COURSE STRUCTURE AND SYLLABUS

FOR

4-YEAR B. TECH. & B.TECH (HONOURS) IN COMPUTER SCIENCE & ENGINEERING

Effective from 2014 Batch

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
INDIAN SCHOOL OF MINES
DHANBAD- 826 004, JHARKHAND

I SEMESTER B. TECH - PHYSICS (GROUP - I)					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hours**
AMC11101	Mathematics-I	3	1	0	**7**
APC11101	Physics	3	0	0	**6**
EEC11101	Electrical Technology	3	1	0	**7**
MCC11101	Engineering Graphics	1	4	0	**6**
MCC11103	Engineering Mechanics	3	1	0	**7**
HSC11301	Value Education, Human Rights and Legislative Procedure (S)	3	0	0	**6**
GLD/ESD11301	Earth System Science (S)	3	0	0	**6**
APC11201	Physics Practical	0	0	3/2	**1.5**
EEC11201	Electrical Technology Practical	0	0	3/2	**1.5**
SWC11701	Counseling / Special Class / Co-Curricular Activities *	0	0	0	**0**
Total					**48**
Contact Hrs.		**19**	**7**	**3**	**29**

* Credit in II Semester.

I SEMESTER B. TECH - CHEMISTRY (GROUP - II)					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hours**
AMC11101	Mathematics-I	3	1	0	**7**
ACC11101	Chemistry	3	0	0	**6**
ECC11101	Electronics Engineering	3	0	0	**6**
MCC11102	Manufacturing Processes	1	4	0	**6**
HSC11101	English for Science & Technology	3	0	0	**6**
CSC11301	Computer Programming (S)	3	0	0	**6**
MSD/APD11301	Disaster Management & Energy Resources (S)	3	0	0	**6**
ACC 11201	Chemistry Practical	0	0	3/2	**1.5**
ECC 11201	Electronics Engineering Practical	0	0	3/2	**1.5**
CSC 11201	Computer Programming (S)	0	0	2	**2**
SWC 11701	Counseling / Special Class / Co-Curricular Activities *	0	0	0	**0**
Total					**48**
Contact Hrs.		**19**	**5**	**5**	**29**

* Credit in II Semester.

II SEMESTER B. TECH - CHEMISTRY (GROUP - I)					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hours**
AMC12101	Mathematics-II	3	1	0	**7**
ACC12101	Chemistry	3	0	0	**6**
ECC12101	Electronics Engineering	3	0	0	**6**
MCC12102	Manufacturing Processes	1	4	0	**6**
HSC12101	English for Science & Technology	3	0	0	**6**
CSC12301	Computer Programming (S)	3	0	0	**6**
MSD/APD12301	Disaster Management & Energy Resources (S)	3	0	0	**6**
ACC 12201	Chemistry Practical	0	0	3/2	**1.5**
ECC 12201	Electronics Engineering Practical	0	0	3/2	**1.5**
CSC 12201	Computer Programming (S)	0	0	2	**2**
SWC 12701	Counseling / Special Class / Co-Curricular Activities *	0	0	0	**3**
Total					**51**
Contact Hrs.		**19**	**5**	**5**	**29**

II SEMESTER B. TECH - PHYSICS (GROUP - II)					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hours**
AMC12101	Mathematics-II	3	1	0	**7**
APC12101	Physics	3	0	0	**6**
EEC12101	Electrical Technology	3	1	0	**7**
MCC12101	Engineering Graphics	1	4	0	**6**
MCC12103	Engineering Mechanics	3	1	0	**7**
HSC12301	Value Education, Human Rights and Legislative Procedure (S)	3	0	0	**6**
GLD/ESD12301	Earth System Science (S)	3	0	0	**6**
APC12201	Physics Practical	0	0	3/2	**1.5**
EEC12201	Electrical Technology Practical	0	0	3/2	**1.5**
SWC12701	Counseling / Special Class / Co-Curricular Activities *	0	0	0	**3**
Total					**51**
Contact Hrs.		**19**	**7**	**3**	**29**

III SEMESTER B.TECH- CSE					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSC13102	Data Structures	3	1	0	**7**
CSC13103	Discrete Mathematics	3	0	0	**6**
CSC13104	Object Oriented Programming	3	0	0	**6**
EIR13101	Digital Electronics	3	0	0	**6**
AMR13101	Methods of Applied Mathematics -I	3	1	0	**7**
CSC13202	Data Structures Lab	0	0	3	**3**
CSC13204	Object Oriented Programming Lab	0	0	3	**3**
CSC13801	Project	0	0	0	**2**
Total					**40**
Contact Hrs.		**15**	**2**	**6**	**23**

Capsule Course					
CSR13101	**Data Structures**	3	0	0	**6**

IV SEMESTER B. TECH- CSE					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSC14102	Algorithm Design & Analysis	3	1	0	**7**
CSC14103	Theory of Computation	3	0	0	**6**
CSC14104	Computer Organization	3	0	0	**6**
AMR14101	Numerical & Statistical Methods	3	1	0	**7**
HSC14306	English for Professional Communication	3	0	0	**6**
CSC14202	Algorithm Design & Analysis Lab	0	0	3	**3**
CSC14204	Computer Organization Lab	0	0	3	**3**
CSC14501	Composite Viva-Voce	0	0	0	**4**
SWC14701	Co-Curricular Activities	0	0	0	**3**
CSC14801	Project	0	0	0	**2**
Total					**47**
Contact Hrs.		**15**	**2**	**6**	**23**

V SEMESTER B. TECH- CSE					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSC15101	Combinatorics & Graph Theory	3	0	0	**6**
CSC15102	Operating Systems	3	0	0	**6**
CSC15106	Computer Networks	3	0	0	**6**
CSC15107	Computer Architecture	3	0	0	**6**
CSC15202	Operating Systems Lab	0	0	2	**2**
CSC15206	Computer Networks Lab	0	0	2	**2**
CSC15801	Project	0	0	0	**4**
Total					**32**
Contact Hrs.		**12**	**0**	**4**	**16**

V SEMESTER B. TECH - CSE					
CSE (Honours)					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSH15101	Advanced Algorithms	3	0	0	**6**
CSH15201	Advanced Algorithms Lab	0	0	2	**2**
Contact Hrs.				**5**	**8**

VI SEMESTER B. TECH - CSE					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSC16101	Artificial Intelligence	3	0	0	**6**
CSC16105	Database Management Systems	3	0	0	**6**
CSC16106	Compiler Design	3	0	0	**6**
MSR14151	**Managerial Economics**	3	0	0	**6**
CSC16205	Database Management Systems Lab	0	0	2	**2**
CSC16206	Compiler Design Lab	0	0	2	**2**
CSC16501	Composite Viva Voce	0	0	0	**4**
CSC16801	Project	0	0	0	**4**
	Vacational Training (to be evaluated in VII Semester)	0	0	0	**0**
Total					**36**
Contact Hrs.		**12**	**0**	**4**	**16**

VI SEMESTER B. TECH - CSE					
CSE (Honours)					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSH16101	Computer Graphics	3	0	0	**6**
CSH16201	Computer Graphics Lab	0	0	2	**2**
Contact Hrs.				**5**	**8**

VII SEMESTER B. TECH - CSE					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSC17102	Parallel & Distributed Computing	3	0	0	**6**
CSC17103	Software Engineering	3	0	0	**6**
CSC171xx	Elective – I	3	0	0	**6**
CSC171xx	Elective – II	3	0	0	**6**
CSC17202	Parallel & Distributed Computing Lab	0	0	2	**2**
CSC17203	Software Engineering Lab	0	0	2	**2**
CSC17001	Vacational Training (to be carried out in VI Semester)	0	0	0	**5**
CSC17801	Project	0	0	0	**6**
Total					**39**
Contact Hrs.		**12**	**0**	**4**	**16**

LIST OF ELECTIVES FOR VII SEMESTER B. TECH - CSE					
Course No.	**Name**	**L**	**T**	**P**	**Credit Hrs.**
CSE17101	Image Processing	3	0	0	**6**
CSE17103	Functional & Logic Programming	3	0	0	**6**
CSE17104	Object Oriented Data Modeling	3	0	0	**6**
CSE17105	Information and Coding Theory	3	0	0	**6**
CSE17107	Pattern Recognition	3	0	0	**6**
CSE17108	Advanced Compilers	3	0	0	**6**
CSE17109	Data Mining	3	0	0	**6**
CSE17110	Computational Geometry	3	0	0	**6**
CSE17111	Evolutionary Computation	3	0	0	**6**
CSE17112	Complexity Theory	3	0	0	**6**
CSE17113	Computational Number Theory	3	0	0	**6**

VII SEMESTER B. TECH - CSE					
CSE (Honours)					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSH17101	Cryptography	3	0	0	**6**
CSH17201	Cryptography Lab	0	0	2	**2**
Contact Hrs.				**5**	**8**

VIII SEMESTER B. TECH - CSE					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSC18103	Wireless & Mobile Communication	3	0	0	**6**
CSC181xx	Elective – III	3	0	0	**6**
CSC181xx	Elective – IV	3	0	0	**6**
CSC181xx	Elective – V	3	0	0	**6**
CSC18203	Wireless & Mobile Communication Lab	0	0	2	**2**
CSC18502	Composite Viva Voce	0	0	0	**4**
CSC18801	Project	0	0	0	**6**
Total					**36**
Contact Hrs.		**12**	**0**	**2**	**14**

LIST OF ELECTIVES FOR VIII SEMESTER B. TECH - CSE					
Course No.	**Name**	**L**	**T**	**P**	**Credit Hrs.**
CSE18101	Digital System Testing and Testable Design	3	0	0	**6**
CSE18102	Soft Computing	3	0	0	**6**
CSE18103	Computational Biology	3	0	0	**6**
CSE18106	Distributed Operating Systems	3	0	0	**6**
CSE18107	Public Key Infrastructure and Trust Management	3	0	0	**6**
CSE18108	Computer Vision	3	0	0	**6**
CSE18109	Internet Technology	3	0	0	**6**
CSE18110	Fault Tolerant Computing Systems	3	0	0	**6**
CSE18111	E-Commerce Technologies	3	0	0	**6**
CSE18112	Quantum Computing	3	0	0	**6**
CSE18113	Multimedia Systems	3	0	0	**6**
CSE18114	VLSI Design	3	0	0	**6**
CSE18115	Intrusion Detection Systems	3	0	0	**6**
CSE18116	Data Analytics	3	0	0	**6**

VIII SEMESTER B. TECH - CSE					
CSE (Honours)					
Course No.	**Name of the Courses**	**L**	**T**	**P**	**Credit Hrs.**
CSH18101	Information Retrieval	3	0	0	**6**
Contact Hrs.				**3**	**6**

CORE COURSE SYLLABI OF I & II SEMESTER

AMC11101	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, Leibinitz test, absolute and conditional convergence, power series, uniform convergence.

AMC12101	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.

Partial Differential equations: Formation of P.D.E, Equations solvable by direct integration,

Linear and non-linear equations of first order, Lagrange's equations, and Charpit's method, Homogeneous and non-homogeneous linear P.D.E. with constant coefficients, Rules for finding C.F. & P.I.

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.

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 / ACC12101	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.

Equlibrium: 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.

ACC11201 / ACC12201	CHEMISTRY PRACTICAL	0-0-3/2

1. Standards of HCl by Standard Sodium Carbonate solution.
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.
6. Estimation of available Chlorine in Bleaching Powder.
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.

MCC11101 / MCC12101	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 quardrants, 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.

MCC11102 / MCC12102	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.

EEC11101 / EEC12101	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 AC circuits and concept of phasor diagram, series and parallel resonance. Three-phase AC circuits with balanced and unbalance loads. Measurement of three-phase power by two-wattmeter method.
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.

EEC11201 / EEC12201	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.

ECC11101 / ECC12101	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.
Bipolar Junction Transistor – Introduction, Transistor operation CB, CE and CC configuration, dc Biasing, Operating Point, Fixed Bias Circuit, Emitter – Stabilized Bias Circuit. Voltage Divider Bias.
BJT Transistor – Amplification in ac domain, Equivalent transistor model. Hybrid Equivalent model, RC coupled amplifier and its frequency response.
Operational Amplifiers – Introduction, Differential and Common Mode Operation, OPAMP Basics, Practical OPAMP Circuits.
Introduction to Field Effect Transistors and their applications.
Digital Electronics – Review of Basic Gates and Boolean Algebra, Introduction to Combinato Design. Standard Representations of Logical Functions and their simplification. Combinatorial Log Half Adder and Full Adder.

ECC11201 / ECC12201	ELECTRONICS ENGINEERING (LAB)	0–0--3

1. Study of Electronic Equipment & Components.
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.

MCC11103 / MCC12103	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 and kinetics of particles: Curvilinear motion, Dynamic equilibrium, Angular momentum, Revision of Conservation of Energy, Energy and Momentum methods for Single Particle and for a System ofPartic1es, Impulsive motion.
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.

CSC11301 / CSC12301	COMPUTER PROGRAMMING	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.
Operators & Expressions: Arithmetic, Relational, Logical, Bitwise operators, Conditional, Assignment, Library functions.
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.

CSC11201 / CSC12201	COMPUTER PROGRAMMING PRACTICAL(S)	0–0--3

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 Handing
4. Structure with applications
5. Pointers with applications
6. File handling in C
7. Programs on Java

GLD/ESD11301 GLD/ESD12301	EARTH SYSTEM SCIENCE (S)	3–0--0

Part A: **AGL** **[2-0-0]**
Space Science: Solar System, Age of the Earth, Origin of Solar system. Meteors and Meteorites.
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.
Hydrogeology: Water table, Aquifer, Groundwater fluctuations and groundwater composition, Hydrologic cycle.
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** **[1-0-0]**
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.
Biosphere: Origin of life, Evolution of life through ages, Geological time scale, biodiversity and its conservation.
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.

MSD/APD11301 **MSD/APD12301**	**DISASTER MANAGEMENT & ENERGY RESOURCES**	**3–0--0**

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.

HSC11301 / HSC12301	**VALUE EDUCATION, HUMAN RIGHTS AND LEGISLATIVE PROCEDURE**	**3–0--0**

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: Oridinary Bills, Money Bills, Private Member Bills; Drafting Bills; Moving the Bills, Debate, Voting, Approval of the President/Governor.
Vigilance: Lokpal and Functionaries.

HSC11101 / HSC12101	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.)

COURSE DETAILS OF III SEMESTER B.TECH - CSE

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	3–0-0
Logic: Propositional logic; Predicates and Quantifiers; Rule of Inferences; Basic Logical Operations: Conjunction, Disjunction, Negation; Tautology; Conjunctive and Disjunctive Normal Forms; De Morgan's Laws; Sets: Types of Set; Set Operations; Partitions of Sets; Partial Ordered Set; Relation: Relations and Their Properties; Equivalence Relations; Partial Orderings; Functions: Injective, Surjective, Bijective Functions; Composition of Functions; Inverse of a Function; Induction and Recurrence: Mathematical Induction; Linear Recurrence Relations; Divide-and-Conquer Recurrence Relations; Congruence Arithmetic: Elementary properties; Linear Congruence equation; Combinatorics: Basic Counting Principles; The Inclusion-Exclusion Principle; Pigeonhole Principle; Permutations and Combinations; Group: Properties; Types of Group; Lagrange's Theorem; Ring: Properties; Types of Ring; Integral Domain; Field; Graph Theory: Basic Terminologies, Degree, Connectivity, Trees; Lattices and Boolean Algebra: Basic Theorems on Boolean Algebra; Duality Principle.		

CSC13104	OBJECT ORIENTED PROGRAMMING	3–0-0
Object Oriented Programming and languages: fundamentals, necessity and advantages, Objects and Classes, Encapsulation; data and method binding; 'self' or 'this' reference, access specification: private, protected and public; modularity based encapsulation, Inheritance: passing knowledge down. single versus multiple inheritance, sub- and super-classes. Code reuse, inheritance and sub-typing. Polymorphism: Simple (or static) polymorphism (in C++), method overloading, subtype polymorphism (extending a class) through method overriding, 'virtual' methods (in C++) and distinction with non-virtual ones, abstraction through polymorphism, 'abstract' classes and methods, 'pure' virtual functions in C++; Interfaces: OOPLs allowing interfaces (like Java), interfaces versus multiple inheritance, distributed-objects through decoupled interfacing; brief glimpse of CORBA, COM, Enterprise Java, etc. Exception Handling: the 'try-catch-throw-finally' paradigm; catching and throwing errors; ensuring cleaning up using 'finally'; Stack-unrolling in error handling, exception classes and their hierarchy, error handling as a built-in feature (as in Java), exception specification, the 'throws' keyword and compiler behavior. Templates: parametric polymorphism through templates, type safety through templates, templates and compiler behavior; Just-in-time compiling, template libraries; generic collections using templates. Comparison of Popular OOPLs, OOPL varieties. Pure versus mixed OOPLs, Compiled versus interpreted, Statically typed versus dynamically typed, Strongly typed versus		

weakly typed, Comparing C++, Java, C#, Javascript and Python.		
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, I2L; 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**
Part: I **Complex Variables**: Limit, continuity and differentiability of function of complex variables. Analytic functions. Cauchy-Reimann's and Cauchy's integral theorem, Morera's theorem, Cauchy's Integral formula, Taylor's and Laurent's series, singularities. Residues theorem, contour integration. **Special Functions**: Solution of Bessel Equation, Recurrence relations and generating functions for $J_n(x)$ orthogonal property and integral representation of $J_n(x)$. Solution for Legendre Equation, Legendre polynomial, Rodrigue's formula, orthogonal property and generating function for $P_n(x)$. **Part II** **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 implicated 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.		
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.		
CSC13204	**OBJECT ORIENTED PROGRAMMING LAB**	**0–0-3**
Laboratory experiments will be set based on the materials taught in CSC13104. It mainly includes programming Lab. assignments in various languages. Emphasis will be given on the implementation of the programs using OOPs (C++ / Java)		

CAPSULE PAPER

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

CSC14102	ALGORITHM DESIGN AND ANALYSIS	3–1--0
Notions of algorithms, Algorithm paradigms, Complexity analysis, Asymptotic notations, Practical Complexities; Divide-and Conquer paradigm: Recurrence relations, finding maximum and minimum, kth smallest selection, Strassen's matrix multiplication; Greedy Algorithms: Knapsack problem, tree vertex splitting, job sequencing, activity selection problem, minimum cost spanning tree; optimal storage on tapes, optimal merge patterns, single-source shortest paths; Dynamic Programming: Multistage graph problem, single-source and all pairs shortest paths, Traveling sales person problem, Longest common subsequence problem; Back Tracking: 8-queens problem, sum-of-subsets, graph coloring, Hamiltonian cycles; Branch-and-Bound: Least cost search, 15-puzzel problem; NP-Hard and NP complete problems, Introduction to approximation algorithms.		

CSC14103	THEORY OF COMPUTATION	3–0--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; Tuning Machines; Decidability and Undecidability; Introduction to Computational Complexity; NP Completeness Problems.		

CSC14104	COMPUTER ORGANIZATION	3–0--0
Introduction: Basics of computer, Von-Neumann architecture, Generations of computer, Basic functional blocks of a computer, Instruction execution, Register transfer and micro operations; Data representation: Signed number representation, fixed and floating point representations, character representation; Programming basic computer: Machine language, Assembly language, Programming arithmetic and logic operations, Double precision operations, Shift operations; Organization of a computer: Central processing unit (CPU)-Hardwired and micro-programmed design approaches, ALU organization, Instruction formats, Three-, two-, one- and zero-address instructions, Addressing modes-Immediate, Register direct and indirect, Indexed, Based-indexed; Input-Output organization: Input-output subsystems, I/O transfers- Program controlled, Interrupt driven and DMA, Privileged and non-privileged instructions; Memory organization: Memory hierarchy, Main memory, Auxiliary memory, Cache memory- Organization, Mapping, Replacement, Writing policies, Virtual memory-Page table, Page replacement, Associative memory; Computer arithmetic: Integer addition an d subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication - shift-and-add, Booth multiplier, carry save multiplier, etc. Division - non-restoring and restoring techniques, floating point arithmetic, Decimal arithmetic-Operations, BCD adder, BCD subtraction; Introduction to peripheral devices and their characteristics.		

AMR14101	NUMERICAL AND STATISTICAL METHODS	3–1--0
Part I **Numerical Methods**: Solution of algebraic and transcendental equation by bisection, iteration, false position, and Newton-Raphson methods. 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, Interpolation and Extrapolation, Newton-Gregory forward and backward, Gauss forward and backward, Stirling, Bessel, Lagrange's formulae, Inverse interpolation by Lagrange and iterative methods, Numerical differentiation and integration: Trapezoidal, Simpson's $1/3^{rd}$, Simpson's $3/8^{th}$, and Wieddle quadrature formulae.
Numerical solution of first order ordinary differential equations by Taylor's series, Picards, Euler's, Modified Euler's, Runge-Kutta, and Milne's methods. Solution of simultaneous first order and second order ordinary differential equations with initial conditions by Runge-Kutta and Milne's methods. Numerical solution of boundary value problems by finite difference methods.

Part II

Statistical Methods: Moments, Skewness and Kurtosis. Probability: Various approaches of probability, two theorems (without proof), conditional probability, Bayes theorem. Random variable: Definition, probability mass and density functions, distribution functions, Mathematical expectation and Moment generating function. Probability distributions: Bernoulli, binomial, Poisson and normal distributions. Theory of least squares and curve fitting. Correlation and Regression: Simple, multiple and partial correlation coefficients, regression lines, regression coefficients and their properties. Test of Significance: Normal test, t-test, Chi-square test 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 time-table 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.

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.

CSC14204	**COMPUTER ORGANIZATION LAB**	**0–0--3**

Laboratory experiments will be set based on the materials covered in CSC14104. Laboratory includes design of registers, shift registers, ALU, Serial adder, Carry Look-ahead adder design, Array Multiplier, Memory design.

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	3–0--0

Introduction: Categories of OS, Interrupts, Storage Structure, Hardware Protection; OS Structures: OS Components, System Calls, System Structures; Process Management: Process Concept, Process State, PCB, Process Creation, Process Termination, Co-operating Process, Producer Consumer Problem, Inter-process Communication, Threads; CPU Scheduling: CPU Scheduler, Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Priority Scheduling, Round Robin Scheduling, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling; Process Synchronization: Critical Section Problem, Bakery Algorithms, Semaphores, Reader's Writer's Problem, Dining Philosopher's Problem; Deadlock: Introduction, Deadlock Prevention, Deadlock Avoidance, Resource Allocation Graph Algorithms, Deadlock Detection, Prevention and Recovery; Memory Management: Memory Hierarchy, Memory Types, Main Memory Architecture, Cache Memory, Address Binding, Dynamic Loading, Linking, Logical vs Physical Addresses, Swapping, Contiguous Memory allocation, Fragmentation, Segmentation, Virtual Memory, Paging, Demand Paging, Page Replacement Algorithms, Thrashing; Secondary Storage Structure: Disk Structure, Disk Scheduling, Case study: Unix.

CSC15106	COMPUTER NETWORKS	3–0--0

Overview of Data Communication and Networking: Network Architecture, OSI Reference Model, TCP/IP Protocol Suite; Physical Layer: Physical Characteristics of Interface and Media, Representation of Bits, Synchronization of Bits, Data Rate, Line Configuration, Physical Topology, Transmission Mode, Switching; Data Link Layer: Framing, Physical Addressing, Flow Control, Error Control, Access Control: Pure/slotted ALOHA, CSMA/CD, CSMA/CA, TDMA, FDMA, CDMA; Network Layer: Routing Algorithms, Congestion Control, Internet Protocol version 4 (IPv4), Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), Networking & Internetworking Devices, Introduction to IPv6; Transport Layer: TCP, UDP; Network Applications: Electronic Mail (SMTP, POP), Client-Server Model, Socket Interface, Introduction to HTTP, FTP, DNS, DHCP.

CSC15107	COMPUTER ARCHITECTURE	3–0--0

Overview of von Neumann architecture: Instruction set architecture; Control Unit, Arithmetic and Logic Unit, Memory and I/O devices; Measuring and reporting performance; CISC and RISC processors; Pipelining: Basic concepts of pipelining, Structural hazards, Data hazards and Control hazards; Techniques for handling various hazards; Implementation hardness for pipelining; Pipeline for floating-point operations,

its hazards and minimization; Memory hierarchy design: Inclusion, Coherence and locality properties; Reducing cache miss and miss-penalty; Virtual memory organization, mapping and management techniques, memory replacement policies; Parallel computer architecture: Design issues, Taxonomy of parallel architectures; Shared-memory multiprocessors-Memory semantics, Uniform and Non-uniform memory access multiprocessors, Message-passing multicomputers- MPPs, Supercomputers.

CSC15202	OPERATING SYSTEMS LAB	0–0--2
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.		

CSC15206	COMPUTER NETWORKS LAB	0–0--2
Laboratory experiments will be set to supplement the theory taught in CSC15106. Protocol simulation, Socket programming, Program development for rlogin, ftp, SNMP, SMTP, etc. Exercises in network programming.		

HONOURS PAPER

CSH15101	ADVANCED ALGORITHMS	3–0--0
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.		

CSH15201	ADVANCED ALGORITHMS LAB	0–0--2
Laboratory experiments will be set to supplement the theory taught in CSH15101.		

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.		

CSC16105	DATABASE MANAGEMENT SYSTEMS	3–0--0
Introduction and Overview of a DBMS - Purpose of Database Systems, View of Data, Data Models, DDL, DML, Transaction Management, Storage Management, Database Administrator, Database Users, Overall System Structure, Entity-Relationship Model: Basic Concepts, Design Issues, Mapping Constraints, Keys, ER-Diagram, Weak Entity Sets, Extended ER-Diagram, Reduction of ER-Schema to Tables Relational Model Concepts: Structure of Relational Databases, Relational Algebra, Tuple Relational Calculus, Domain Relational Calculus, Extended Relational-Algebra Operations, Modification of the Database, Views Structured Query Language, Integrity Constraints: Domain Constraints, Referential Integrity, Assertions, Triggers, Functional Dependencies, Relational Database Design: Decomposition, Normalization, Transactions and Concurrency Control: Transaction Concepts, Transaction State, Concurrent Executions, Serializability, Recoverability, Lock-Based Protocols, Timestamp-Based Protocols, Deadlock Handling Basics of Database File Organization & Query Processing: File Organization, Organization of Records in Files, Data Dictionary Storage, Steps in Query Processing.		

CSC16106	COMPILER DESIGN	3–0--0
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.		

MSR14151	MANAGERIAL ECONOMICS	3–0--0
Fundamentals of Economics - Microeconomics and Macroeconomics; Marginal analysis and Time Value of Money; Firm – meaning and objectives; Demand and Supply Analysis - law of demand and law of supply, price mechanism, price ceilings and floors; Utility Analysis – cardinal and ordinal utility, law of diminishing marginal utility, Indifference curves, budget constraints, consumer's equilibrium – utility maximization; Production and Cost Analysis – short run and long run production functions, returns to scale, economies of scale and scope, different costs, producer's equilibrium – cost minimization; Market Analysis – types of markets, short run and long run equilibrium in each market; Pricing Strategies – price discrimination; Public Goods and		

Externalities; Asymmetric Information – adverse selection and moral hazard; Economics of Uncertainty and Risk; Inflation: Measures, Causes and Remedies.		
CSC16205	**DATABASE MANAGEMENT SYSTEMS LAB**	**0–0--2**
Laboratory experiments will be set based on the materials covered in CSC16105. It includes ER Modeling, Schema Designing, writing SQL queries, and team work to study, design and implement a mini-project related to the subject.		
CSC16206	**COMPILER DESIGN LAB**	**0–0-2**
Laboratory experiments are based on the materials covered in CSC16106. It includes programming assignments to build parts of a compiler a c-like programming language as mini projects in small groups.		

HONOURS PAPER

CSH16101	**COMPUTER GRAPHICS**	**3–0--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.		
CSH16201	**COMPUTER GRAPHICS LAB**	**0–0--2**
Laboratory experiments will be set to supplement the theory taught in CSH16101. 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.		

COURSE DETAILS OF VII SEMESTER B.TECH - CSE

CSC17102	PARALLEL AND DISTRIBUTED COMPUTING	3–0--0
Need, Parallelism in uniprocessors 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.		

CSC17103	SOFTWARE ENGINEERING	3–0--0
Introduction: Objectives and Scope of SE, Introduction to System, Software Definition, Characteristics of Software, Evolution of Software, Software Quality, Software Problems, Software Engineering Definition, Software Engineering Problem, Software Development Methodologies, Software Process: Introduction, Components of Software Process, Characteristics of Software Process, Software Development Process, Software Development Models, Project Management Process, Software Configuration Management Process, Process Management Process, Object Oriented Modeling & Design - Object Modeling, Dynamic Modeling, Functional Modeling, Object Oriented Design Methodology, Software Requirements Analysis: Introduction, Problem Analysis, Data Flow Diagram, Requirement Specifications, Validation, Planning a Project - Cost Estimation, Project Scheduling, Staffing and Personal Planning, SCM Plans, Quality Assurance Plans, Project Monitoring Plans, Risk Management, Designing a Project: Introduction, Function-Oriented Design, Object-Oriented Design, Detailed Design, Coding: Programming Principles and Guidelines, Coding Process, Metric, Testing: Testing Fundamentals, Types of Testing, Levels of Testing; Design of test cases with examples.		

CSC17202	PARALLEL AND DISTRIBUTED COMPUTING LAB	0–0--2
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.		

CSC17203	SOFTWARE ENGINEERING LAB	0–0--2
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 IBM RSA CASE.		

LIST OF ELECTIVES OF VII SEMESTER B.TECH – CSE

CSE17101	IMAGE PROCESSING	3–0--0
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.		

CSE17103	FUNCTIONAL AND LOGIC PROGRAMMING	3–0--0
The functional style of programming, paradigms of developments of functional programs. The relationship between logic programming and functional programming. Functional Programming Language LISP- a case study. Propositional logic, First Order Logic: syntax and semantics, deduction, Herbrand interpretation and resolution methods, Syntax and Semantics of Logic Programs, Inference Rules, Unification and SLD- and SLDNF-Resolution, Logic programming language PROLOG - a case study. Basic concepts, Recursive programming, Cuts and negation, Non-deterministic programming, Abstract computational model - Warren's Abstract Machine (WAM), Implementation of Prolog on WAM. Introduction to Constraint Logic Programming: Constraint logic programming scheme, Constraint satisfaction, constraint propagation, Constraint Logic Programming over the reals, Constraint Logic Programming over finite domains. Introduction to nonclassical logics. Modal logic. Accessibility. Relation and Kripke possible world semantics. The logic of knowledge and belief, Autoepistemic knowledge, Temporal logic. 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 coditional 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 Hoeqenghem(BCH) codes and Reed-Solomon codes,		

Convolution code, Code tree and state diagram, Turbo coding.

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 parallelzing 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

Introduction: Historical perspective, Towards Computational Geometry, Data Structures, Geometric Preliminaries. Convex Hulls: Graham's scan, Jarvis's march, Quick hull technique, Divide-and-conquer algorithm, Dynamic convex hull algorithm, Extension and Applications. Point Searching: Point location problems, Location of a point in a planar subdivision, The slab method. Proximity: A collection of problems, Locus Approach, Voronoi diagram and its construction, Delaunay triangulations, Proximity problems solved by Voronoi diagram. Orthogonal Range Searching: 1-dimensional range searching, Higher-dimensional range trees. Window Searching: Priority search trees, Segment trees. Polygon Triangulations: Art Gallery Problem, Guarding and triangulations, Triangulating a monotone polygon. Sweep Techniques: Trapezoidalization, Intersection of segments, Union of rectangles.

CSE17111	EVOLUTIONARY COMPUTATION	3–0--0

Introduction, Machine learning and evolutionary computation, Genetic programming and biology, formalism, Fundamental of genetic programming, Application of genetic programming, Genetic

programming software, Evolutionary optimization, Evolutionary neural networks, Learning classifier systems, Development of evolutionary systems for application in Industry and Medicine, Case studies.		
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.		
CSE17113	**COMPUTATIONAL NUMBER THEORY**	**3–0--0**
Divisibility, GCD, modular arithmetic, Congruence, Chinese remainder theorem; Prime and extension fields, representation of extension fields, polynomial basis, primitive elements, normal basis, irreducible polynomials. Primality testing algorithms: Fermat test, Miller-Rabin test, Solovay-Strassen test, AKS test. Integer factoring algorithms: Trial division, Pollard rho method, p-1 method, CFRAC method, quadratic sieve method, elliptic curve method. Computing discrete logarithms over finite fields: Baby-step-giant-step method, Pollard rho method, Pohlig-Hellman method, index calculus methods, linear sieve method, Coppersmith's algorithm. Applications: Algebraic coding theory, cryptography.		

HONOURS PAPER

CSH17101	**CRYPTOGRAPHY**	**3–0--0**
Introduction to Cryptography and Its Applications, Classical Cryptosystems, Cryptanalysis of Classical Ciphers, Mathematical Tools for Cryptography; Private-Key Cryptosystems: Feistel Cipher, DES, Differential and Linear Cryptanalysis, AES, IDEA, CAST, RC4, RC5, Blowfish; Mode of operations; Public Key Cryptosystems: Knapsack cryptosystems, RSA; Attacks on RSA, Diffie-Hellman Key Exchange, Discrete Logarithm problem, ElGamal cryptosystems, Elliptic Curve cryptosystems; Cryptographic Hash functions: MD5, SHA-1, SHA-512, Birthday Attack; Message Authentication Codes, HMAC; Digital Signatures: RSA Signatures, ElGamal Signature, DSA, Blind Signatures; Key Establishment: Kerberos, PKI, X.509 Certificates.		
CSH17201	**CRYPTOGRAPHY LAB**	**0–0--2**
Laboratory is mainly based on the materials taught i.e. development of code for Classical Cryptosystems, DES, AES, IDEA, RSA, MD5, SHA, DSA etc. and do experimentation. Mini projects may be given in small groups.		

COURSE DETAILS OF VIII SEMESTER B.TECH - CSE

CSC18103	WIRELESS & MOBILE COMMUNICATION	3–0--0
Introduction and evolution of wireless communication systems; Radio propagation and path-loss: Free-space model, Reflection, ground reflection, Diffraction, Scattering; Fundamentals of cellular communications: Cell geometry, Frequency reuses, Co-channel interference and reduction, Adjacent channel interference, Cell splitting, sectoring and micro-cell; Multiple access technique: Narrowband systems- FDD, TDD; Wideband systems- FDMA, TDMA, Spread Spectrum and CDMA, OFDM, CSMA, CSMA/CA, Error control schemes; Mobility management: Mobility models, Mobile registration, Paging, Handoff, Location management, HLR-VLR scheme, Hierarchical scheme, Predictive location management schemes; GSM systems: Architecture, GSM evolution for data, 3G wireless systems, UTMS networks; Wireless LAN: IEEE 802.11 standards, Architectures and services, HIPERLAN, WiFi, and WiMAX; Mobile network and transport layers: Mobile IP, DHCP, Mobile ad hoc routing protocols, Multicast routing, TCP over wireless networks, Mobile TCP, Retransmission, Timeout and Transaction, TCP over 2.5G/3G networks; Application layer: WAP model, Mobile location based services, WAP protocols, WML; Security in wireless systems.		

CSC18203	WIRELESS & MOBILE COMMUNICATION LABORATORY	0–0--2
Estimation of path-loss based on different models and conditions, Estimation of frequency-reuse, user-capacity, Co-channel-interference, etc of cellular system, Estimation of GSM speed based on different logical and physical frame-format, Cost estimation of location management and paging in mobile communication; Simulation of the protocols like FDD, TDD, FDMA, TDMA, DS-CDMA, FH-CDMA, CSMA/CA, Routing protocols for ad hoc networks, WAP, WML, Wireless security schemes.		

LIST OF ELECTIVES OF VIII SEMESTER B.TECH – CSE

CSE18101	DIGITAL SYSTEM TESTING AND TESTABLE DESIGN	3–0--0
Physical faults and their modeling. Fault equivalence and dominance; fault collapsing. Fault simulation: parallel, deductive and concurrent techniques; critical path tracing. Test generation for combinational circuits: Boolean difference, D-algorithm, Podem, etc. Exhaustive, random and weighted test pattern generation; aliasing and its effect on fault coverage. PLA testing: cross-point fault model, test generation, easily testable designs. Memory testing: permanent, intermittent and pattern-sensitive faults; test generation. Delay faults and hazards; test generation techniques. Test pattern generation for sequential circuits: time-frame expansion method, ad-hoc and structures techniques, scan path and LSSD, boundary scan. Built-in self-test techniques. Testing issues in embedded core based systems.		

CSE18102	SOFT COMPUTING	3–0--0
Artificial Neural Networks (ANN): Basics of artificial neural networks, Characteristics and Comparison with biological neural networks. Advantages of ANNs, Synaptic dynamics, Applications of ANNs, Basic Models of ANNs: Mc-Culloch Pitt's model, Single Layer Perceptron model of neural networks, Hebb's model, Learning Laws, Learning: Supervised, unsupervised, and Reinforcement Law of learning. Comparison and differences among learning		

laws. LMS and Delta Learning, Gradient descent method, Multilayer Perceptron Model (MLP), Back propagation algorithm for weight updates, classification problem using MLP. Architecture for complex pattern recognition tasks, Competitive Learning: Hopfield model, Self Organizing Feature Map, ART; Fuzzy Logic: Fuzzy sets, application: basic operations, membership functions, Properties; Fuzzy Relations, Fuzzification, Fuzzy Inference, Fuzzy Rule Based System, Defuzzification; Genetic Algorithm: working Principle, Cross over mutation, roulette wheel selection, tournament selection, population, binary encoding and decoding for any optimization problem. Multi objective Gas, Concepts on Non-domination, tournament selection, crowding distance operator, ranking, SPEA, Evolutionary strategies etc.; Rough Sets: basic operations, lower and upper approximations, discernibility matrix, distinction table etc.; Hybridization of Soft Computing tools like Neuro-fuzzy, rough fuzzy, Rough-Fuzzy-GA with applications.

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.

CSE18106	DISTRIBUTED OPERATING SYSTEMS	3–0--0

Introduction: Distributed Computing System Models, OS, Goals of Distributed System, Hardware Concept; Message Passing: Desirable features, Issues in IPC, Synchronization, Buffering, Encoding and Decoding, Process Addressing, Failure Handling, Group Communication; Remote Procedure Calls: RPC Model, Transparency of RPC, Implementation of RPC Mechanism, RPC Messages, Marshalling, Server Management (Stateful and Stateless Server), Parameter-Passing Semantics (Call-by-Value, Call-by-Reference), Call-Semantics, Communication Protocols for RPCs, Client-Server Binding, Special Types of RPCs; Distributed Shared Memory: General Architecture of DSM Systems, Design and Implementation Issues of DSM, Structure of Shared-Memory Space, Consistency Models, Replacement Strategy, Thrashing, Advantages of DSM; Synchronization: Clock Synchronization, Event Ordering, Mutual Exclusion, Deadlock, Election Algorithms; Resource Management: Task Assignment Approach, Load-Balancing Approach, Load-Sharing Approach; Process Management: Process Migration, Threads; Distributed File Systems: File Models, File-Accessing Models, File-Sharing Semantics, File-Caching Schemes, File Replication; Security: Potential Attacks to Computer Systems, Cryptography, Authentication, Access Control, Digital Signatures.

CSE18107	PUBLIC KEY INFRASTRUCTURE AND TRUST MANAGEMENT	3–0--0

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

Introduction to Internet - Internet Architecture, Evolution and Internet Network Architecture, OSI Reference Model, TCP/IP, Internet Protocols - Introduction to IPv4 and IPv6, Need of Internet Protocols, Addressing Scheme, Subnet Masking, ICMP, Transport Layer Protocol - TCP, UDP, Internet Routing Protocols - RIP, OSPF, BGP, Other Protocols - ARP, RARP, BOOTP, DHCP, DNS, Mail Server & E-mail Protocol - SMTP, MIME, POP, HTML Web Tools - Introduction to HTTP, HTTP Transaction, HTTP Request and Response Message, Introduction to WWW, Browser Architecture, HTML Page Creation (Static and Dynamic), Client-Server Approach - Client-Server Model, Socket Interface, Introduction to JAVA Programming - Introduction to JAVA, Features of JAVA, Difference between Application and Applets, Creation and Compilation of Application and Applets, Voice & Multimedia over IP - Introduction to Real-Time Traffic, VoIP, Mobile IP - Introduction and Need of MIP, Agent Discovery, Registration, Data Transfer, Inefficiency in MIP.

CSE18110	FAULT TOLERANT COMPUTING SYSTEMS	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 TECHNOLOGIES	3–0--0

Introduction to e-Commerce, e-Commerce infrastructure, Business model and e-Commerce, e-Commerce strategy, Supply chain management and e-Commerce, Marketing strategies and e-Commerce, e-Commerce security and control, Electronic payment system, Legal and ethical issues in e-Commerce, Global, Social and other issues in e-Commerce.

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.

CSE18113	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.		

CSE18114	VLSI DESIGN	3–0--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.		

CSE18115	INTRUSION DETECTION SYSTEMS	3–0--0
Introduction to IDS, Types of IDS-HIDS, NIDS, MIDS, AIDS, Honeypots, Usages of IDS, various measures for IDS, Architecture and Implementation, IDS Design Approaches: Fuzzy, Support Vector Machine, Artificial Neural Networks, Genetic Algorithm, Evolution criteria, IPS, Ethical Hacking. Firewall: Packet-level, Circuit-level, Application-level. Bastion Host. Firewall configurations, trusted system, Worms, Zombie, Trojans, Logic bombs, Computer viruses, E-mail viruses. Virus countermeasures, Case Study: SNORT, WEKA, Bro.		

CSE18116	DATA ANALYTICS	3–0--0
Introduction, BigData, Overview of DBMS, R and RStudio, Regression Modeling, Multivariate Analysis, Bayesian Modeling, Inference and Bayesian Networks, Support Vector and Kernel Methods, Analysis of Time Series: Linear Systems Analysis, Nonlinear Dynamics, Decision trees, Market Based Model, Apriori Algorithm, Handling Large Data Sets, Limited Pass Algorithm, Clustering High Dimensional Data, Hadoop and HDFS, MapReduce, Hive, MapR, Sharding, NoSQL Databases, Visualizations, Visual Data Analysis Techniques.		

HONOURS PAPER

CSH18101	INFORMATION RETRIEVAL	3–0--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.