

**Calculus-II:** Improper integrals, convergence of improper integrals, test of convergence, Beta and Gamma functions and its properties, Differentiation under integral sign, differentiation of integrals with constant and variable limits, Leibnitz rule. Evaluation of double integrals, Change of order of integrations, change of coordinates, evaluation of area using double integrals, Evaluation of triple integrals, change of coordinates, evaluation of volumes of solids and curved surfaces using double and triple integrals. Mass, center of gravity, moment of inertia and product of inertia of two and three-dimensional bodies and principal axes.

**Trigonometry of Complex Number, 3D Geometry and Algebra:** Function of complex arguments, Hyperbolic functions and summation of trigonometrical series.

**3D Geometry:** Cones, cylinders and conicoids, Central conicoids, normals and conjugate diameters.

**Algebra:** Convergency and divergency of Infinite series. Comparison test, D’ Alembert’s Ratio test, Raabe’s test, logarithmic test, Cauchy’s root test, Alternating series, Leibnitz test, absolute and conditional convergence, power series, uniform convergence.

AMC 12101 MATHEMATICS- II [3–1–0]

**Vector Calculus and Fourier series:**

**Vector Calculus:** Scalar and vector fields, Level surfaces, differentiation of vectors, Directional derivatives, gradient, divergence and curl and their physical meaning, vector operators and expansion formulae, Line, surface and volume integrations, Theorems of Green, Stokes and Gauss, Application of vector calculus in engineering problems, orthogonal curvilinear coordinates, expressions of gradient, divergence and curl in curvilinear coordinates.
**Fourier Series:** Periodic functions, Euler’s formulae, Dirichlet’s conditions, expansion of even and odd functions, half range Fourier series, Perseval’s formula, complex form of Fourier series.

**Matrix Theory:** Orthogonal, Hermitian, skew-Hermitian and unitary matrices, Elementary row and column transformations, rank and consistency conditions and solution of simultaneous equations, linear dependence and consistency conditions and solution of simultaneous equations, linear dependence and independence of vectors, Linear and orthogonal transformations, Eigen values and Eigen vectors, properties of Eigen values, Cayley-Hamilton theorem, reduction to normal forms, quadratic forms, reduction of quadratic forms to canonical forms, index, signature, Matrix calculus & its applications in solving differential equations.

**Differential Equations:** Differential Equations of first order and higher degree, Linear independence and dependence of functions. Higher order differential equations with constant coefficient, Rules of finding C.F. and P.I., Method of variation of parameter Cauchy and Legendre’s linear equations, Simultaneous linear equations with constant coefficients, Linear differential equations of second order with variable coefficients; Removal of first derivative (Normal form), Change of independent variable, Applications of higher order differential equations in solution of engineering problems.


**Recommended books for Mathematics I & II:**

**APC11101/APC12101 PHYSICS [3-0-0]**

**Thermal Physics:** Concepts of distribution of molecular velocities; Distribution laws and statistics MB, FD and BE, mean free path; Transport phenomena-viscosity, diffusion; thermal conductivity, measurement of thermal conductivity; periodic and aperiodic flow of heat; Wiedemann-Franz law. Heat radiation; black body and black body radiation; Planck’s distribution law and its application to classical distribution (Rayleigh-Jeans and Wiens) and total radiation (Stefan-Boltzmann) laws.

**Modern Physics:** Brief idea of molecular spectra; Rigid rotator, spectra of simple molecules, rotation and rotation-vibration spectra. Brief idea of wave pocket and wave function, Schrödinger equation, Particle in a Box. Free electron theory; qualitative idea
of band theory of solids and Hall effect, Laser and laser systems (He-Ne and Ruby Lasers).

**Electromagnetics and Electrical Phenomena in Rocks:** Maxwell’s field equation, Equation of electromagnetic field, Propagation of electromagnetic waves in different isotropic media, energy of electromagnetic waves, Poynting’s theorem & Poynting’s vector. Rocks and minerals as dielectrics, electrical conductivity and electrical phenomena in rocks, Piezo-, ferro-, tribo-, and pyro-electricity.

**Recommended Books:**
1. Heat And Thermodynamics; Brij Lal & Subrahmanyam; S Chand & Co Ltd; 2001
2. Thermal And Statistical Physics; R B Singh; New Age Publications; 2009
3. An Introduction To Thermal Physics; Schroeder; Dorling Kindersley India; 2007
4. Thermal Physics And Statistical Mechanics; Roy & Gupta; New Age Publications; 2001
5. Concepts Of Modern Physics; Beiser; McGraw-Hill Science; 2010
6. Modern Physics; Sivaprasath & Murugeshan; S. Chand Publisher; 2009

**APC11201/APC12201 PHYSICS PRACTICAL [0-0-3/2]**

Measurement of thermal conductivity of bad conductors, Optical experiments on Diffraction using diffraction grating, Experiments on Semi-conductors – Measurement of band gap and Hall Effect, experiments using He-Ne Laser - Diffraction Experiments to measure diameter of circular aperture, Polarisation Experiments to measure Brewster’s angle & refractive index.

**ACC11101 / ACC11102 CHEMISTRY [3-0-0]**

**Cement:** Manufacturing, composition, setting and hardening of cement.

**Glass:** Types of Glasses, Manufacturing & properties of Glasses.

**Polymer:** Classification, structure-property relationship, conductive polymers.

**Solid Fuel:** Structure of coal, classification of coal, Effect of heat on coal, carbonization and pyrolysis. Recovery and purification of byproducts obtained from coke ovens; Distillation of coal tar; coal.

**Liquid fuel:** Composition of crude oil, processing of crude oil, distillation, sweetening and cracking (basic concepts), octane number, Cetane number. Additives to improve the quality of diesel and petrol, bio-diesel.

**Gaseous fuel:** Characteristics of good fuel; calorific value, theoretical calculations of calorific value of a fuel, natural gas and hydrogen gas.
Phase rule & Phase equilibrium: Phase rule; degree of freedom, one and two component systems, temperature and composition diagrams, liquid-liquid and liquid-solid phase diagrams.

Lubricants: General characteristics of lubricants, chemistry of lube oil and greases. Reclamation of lubricants.

Equilibrium: Electrochemistry; Electric potentials at interfaces, electrodes, batteries. Electrochemical cells and their applications.

Corrosion: Chemical and electrochemical corrosion, classification, factors affecting corrosion, Form of corrosion and general methods of corrosion prevention.

ACC12101 / ACC12102 CHEMISTRY PRACTICAL [0-0-3/2]

2. Determination of Temporary Hardness of tap water.
3. Estimation of Total Hardness of water.
4. Determination of Iron in Ferrous Ammonium Sulphate solution (Redox titration).
5. Determination of Copper in crystallized Copper-Sulphate.
7. Determination of Molecular Weight of Organic Acid by Titration method.
8. Estimation of Sodium Carbonate and bicarbonate in a mixture.
9. To determine the saponification number of an oil.
10. To determine the rate of hydrolysis of methyl/ethyl acetate.
11. To prepare Chrome Alum.

Recommended Books:
1. A Textbook of Engineering Chemistry - Sashi Chawla

MMC 11101/ MMC 12101 ENGINEERING GRAPHICS [1–4–0]

Introduction: Drawing instruments and their uses; Indian standards for drawing. Lettering and Types of lines used in engineering graphics.

Curves used in engineering practice: Conic sections, ellipse, parabola, hyperbola, cycloid, epicycloid, hypocycloid, involutes and spiral.

Projections: Orthographic projection, projection of points in different quadrants, projection of lines, projection of lines parallel to one and inclined to the other reference plane, projection of lines inclined to both the reference planes.

Multi view orthographic projections: First angle and third angle projections, conventions used, Conversion of three-dimensional views to orthographic views.
Projection of Solids and Development of surfaces

**Isometric projections:** Isometric views, conversion of orthographic views to isometric views.

**Recommended Books:**
1. Engineering Drawing - N D Bhatt
2. Engineering Graphics - S C Sharma & Naveen Kumar
3. Engineering Drawing - P S Gill
4. Engineering Drawing with Auto-CAD - Parvez, Khan & Khalique

**MMC 111021/ MMC 12102 MANUFACTURING PROCESSES** [1-4-0]

**Carpentry:** Classification of timber, seasoning & preservation to wood, description and application of the various tools used in carpentry, different joints and their practical uses.

**Forming:** Introduction to deformation and forming, types of forming processes and their applications, safety rule.

**Casting:** Introduction to foundry, pattern making, types of casting processes, purpose of runner and riser, application of casting, defects in casting, safety rules.

**Fitting:** Introduction to fitting jobs, fitting tools and their uses, safety rules.

**Welding:** Welding types, accessories, weldments.

**Machine Tools:** Types of cutting tools, types of machine tools and their specifications, safety rules.

**Measurement:** Use of measuring instruments etc for product measurement.

**Recommended Books:**
1. Workshop Technology part I, II & I IJ - W A J Chapman
2. Workshop Technology part I & II - Hazra Chowdhary
3. Workshop Technology part I & II - Raghuvanshi
4. Workshop Technology - S.K. Garg
5. Manufacturing Technology - P. N. Rao

**EEC 11102/12102 ELECTRICAL TECHNOLOGY** [3-0-0]

Concepts of circuit elements: active and passive elements; resistance, inductance, capacitance; mutual inductance and coupling. Network theorems (KCL, KVL, Thevenin, Norton, Maximum power transfer). Mesh and nodal analysis of DC circuits.

Single-phase transformer: construction, types, e.m.f equation, equivalent circuit diagram, hysteresis and eddy current losses, efficiency, applications.

DC Machines – construction and types, e.m.f and torque equation. DC generator – operation, e.m.f. equation, OCC, losses and efficiency, applications. DC motor – operation, torque equation, starting, losses and efficiency, applications.

Three-phase induction motor: construction, types, operation, torque equation, torque slip characteristics, starting methods, applications.

Recommended Books:
1. Electrical Engineering Fundamentals - V Del Toro.
2. Basic Electrical Engineering (Special Indian Edition) - J J Cathey, S A Nasar, P Kumar.

**EEC11201/12201 ELECTRICAL TECHNOLOGY PRACTICAL [0-0-3]**

Experiments on Thevenin’s theorem, R-L-C series circuit, Single phase power measurement, Characteristics of fluorescent lamp and incandescent lamp, OC and SC tests of single phase transformer, Open- circuit characteristics of DC separately excited generator, External Characteristics of separately excited DC generator, Three-point starter of DC shunt motor, Speed control of DC motor.

**ECC 11101/12101 ELECTRONICS ENGINEERING [3-0-0]**

Semiconductor Diodes and Applications – Introduction Characteristics, dc and ac resistances of a diode. Half wave and Full wave rectification. Zener Diodes and then use as regulators, Clippers and Clampers.


BJT Transistor – Amplification in ac domain, Equivalent transistor model. Hybrid Equivalent model, RC coupled amplifier and its frequency response.


Introduction to Field Effect Transistors and their applications.

**Recommended Books:**
1. Electronic Device and Circuit Theory - Boilestad & Nashelsky
2. Digital Principles & Applications - Malvino & Leach

**ECC 11201/12201 ELECTRONICS ENGINEERING (LAB) [0-0-3]**

2. Study of diode characteristics.
3. Study of regulated power supply.
4. Study of BJT characteristics.
5. Study of op-amp characteristics.
6. Implementation of Boolean algebra using logic gates.
7. Adder Circuits.

**MMC 11103/MMC12103 ENGINEERING MECHANICS [3-1-0]**

**Fundamentals of Mechanics:** Equivalent force systems, Equilibrium of rigid bodies.

**Introduction to structural mechanics:** Trusses, Frames, Machines, Beams, and Cables.

**Friction force analysis:** Sliding and Rolling friction, Screw, Belt and Collar friction

**Properties of surfaces:** Centroid of composite bodies, Pappus-Guldinus theorem, moment of inertia of composite bodies, parallel axis theorem, product of inertia, principal axes, Mohr's circles for moments and products of inertia.

**Virtual work:** Principle and applications, Stability of equilibrium.


**Kinematics of rigid bodies:** General plane motion, Instantaneous center of rotation, Planer motion relative to a rotating frame, Coriolis acceleration, Frame of reference in general motion.

**Kinetics of rigid bodies:** Application of the principle of impulse and momentum to the 3D motion of a rigid body, Kinetic energy in 3D, Euler's equations of motion, Motion of a Gyroscope, Eulerian angles.

**Recommended Books:**

CSC 11101/CSC 12101 COMPUTER PROGRAMMING (S) [3–0–0]

Programming in C
C Fundamentals: Introduction to C, Data types, Constants and variable declaration, Scope, Storage classes, Data input and output functions, Sample programs.
Control & Looping Statements: if, while, for, do-while, switch, break and continue statements, nested loops.
Arrays: Declaration, Initialization, Processing an array, 1D, 2D and multidimensional arrays, Strings and their Operations.
Functions: Defining functions, Function prototypes, Accessing a function, Passing arguments, Passing arrays and Recursive functions.
Pointers: Declaration, Operations on pointers, passing pointers to a function, Pointers and arrays, Array of Pointers.
Structures & Unions: Defining a structure, processing a structure, User defined data types, Structure and pointers, passing structure to a function, Self referential structures, Unions.
File Management: File operations, Creating and processing a data file, Command line arguments.

Programming in JAVA
Fundamentals of Object-Oriented Programming: Basic concepts, Objects and classes, Data abstraction and encapsulation, Inheritance, Polymorphism and Dynamic binding.
JAVA Evolution: Java features, Java versus C and C++, Creating, compiling and running a Java program, Constants, Variables, Data types, Operators and Expressions, Decision making and branching, Decision making and looping, Classes, objects, and methods, Sample programs.

Recommended Book:
Laboratory experiments will be based on the materials covered in the theory of this paper emphasizing the following topics:
1. Control statements
2. Arrays with applications
3. String Handling
4. Structure with applications
5. Pointers with applications
6. File handling in C
7. Programs on Java

Part A: AGL

Earth Dynamics: Interior of the Earth, Composition of the Earth, Seismic waves, Seismograph, Plate Tectonics, Basics of Earthquake Engineering, Landslides, Volcanoes.
Geological Oceanography: Sea waves, Tides, Ocean currents, Geological work of seas and oceans, Tsunami and its causes, Warning system and mitigation.
Glaciology: Glacier types, Different type of glaciers, Landforms formed by glacier.
Geological bodies and their structures: Rock, mineral, batholith, dyke, sill, fold fault, joint, unconformity.

Part B: ESE

Earth’s Atmosphere: Structure and composition of atmosphere, Atmospheric circulation, Geological work of wind, Greenhouse effect and global warming, Carbon dioxide sequestration. Steps to maintain clean and pollution free atmosphere with governing laws, precautionary measures against disasters.
Natural Resources: Renewable and non-renewable resources, Mineral and fossil fuel resources and their geological setting, mining of minerals and conservation, effect of mining on surface environment.

Recommended Books:
1. Earth’s Dynamic Systems – W. Kenneth and Eric H. Christiansen
2. Exploring Earth: An introduction to Physical Geology – John P. Davidson
3. Holmes Principles of Physical Geology – A. Holmes (Revised Ed. Doris L. Holmes)
4. A Textbook of Geology – P K Mukherjee

(DMS/APD)(11301/12301) DISASTER MANAGEMENT & ENERGY [3-0-0] RESOURCES

DISASTER MANAGEMENT(S) [2-0-0]

Concepts of Disaster, Types of Disaster and Dimensions of Natural and Anthropogenic Disasters (cyclone, flood, landslide, subsidence, fire and earthquake);
Principles and Components of Disaster Management, Organizational Structure for Disaster Management, Disaster Management Schemes;
Introduction to Natural Disasters and Mitigation Efforts: Flood Control, Drought Management, Cyclones, Terror Threats;
Pre-disaster risk and vulnerability reduction; Post disaster recovery and rehabilitation;
Disaster related Infrastructure Development;
Role of Financial Institutions in Mitigation Effort;
Psychological and Social Dimensions in Disasters;
Disaster Management Support Requirements – Training, Public Awareness.

ENERGY RESOURCES [1-0-0]

Classification of energy resources and their availability; Renewable and non-renewable energy sources; World energy prospects; Environmental impacts; Energy, power and electricity; Energy scenario in India: Availability of conventional and nonconventional energy resources and future energy demand; Indian reserves and resources of natural oil and gas, coal and nuclear minerals; Potential of hydroelectric power, solar energy, thermal, nuclear, wind, tidal wave and biomass based power in India; Introduction to hydrogen energy and fuel cells.

Books Recommended:
HSS11305/HSS12305    VALUE EDUCATION, HUMAN RIGHTS AND
LEGISLATIVE PROCEDURE

Social Values and Individual Attitudes, Work Ethics, Indian Vision of Humanism, Moral
and Non-moral Valuation, Standards and Principles, Value Judgements.
Rural Development in India, Co-operative Movement and Rural Development.
Human Rights, UN declaration, Role of various agencies in protection and promotion of
rights.
Indian Constitution, Philosophy of Constitution, Fundamental Rights and Fundamental
Duties, Legislature, Executive and Judiciary: Their Composition, Scope and Activities.
The Legislature: Function of Parliament, Constitution of Parliament, Composition of the
Council of the States, Composition of the House of People, Speaker.
Legislative Procedure: Ordinary Bills, Money Bills, Private Member Bills; Drafting
Bills; Moving the Bills, Debate, Voting, Approval of the President/Governor.
Vigilance: Lokpal and Functionaries.

HSS 11101/HSS12101    ENGLISH FOR SCIENCE AND TECHNOLOGY    [3-0-0]

Language Resource Development: Using appropriate grammatical lexical forms to
express meaning-accuracy, range and appropriacy in grammatical lexical exercises.
Reading, Interpreting and Using Written, and Graphic Information: Using (reading and
writing) academic texts, articles in technical journals, instruction manuals/laboratory
instruction sheets, safety manuals and regulations, and reports; Using maps, graphs, plan
diagrams, flow-charts, sketches, tabulated and statistical data.
Writing Appropriately in a Range of Rhetorical Styles i.e. Formal and Informal: Writing
instructions, describing objects and processes; defining, narrating, classifying
exemplifying, comparing, contrasting, hypothesizing, predicting, concluding,
generalizing restating, and reporting; Note making (from books/journals); Writing
assignments; summarizing, expanding, paraphrasing; Answering examination questions;
Correspondence skills; Interpreting, expressing and negotiating meaning; Creating
coherent written tests according to the conventions.
Receiving and Interpreting the Spoken Word: Listening to lectures and speeches,
listening to discussions and explanations in tutorials; Note taking (from lectures);
Interacting orally in academic, professional and social situation; Understanding
interlocutor, creating coherent discourse, and taking appropriate turns in conversation;
Negotiating meanings with others (in class room, workshop, laboratory, seminar,
conference, discussion, interview etc.).

Recommended Books:
1. Robert, E. Dewey and Robert, H, Hurlbutt III. An Introduction to Ethics, Macmillan
COURSE DETAILS OF III SEMESTER B. TECH - CSE

CSC13101  PROGRAMMING LANGUAGE CONCEPTS  [3-1-0]


CSC13102  DATA STRUCTURES  [3-1-0]

Basic concepts; Mathematical Background; Complexity Analysis; Arrays: one dimensional, multi-dimensional, Sparse Matrix, Elementary Operations; Stacks: Representation, elementary operations and applications such as infix to postfix, postfix evaluation, parenthesis matching; Queues: Simple queue, circular queue, dequeue, elementary operations and applications; Linked lists: Linear, circular and doubly linked lists, elementary operations and applications such as polynomial manipulation; Trees: Binary tree representation, tree traversal, complete binary tree, heap, binary search tree, height balanced trees like AVL tree and 2-3 tree, tries, red-black tree, B-tree, other operations and applications of trees; Graphs: representation, Adjacency list, graph traversal, path matrix, connected components, DAG, topological sort, Spanning tree; Sorting: Selection sort, bubble sort, quick sort, merge sort, heap sort, radix sort; Searching: linear and binary search; Hashing: hash tables, hash functions, open addressing, File structures: Introduction, data file types, file organization, file access methods.

CSC13103  DISCRETE MATHEMATICS  [3-1-0]

Set Theory: Types of Set, Partitions of Sets; De Morgan’s Laws, Computer representation of Sets, Fuzzy Sets and its related operations, Partial Ordered Set; Mathematical Induction; lattices; Graph theory: Operations on Graph, paths, cycles, trees, connectivity; Mathematical Logic: Proposition and Predicate Logic and Calculus, Basic Logical Operations: Conjunction, Disjunction, Negation; Tautology and Rule of Inferences, Conjunctive and Disjunctive Normal Forms; Functions and Relations; Algebraic Structures: Binary Operation, Group: Properties, Types of Group, Lagrange’s theorem, Ring: Properties, Types of Ring, Integral Domain, Field, Combinatorics: Sum and Product Rules, Permutation with repetition of Objects, Circular Permutation, Restricted
Permutations, Pigeonhole principle, Multinomial Coefficient, Derangements; Boolean Algebra: Basic Theorems on Boolean Algebra, Duality Principle, Recurrence Relations; Generating Functions: Characteristic equation of recurrence relation, solution of homogeneous and non-homogeneous recurrence relations; Congruence Arithmetic: Elementary properties, Linear Congruence equation.

**EIR13101 DIGITAL ELECTRONICS [3-0-0]**

Basic of Boolean Algebra and Minimization Techniques; Combinational and sequential circuits; Introduction to finite state machine concept; Bipolar logic families: DTL, TTL, ECL, I^2L; MOS logic families: NMOS (EE and ED) and CMOS. Basic Digital circuits, Shift Register and Flip-flops and Counters; Semiconductor memories; Logic Implementation on ROM, PAL, PLA and Gate Array; Wave from generation using gates; Timing Circuits, Arithmetic Systems.

**AMR13101 METHODS OF APPLIED MATHEMATICS-I [3-1-0]**


Section – B: Special Functions: Solution in series of ordinary differential equations, singular points. Solution of Bessel and Legendre equations, recurrence relations and generating functions for J_n (x), orthogonal property and Integral representation of J_n (x). Legendre polynomial, Rodrigue’s formula, orthogonality properties, generating function for P_n (x). Elliptic integrals and Error function and their properties.

Section – C: Laplace Transform and PDE: Laplace transform of simple functions, first and second shifting theorems, t–multiplication and t–division theorems; Laplace transforms of derivatives, integrals and periodic functions. Inverse of Laplace transform and convolution property. Use of Laplace transform in evaluating complicated and improper integrals and solution of differential equations related to engineering problems.

Partial Differential Equations: Classification of partial differential equations, solutions of one dimensional wave equation, one dimensional unsteady heat flow equation and two dimensional steady heat flow equation in Cartesian and Polar coordinates by variable separable method with reference to Fourier trigonometric series and by Laplace transform technique.
CSC13201 PROGRAMMING LANGUAGE CONCEPTS LAB [0-0-3]

Laboratory experiments will be set based on the materials taught in CSC13101. It mainly includes programming Lab. assignments in various languages. Emphasis will be given on the implementation of the programs using OOPs (C++ / Java)

CSC13202 DATA STRUCTURES LAB [0-0-3]

Laboratory assignments will be based on the implementation of the basic operations and application algorithms using various data structures. Programs are to implemented using any preferable language such as C, C++, Java.

CAPSULE COURSE

CSR13101 DATA STRUCTURES [3-0-0]

Data structure overview, Data types, Creation and analysis of programs, Algorithm analysis; Different data structures: Arrays, Stacks, Queues, Circular queues, Priority queues, Linked lists together with the algorithms for their implementation and uses; Sorting algorithms: Insertion, Selection, Bubble, Quick, Merge, Heap etc; Searching algorithms: Linear searching, Binary searching, Hashing strategy, Hashing functions and hash search; Trees: Binary tree representation, Traversals, Binary search tree, AVL trees, Balancing, Rotations, Applications; Graphs: Representation, Traversals, Shortest-path problems, Applications; Recursive: Divide and conquer, Towers of Hanoi etc.
COURSE DETAILS OF IV SEMESTER B. TECH - CSE

CSC14101 COMPUTER ORGANIZATION & ARCHITECTURE [3-1-0]

Basic structure of computers; Instruction format, Instruction sequencing, Addressing modes; Central Processing Unit: Concepts, CPU Organization, Execution of Programs, Control Structure, Hardwired Control Unit, Micro-programmed Control Unit, RISC and CISC architecture, ALU Design; Computer Arithmetic: Addition and Subtraction of signed numbers, Design of Fast Adders, Multiplication of positive and signed numbers, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations; I/O Organization: Programmed, Memory-Mapped, Interrupts, Direct Memory Access; Memory Organization: Memory Hierarchy, Semiconductor RAM, ROM, Cache Memories, Cache Mapping, Performance, Virtual Memories, Secondary storage; Computer Peripherals: Key Board, Mouse, Scanners, VDU, Printers; Computer architecture: overview, Performance evaluation of CPU, Pipelining, Pipelining hazards, Static and Dynamic scheduling, Instruction level parallelism, Loop unrolling. Taxonomy of parallel computers, SIMD and MIMD Machines; Multiprocessor architectures, Cache coherence, Message Passing systems; Case Study of latest architectures.

CSC14102 ALGORITHM DESIGN AND ANALYSIS [3-1-0]


EIR14101 MICROPROCESSORS AND APPLICATIONS [3-0-0]

Intel microprocessor 8085 architecture, Instruction set of 8085, Assembly language of 8085, Addressing modes and different arithmetic, logical, data transfer and other instructions with simple programs, counter and time delays, BCD arithmetic, 16-bit operations, Stack and subroutine. Interrupt structure and serial I/O, Timing diagrams of different instructions, memory and I/O interface. Introduction to 8086 CPU, Addressing modes of 8086, Assembly language programs, Interfacing memory and I/O devices, DOS routines, Minimum and maximum modes of 8086. Interfacing different peripherals: 8155, 8255, PPI, 8254, 8279, 8259A, 8257 chips to 8085 and 8086. Introduction to 8087 Math
co-processor and I/O processor. Interfacing ADC, DAC and key board and different types of displays.

AMR14101  NUMERICAL AND STATISTICAL METHODS  [3-1-0]

Solution of a system of linear simultaneous equations by Gauss elimination, Gauss-Jordan, Crout’s triangularization, Jacobi and Gauss-Seidel iterative methods.
Finite difference, Symbolic relations, differences and factorial notation of a polynomial, data smoothing, Interpolation and Extrapolation, Newton-Gregory forward and backward, Gauss forward and backward, Stirling, Bessel, Everett, Lagrange’s and Newton’s divided difference formulae, Inverse interpolation by Lagrange and iterative methods, Cubic spline, Numerical differentiation and integration: Trapezoidal, Simpson’s 1/3rd, Simpson’s 3/8th, Wieddle and Gaussian quadrature formulae.
Numerical solution of first order ordinary differential equations by Taylor’s series, Picards, Euler’s, Modified Euler’s, Runge-Kutta, Adams-Moulton and and Milne’s methods. Solution of simultaneous first order and second order ordinary differential equations with initial conditions by Taylor’s series, Runge-Kutta and Milne’s methods.
Numerical solution of boundary value problems by finite difference and shooting methods.

B. Statistical Methods: Concept of a frequency distribution: Moments, skewness and kurtosis. Probability: Various approaches of probability-classical, frequency (statistical), subjective and axiomatic. Theorems on probability, conditional probability, independence, Bayes theorem.
Random variable-discrete and continuous. Distribution functions and their properties, probability mass and density functions, Mathematical expectation, Moment generating function and its properties.
Probability distributions: Bernoulli, binomial, negative binomial, Poisson and normal distributions. Theory of least squares and curve fitting.
Correlation–Simple, multiple and partial, Regression lines and regression coefficients; multiple and partial regression.
Test of Significance: Normal test, t-test, Chi-square and F-test.

HSC14306  ENGLISH FOR PROFESSIONAL COMMUNICATION  [3-0-0]

PART 1: PROFESSIONAL ORAL COMMUNICATION

1. The nature of group discussion: forms, functions, structural dimensions and interaction dimensions.
2. The conduct of group discussion: leadership functions, meeting management, providing the beginning, providing optimal participation, responding to problems, maintaining communication, coordinating, consensus testing, seeking
clarification, providing clarification, co-operation, initiating topic shift, guiding for progress, ensuring objectivity, creating the atmosphere, effecting closure and follow-up; participant responsibilities, preparing for participation, communicating effectively, contributing systematically, maintaining friendly attitudes; process evaluation

3. Starting meetings and discussions: Opening the discussion, problem analysis, stating objectives, suggesting good group procedure (Time management, speaking procedure, etc.)

4. Presenting and supporting opinions: asking for opinions, supporting opinions, giving opinions, making suggestions, asking for suggestions

5. Balancing points of views: expressing advantages, disadvantages and consequences; presenting alternatives; accepting and rejecting ideas and proposals, building up arguments

6. Professional listening: decoding and comprehending, taking notes, listening cues, micro-markers and macro-makers.

Job Interviews:

1. Job Interview (JI): The Interviewing Process, types of interviews and interview formats
2. Pre-interview Preparation techniques, Self analysis, Skills Assessment, company analysis, Job Analysis, Practice, Developing the Interview file
3. Projecting success: The beginning, the middle and the end of the interview
4. Interviewing Strategies
5. Upholding the personality and overcoming interviewing hazards

PART 2: PROFESSIONAL WRITING

Report Writing:

1. Mechanics of Professional writing: stages of writing, research and preparation, some basics
2. Report writing (RW): Characteristics of Business and Project Reports, Reports and other forms of communication, features of good reports
3. Types of reports (formal/Informal)
4. Structure of formal Reports: Front Matter, Main Body and Back Matter
5. Elements of formal reports: Organization, format and graphics
6. Style of Reports: Readability of reports, Choice of words and phrases, Construction and length of sentences and paragraphs

Business Correspondence

1. Nature and Principles of Business correspondence
2. Structure of Business letters
3. Business Letter formats
4. Letters giving instructions, inquiry letters, letters of complaints, letters urging action
5. Employment letters and applications; job query letters, job application letters, recommendation letters, follow-up letters, letters of acceptance, letters of refusal
6. C.V. & Resume writing
7. Business memos: form and structure  
8. Writing an effective memo  

Methods:  
1. Theoretical input  
2. Practical exercises, handouts and worksheets  
3. Interactive classroom tasks, simulation and role play  
4. Group communication tasks, simulation and role play  
5. Guided discussions and practice discussions  
6. Mock interview sessions  
7. Self and peer evaluation  
8. Audio-video input  
9. Written assignments  
10. Student Portfolio  
11. Quizzes  

TUTORIAL & PRACTICE SESSIONS  

For tutorial and practice sessions, students will be divided into small groups. The timetable for these sessions will be communicated to the students. The sessions will include guided group discussions, open group discussions, case study discussions, mock interviews, student's seminars, paper presentations, writing practice, and group writing projects.  

CSC14201  COMPUTER ORGANIZATION & ARCHITECTURE LAB  [0-0-3]  

Laboratory includes design of registers, shift registers, ALU, Serial adder, Carry Look-ahead adder design, Array Multiplier, Memory design, study and simulation of 5-stage pipelining, scoreborading, Tomasulo’s algorithm, Hardware based speculation, Loop unrolling, Multiple issue super scalar.  

CSC14202  ALGORITHM DESIGN AND ANALYSIS LAB  [0-0-3]  

Laboratory experiments will be set based on the materials covered in CSC14102. It includes programming assignments for practicing and designing on different algorithm design paradigms.
COURSE DETAILS OF V SEMESTER B. TECH - CSE

CSC15101 COMBINATORICS AND GRAPH THEORY [3-0-0]

Combinatorics: Introduction and scopes, permutations, combinations, derangements, Binomial and Multinomial coefficients, Principles of inclusion and exclusions; Generating functions, Theory of counting, Fibonacci numbers, Recurrence relations, Catalan numbers, Permutation groups, Burnside’s theorem, Polya’s theorem of counting, Cycle index, Stirling numbers, Euler numbers.

Graph theory: Introduction, Graphs and sub-graphs, representations, Paths, Cycles, diameter, girth, trees, connectivity, Eulerian tours, Hamilton cycles, matching, systems of distinct representatives, edge coloring, independent sets, cliques, vertex coloring, Ramsey theory, planar graphs, regular polyhedral, directed graphs, properties of some special graphs.

CSC15102 OPERATING SYSTEMS [3-1-0]


CSC15103 THEORY OF COMPUTATION [3-1-0]

Notation of Languages; Deterministic and Non-Deterministic Finite Automata, Regular Expression and their relation to Regular Language, Pumping Lemma for Regular Languages; Context Free Grammar and Languages and their relation to Push Down Automata; Turing Machines; Decidability and Undecidability; Introduction to Computational Complexity; NP Completeness Problems.
CSC15104 SOFTWARE ENGINEERING [3-0-0]


CSC15105 DATA BASE MANAGEMENT SYSTEMS [3-1-0]


CSC15202 OPERATING SYSTEMS LAB [0-0-3]

It includes experiments that supplement Process Synchronization, Deadlock Handling, CPU and Disk Scheduling etc. Shell programming, concurrent programming with IPC. The programming assignments may be given to build parts of an OS as mini projects forming small groups.
CSC15204    SOFTWARE ENGINEERING LAB    [0-0-3]

Laboratory experiments will be set to supplement the theory taught in Software Engineering. It includes programming and implementation for software design, testing and verification, Preparation of Test Cases etc. Working with the various CASE Tools like Caliber RM, TogetherSolo, Star Team etc. Case Study.

CSC15205    DATABASE MANAGEMENT SYSTEMS LAB    [0-0-3]

It includes the Session of writing SQL queries and team work to study, design and implement a mini-project related to the subject.
COURSE DETAILS OF VI SEMESTER B. TECH - CSE

CSC16101 ARTIFICIAL INTELLIGENCE [3-0-0]
Problem solving, search techniques, control strategies, game playing (minimax), reasoning, knowledge representation through predicate logic, rule-based systems, semantic nets, frames, conceptual dependency formalism; Planning. Handling uncertainty: Bayesian Networks, Dempster-Shafer theory, certainty factors, Fuzzy logic; Learning through Neural nets -- Back propagation, radial basis functions, Neural computational models - Hopfield Nets, Boltzmann machines. PROLOG programming

CSC16102 COMPUTER NETWORKS [3-1-0]

CSC16103 COMPUTER GRAPHICS [3-1-0]
Introduction; Graphics Hardware: I/O Devices, printers, non-VDU devices; Basic raster graphics algorithms for drawing primitives; Scan conversion; Region filling; Anti-aliasing: different types of solutions; Clipping techniques : lines, polygons, text; Generating characters; Geometrical transformations; viewing in 2D & 3D; Input devices; interaction techniques and tasks; Dialogue design; Object hierarchy; Representing curves and surfaces: Hermite, Bezier, and other related interpolation techniques, splines; Solid modeling; Projections: parallel, perspective, affine; Color: achromatic and colored light, color models and their inter conversion, CIE diagram; visible surface detection; illumination models & shading, mathematics for computer graphics, GUI: concepts of window programming, X-windows programming on unix / linux platforms, openGL programming in windows/linux environments.
Introduction to compiler, phases and passes of a compiler, Cousins of compilers: loaders and assemblers; Lexical analysis: Role, tokens, regular expressions, transition diagrams, Design of lexical analyzer generator; Syntax analysis: Role, context free grammars, ambiguity, top down parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR, LALR, LR); Syntax-Directed Translation (SDT): Scheme, Implementation of SDT, postfix notation, SDT to postfix code; Intermediate code generation: Intermediate language, translation of assignment statements, Boolean expressions, case statements; Error Detection and Recovery: Lexical-phase errors, Syntactic-phase errors; Code optimization: Sources, optimization of basic blocks, loops in flow graphs, loop optimization; Code generation: Issues, target machine, runtime storage management, basic block and flow graphs, next use information, a simple code generator, register allocation, DAG representation of basic blocks, peephole optimization, code generation from DAGs.

Different areas of Micro, economics and Macro-economics, Marginal utility analysis, Law of demand and its factors and exceptions, Demand curve. Elasticity of demand and its classification, Indifference curve and its properties, consumer’s equilibrium with the help of indifference curve. Law of supply and supply curve. Concept of elasticity of supply, Total revenue, Marginal revenue and average revenue, Different types of returns to scale, Concept of production function and its significance. Different cost concepts and their behaviors, Different cost curves, Significance and measures of cost, control. Features of perfect competition, Equilibrium of a firm under perfect competition both in the short run and in the long run, Equilibrium of monopoly, Conditions of price, discrimination, Equilibrium of discriminating monopoly, Features of monopolistic competition, Equilibrium of a firm under monopolistic competition both in the short run and in the long run.

Different theories of wage-determination, Different theories of interest determination, Sources of profit. Different components of consumption function and investment function, Relationship between money supply and price level, Concepts of demand-pull and cost-push inflation, Effects of inflation, Steps to control inflation. Criteria of economic development, Features of capitalism, Socialism and mixed economy, characteristics of developed and underdeveloped/developing economy. Economic planning and its types, significance of economic planning in developed and underdeveloped/developing economy. Labor intensive strategy and capital intensive strategy – Small unit strategy and big unit strategy – Public sector strategy and private sector strategy. Area of public finance, Merits and demerits of direct and indirect tax. Nature of the problem of investment decision, Methods of investment decisions for selecting the best project.
CSC16202 COMPUTER NETWORKS LAB [0-0-3]

Laboratory experiments will be set to supplement the theory taught in CSC16102. Protocol simulation, Socket programming, Program development for rlogin, ftp, SNMP, SMTP, etc. Exercises in network programming.

CSC16203 COMPUTER GRAPHICS LAB [0-0-3]

Laboratory experiments will be set to supplement the theory taught in CSC16103. It includes the familiarization of different graphic packages, programming assignments on different algorithms taught with special emphasis on drawing graphics primitives, projection, clipping, shading, removal of hidden surfaces, windows programming, openGL.

CSC16204 LANGUAGE PROCESSORS LAB [0-0-3]

Laboratory experiments are based on the materials covered in CSC16104. It includes programming assignments to build parts of a compiler a c-like programming language as mini projects in small groups.

CAPSULE COURSE

CSR16101 COMPUTER NETWORKS [3-0-0]

Overview of data communication and networking, Network architecture; Physical layer communication: Signals, Media, Bits, Digital transmission; Circuit/packet switching, Error detection/correction techniques; Data link control and protocols, Medium access control: Pure/slotted ALOHA, CSMA/CD, CSMA/CA; Ethernet addressing and wiring; Internetworking: Architecture, IP addressing, Address binding with ARP; Datagram encapsulation and fragmentation, Link state and distance vector routing, Dijkstra's/Bellman-Ford Algorithms, IPv6 Internet protocols, UDP and TCP, TCP segment format, Protocol ports, ICMP and error handling, Network applications: Client/Server concepts, Socket API, DNS, Electronic mail, HTTP and WWW including HTML.
COURSE DETAILS OF VII SEMESTER B. TECH - CSE

CSC17101  CRYPTOGRAPHY AND NETWORK SECURITY  [3-1-0]


CSC17102  PARALLEL AND DISTRIBUTED COMPUTING  [3-1-0]

Need, Parallelism in unprocessors systems; Models of Parallel computation; Topology of interconnection networks; review of pipelining, pipelined vector processing methods, Embedding other networks, Parallel algorithm design; Performance and scalability; Algorithms for array processors: sum, prefix computation, matrix multiplication; parallel sorting: odd-even transposition sorting, odd-even merging, enumeration sorting, bitonic sorting, odd-even merging network; Communication algorithms: One-to-all, all-to-one, all-to-all, Multiprocessor interconnection networks and algorithms; Dataflow computers; Parallel algorithms on systolic array; Reconfigurable processor array. Models of distributed computation; Design issues; Operating systems for distributed computing: Distributed algorithms and applications, Clock synchronization algorithms; Distributed memory systems; Message passing; Middleware; Point-to-point communication; Fault Tolerance; Fault tolerant routing.

CSC17201  CRYPTOGRAPHY AND NETWORK SECURITY LAB  [0-0-3]

Laboratory is mainly based on the materials taught on CSC17101, i.e., development of code for DES, IDEA, AES, RSA, MD5, SHA, DSA, IPSec, etc. and do experimentation. Mini projects may be given in small groups.

CSC17202  PARALLEL AND DISTRIBUTED COMPUTING LAB  [0-0-3]

The laboratory will be based on the simulation and implementation of the parallel algorithms (on a PC-cluster under Linux platform). The programs will be based on MPI programming. The laboratory assignments will be given as small projects.
## ELECTIVE SUBJECTS (VII SEMESTER)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSE17101</td>
<td>IMAGE PROCESSING</td>
<td>3-0-0</td>
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<tr>
<td></td>
<td>Introduction, image formats, image enhancement techniques in spatial and spectral domain: contrast enhancement, histogram processing, noise smoothing, sharpening, background correction, color enhancement, image restoration, motion blur removal, geometric/ corrections, image compression and coding, edge detection, edge linking, edge relaxation, image segmentation, multi-resolution techniques, fractals, wavelets, shape and representation, and practical applications, hands on using MATLAB.</td>
<td></td>
</tr>
<tr>
<td>CSE17102</td>
<td>ADVANCED ALGORITHMS</td>
<td>3-0-0</td>
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<td></td>
<td>Algorithm paradigms, Advanced graph algorithms, shortest paths, NP-completeness, Randomized algorithms, Linear programming; Geometric algorithms, Range searching, Convex hulls, closest pairs; Numerical algorithms, Matrix and Polynomial multiplication, FFT, Euclid’s algorithm, Primality testing, Cryptographic computations; Internet algorithms, Pattern matching, information retrieval, data compression, Web cashing.</td>
<td></td>
</tr>
<tr>
<td>CSE17103</td>
<td>FUNCTIONAL AND LOGIC PROGRAMMING</td>
<td>3-0-0</td>
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Introduction to declarative programming paradigms. Logic as a system for declarative programming. The use of resolution and theorem-proving techniques in logic programming. Logic programming foundations: preliminaries, definite program, Herbrand model, SLD and SLDNF resolution, cut operator. Prolog programming
Techniques (Nondeterministic programming Parsing with DCG’s) . CASE studies: LISP, PROLOG.

CSE17104 OBJECT ORIENTED DATA MODELING [3-0-0]

Review of programming practices and code-reuse; Object model and object-oriented concepts; Object-oriented programming languages and implementation; Object-oriented analyses and design using UML structural, behavioral and architectural modeling; Unified development process, Software reuse design patterns, components and framework; Distributed object computing, interoperability and middleware standards COM/DCOM and CORBA; Object-oriented database system data model, object definition and query language, object-relational system.

CSE17105 INFORMATION AND CODING THEORY [3-0-0]

Information Theory: Introduction, measure of Information, Mutual information, Joint and conditional Entropy, Discrete memoryless Source(DMS), Channel capacity, Huffman encoding, Arithmetic encoding, Lempel-Ziv encoding Coding Theory: Introduction, Error detection and Correction, Binary Symmetric Channel(BSC), Linear block codes: Encoding and Decoding, Parity and Generator matrices, Hamming Code, Tanner Graph, Low Density Parity Check Code and its types, Cylic code: Generation and Decoding, Burst error detection and correction, Syndrome calculation, Bose-Chaudhuri Hocqenghem(BCH) codes and Reed-Solomon codes, Convolution code, Code tree and state diagram, Turbo coding.

CSE17106 MULTIMEDIA SYSTEMS [3-0-0]

An overview of multimedia system and media streams; Source representation and compression techniques text, speech and audio, still image and video; Graphics and animation; Multi-modal communication; Multimedia communication, video conferencing, video-on-demand broadcasting issues, traffic shaping and networking support; Trans-coding; Multimedia OS and middleware; Synchronization and QoS; Multimedia servers, databases and content management; Multimedia information system and applications.

CSE17107 PATTERN RECOGNITION [3-0-0]

Introduction, probability distribution, linear models for regression, linear models for classification, classifiers based on Bayes decision theory, linear and nonlinear classifiers, feature selection, generation, dimensionality reduction, template matching, context
dependent classification, system evaluation, clustering, cluster validity, kernel methods, sparse kernel methods, graphical methods, mixture model and EM.

CSE17108 ADVANCED COMPILERS [3-0-0]

Introduction to code optimization, efficient code generation and parallelizing compilers. Data-flow analysis: Classical theory, bi-directional flows, unified algorithms, etc. Efficient code generation: Algorithms, register allocation heuristics and automated tools. Parallelism detection: Data dependence, control dependence, various restructuring transformations on loops. Inter-procedural analysis: Constant propagation, data dependence, etc. Selected case studies.

CSE17109 DATA MINING [3-0-0]

Introduction: Data mining functionalities, classification and integration of a data mining system with data warehouse system; Data preprocessing: data summarization, data cleaning, data integration and transformation and data reduction; Data warehouse and OLAP Technology: a multidimensional data model, data warehouse architecture, Data warehouse implementation, from data warehousing to data mining; Mining Frequent Patterns; Associations and correlations: efficient and scalable frequent item-set mining methods, mining various kinds of association rules, constraints based association mining; Classification and prediction: classification by decision tree induction, rule-based classification, classification by back propagation, evaluating the accuracy of classifier or predictor, accuracy and error measures, model selection; Cluster analysis: data types, cluster analysis, partitioning, hierarchical and density based methods, outlier analysis. Mining data streams, Time series data, and sequence data, Graph mining, spatial data mining, multimedia data mining, text mining, mining the World Wide Web, data mining applications.

CSE17110 COMPUTATIONAL GEOMETRY [3-0-0]

CSE17111 EVOLUTIONARY COMPUTATION [3-0-0]


CSE17112 COMPLEXITY THEORY [3-0-0]

Turing machines and non-determinism, Models of computation like RAM and pointer machines, Relations between complexity classes. Time-space trade-off for some fundamental problems. Reduction and completeness, Randomized complexity classes, Boolean circuit complexity. Cryptography, cryptanalysis and one-way hash function. Polynomial hierarchy, P-space completeness, Interactive proofs and hardness of approximation, Parallel complexity classes.
COURSE DETAILS OF VIII SEMESTER B. TECH - CSE

CSC18101    VLSI DESIGN    [3-1-0]

Introduction to MOS technology; MOS transistor theory, Fabrication, MOS Switches, Pass transistors and Transmission Gates; Design rules, Stick diagram and Mask Layout; Circuit characterization, Delay estimation and Performance evaluation of MOS circuits; nMOS and CMOS Inverters, Logic implementation, Layout and Design processes; CMOS processing technology, CMOS building blocks; Design of Combinational logic elements, Registers; Design of semiconductor memories, Parallel architecture; Design verification and testing, DFT and BIST schemes.

CSC18102    INFORMATION RETRIEVAL    [3-1-0]

Introduction: Boolean retrieval, term-vocabulary, postings-lists, Dictionaries; Index Construction: Hardware Basics, Blocked sort-based indexing, Single-pass in-memory indexing, Dynamic indexing; Retrieval Models: term weighting, vector space model, probabilistic model, language models, computing scores in a complete search system; Evaluation: system evaluation, standard test collection, concept of relevance, metrics like precision, recall, average precision, mean average precision, F-measure; Relevance feedback and query expansion: Rocchio algorithm; Text classification: Naïve Bayes; Text clustering: Flat Clustering, Hierarchical Clustering; XML Retrieval: Basic concepts, Challenges, Evaluation; Web search: Introduction, web characteristics, web graph; Web crawl: overview, crawler architecture; Link Analysis: PageRank, Hubs and Authorities; Social search.

CSC18201    VLSI DESIGN LAB    [0-0-3]

Programming practice on hardware definition languages (HDL) like VHDL, Verilog etc to design different digital subsystem. Simulation of MOS circuits using SPICE, design of TPG and fault simulator. Familiarization of VLSI CAD tools.

CSC18202    INFORMATION RETRIEVAL LAB    [0-0-3]

The laboratory is based on the course information retrieval emphasizing the experiments on Text Preprocessing, Indexing and Retrieval with standard IR tool like TERRIER, LEMUR etc., Experiments on Text Clustering, Classification, Evaluation of IR systems. Experiments on WEB search, WEB data and social research.
**ELECTIVE SUBJECTS (VIII SEMESTER)**

**CSE18101  DIGITAL SYSTEM TESTING AND TESTABLE DESIGN  [3-0-0]**


**CSE18102  SOFT COMPUTING  [3-0-0]**


**CSE18103  COMPUTATIONAL BIOLOGY  [3-0-0]**

Molecular Biology Premier: Genetic material, Genes, Structure of DNA, Analyzing DNA, Proteins; Mapping and Sequencing DNA: Restriction mapping, DNA sequencing, Shortest super string problem, Sequencing by hybridization, SBH as a Hamiltonian path problem; Sequence Comparison: Edit distance and alignment, Local alignment, Alignment with gap penalties, global alignment, Multiple alignment, Space-Efficient alignment; Finding Signals in DNA: Regularity Motifs in DNA sequences, Profiles, Motif finding problem, Median string problem, Brute force approach, Branch and bound algorithm, A greedy approach, A randomized algorithm; Clustering and Evolutionary Trees: Gene Expression analysis, Hierarchical clustering, k-Means clustering, Evolutionary trees, Additive-matrices, Small Parsimony, Large parsimony, Phylogenetic alignment, Phylogenetic networks, Galled-trees; Protein Structure and Folding: Protein stability and folding, Evolution of protein structures, classifications of protein structures, protein structure prediction and modeling, Prediction of protein function, drug discovery and development.
CSE18104 MOBILE COMMUNICATION [3-0-0]

Introduction, need for mobile computing, Radio Channel Characterization: Multipath propagation, Co-channel interference, Exponential power delay profile, Propagation effects - scattering, ground reflection, fading, Log-normal shadowing, Coherence Bandwidth. PHY Layer techniques: Diversity, Spread Spectrum, Frequency Hopping, Direct Sequence, Adaptive Equalization, Orthogonal Frequency Division Multiplexing. MAC protocols: Medium access control protocols, Aloha, IEEE 802.11, ETSI HILERAN Type 1 MAC protocol, Multiple access with collision avoidance. The Cellular concept--

System Design Fundamentals: Frequency reuse, Reuse distance, Cluster size, channel assignment strategies, Handoff strategies, Co-channel interference and system capacity, Trunking and grade of service. Wideband CDMA concept/principles, Global System for Mobile W-CDMA (3G) UMT.

CSE18105 COMPUTATIONAL NUMBER THEORY [3-0-0]


CSE18106 DISTRIBUTED OPERATING SYSTEM [3-0-0]

CSE18107  PUBLIC KEY INFRASTRUCTURE AND TRUST  [3-0-0]
MANAGEMENT

Digital certificates and PKIs; Different PKIs: PGP (Pretty Good Privacy): Web of trust, applications; X.509: X.500, Certification Authority (CA), Registration Authority (RA), Root-CA, X.509 Protocols, Simple PKI (SPKI), Simple Distributed Security Infrastructure (SDSI); Issues of revocation, Anonymity and Privacy Smartcard integration with PKIs, Trust management systems, Important of e-commerce and e-business.

CSE18108  COMPUTER VISION  [3-0-0]

Introduction, image formation and early processing, imaging geometry camera modeling and calibration, representation of 2D and 3D structures, feature detection and matching, segmentation, feature based alignment, optical flow, structure from motion, structure from shading, dense motion estimation, image stiching, computational tomography, stereo correspondence, 3D reconstruction, image based rendering, recognition, structure from X.

CSE18109  INTERNET TECHNOLOGY  [3-0-0]


CSE18110  FAULT-TOLERANT COMPUTING SYSTEM  [3-0-0]

Origin of fault-tolerant computing, reliability, maintainability, testability, dependability. Fault, errors and fault-model, Design technique for fault-tolerance, triple modular redundancies, m-out-of-n codes, check sums, cyclic codes, Berger codes etc. Fault tolerant design of VLSI circuits and systems, concepts of t-diagnosable systems, self-checking, BIST, LSSD etc. Testing and design testability, fault-equivalence, dominance,
checkpoints, test generations, D-algorithms, PODEM, FAN, Boolean difference, testability analysis, fault testing, signature analysis, CMOS and PLA testing.

CSE18111  E-COMMERCE TECHNOLOGY [3-0-0]


CSE18112  QUANTUM COMPUTING [3-0-0]

Introduction to Quantum Mechanics, Quantum bits and complex vector spaces, Quantum evolution and quantum Gates, Quantum Registers, Universal gates, Quantum circuits, No-Cloning theorem, Quantum Entanglement and Teleportation, Quantum Algorithms, Quantum search, Quantum Fourier Transform, Phase estimation, Quantum counting, Order finding for periodic functions, Quantum factoring of Integers, Physical realization of Quantum Gates, Quantum error correction.