Proposed Syllabus

For

B.Tech Program

in

Computer Science Engineering

By

C.S.J.M.University,Kanpur

Department of Computer Science and Engineering

B.Tech program curriculum

Semester-wise breakup of courses

Semester – I

		L	T	P	Credits
MTH – S101	Mathematics – I	3	1	0	4
PHY – S101T	Physics – I	3	1	0	3
PHY – S101P	Physics Lab-I	0	0	3	2
TCA – S101	Engineering Drawing	0	2	4	5
ESC – S101T	Basic Electrical & Electronics Engineering	3	1	0	3
ESC – S101P	Basic Electrical & Electronics Engineering Lab	0	0	3	2
HSS – S101	Communicative English	3	1	0	4

Semester – II

MTH – S102	Mathematics – II	3	1	0	4
PHY – S102T	Physics – II	3	1	0	3
PHY – S102P	Physics Lab-II	0	0	3	2
ISC – S101T	Programming & Computing (C & UNIX)	3	0	0	3
ISC – S101P	Programming Lab (C & UNIX)	0	0	3	2
TCA – S102T	Workshop Concepts	1	1	0	2
TCA – S102P	Workshop Practice	0	0	3	3
CHM – S101T	Chemistry – I	3	0	0	3
CHM – S101P	Chemistry Lab – I	0	0	3	2

Semester – III

MTH – S201	Mathematics – III	3	1	0	4
ESC – S202	Thermodynamics	3	1	0	4
ESC – S201	Engineering Mechanics	3	1	0	4
CSE – S201T	Data Structure	3	0	0	3
CSE – S201P	Data Structure-Lab	0	0	3	2
CSE – S202T	Digital Electronics & Logic Design	3	0	0	3
CSE – S202P	Digital Electronics & Logic Design Lab	0	0	2	1

Semester – wise breakup of courses

Semester – IV	**L**	**T**	**P**	**Credits**
HSS – S401 Industrial Economics	3	1	0	4
CSE – S204T Object Oriented Programming (Using C++ or Java)	3	0	0	3
CSE – S204P Object Oriented Programming Lab	0	0	3	2
CSE – S205 Computer Organization	3	1	0	4
CSE – S206 Operating Systems	3	2	0	5
MTH – S301 Discrete Mathematics	3	1	0	4
Semester – V				
CSE – S301T Data Base Management System	3	0	0	3
CSE – S301P DBMS–Lab	0	0	3	5
CSE – S302 Design and Analysis of Algorithms	3	1	0	4
CSE – S303T Microprocessor	3	0	0	3
CSE – S303P Microprocessor Lab	0	0	2	1
CSE – S304 Theory of Computation	3	1	0	4
Maths Elective(MTH–S501/MTH–S502)	----------			
Semester – VI				
CSE – S305 Compiler Design	3	2	0	5
CSE – S306 Computer Networks	3	2	0	5
CSE – S307 Software Engineering	3	1	0	4
HSS – S301 Professional Communication	1	1	1	2
Maths Elective(MTH–S503/MTH–S504)	----------			
Departmental Elective	----------			
Semester – VII				
HSS – S201 Industrial Management	3	0	0	4
CSE – S401 Computer Graphics	3	2	0	5
SST – S401 Summer Training	0	0	3	2
SSM – S401 Student Seminar	0	0	3	2
PRT– S401 B.Tech. Project I	0	0	6	4
Departmental Elective	----------			
Departmental Elective	----------			

Semester – wise breakup of courses

Semester – VIII	**L**	**T**	**P**	**Credits**
PRT – S402 B.Tech Project II	0	0	6	4
Departmental Elective	---			
Departmental Elective	---			
Departmental Elective	---			
Departmental Elective/Humanities Elective	---			

Note: Total No. of Lectures in each course should in the range of 40 to 45 per semester if per week three lectures are allotted.

List of Departmental Elective Courses

		L	**T**	**P**	**Credits**
CSE – S501	Digital Image Processing	3	1	0	4
CSE – S502	Digital Signal Processing	3	1	0	4
CSE – S503	Parallel Processing	3	1	0	4
CSE – S504	Advance Java Programming (Theory+Lab)	3	1	3	5
CSE – S505	Distributed Processing	3	1	0	4
CSE – S506	VLSI Design	3	1	0	4
CSE – S507	Adv. Computer Networks	3	1	0	4
CSE – S508	Natural Language Processing	3	1	0	4
CSE – S509	Soft Computing (Neural Networks. Fuzzy Logic, and Genetic Algorithm)	3	1	0	4
CSE – S510	Cryptography and Network Security	3	1	0	4
CSE – S511	Advanced Data Base Management Systems(Theory +Lab)	3	0	3	5
CSE – S512	Computational Geometry	3	1	0	4
CSE – S513	Computer Vision	3	1	0	4
CSE – S514	Embedded Systems	3	1	0	4
CSE – S515	Web Technology (Theory+Lab)	2	0	3	4
CSE – S516	Bioinformatics concepts: A Computer Sc. Perspective	3	1	0	4
CSE – S517	Wireless and Mobile Computing	3	1	0	4

		L	T	P	C
CSE – S518	Artificial Intelligence	3	1	0	4
CSE – S519	Advance Computer Architecture	3	1	0	4
CSE – S520	Machine Learning	3	1	0	4
CSE – S521	Data Mining & Data Warehousing	3	1	0	4
CSE – S522	Multi-core Architectures	3	1	0	4

List of Mathematics Electives

MTH – S501	Numerical Methods (Theory + Lab)	3	0	3	5
MTH – S502	Operations Research	3	1	0	4
MTH – S503	Graph Theory	3	1	0	4
MTH – S504	Probability and Statistics	3	1	0	4

List of Humanities Electives

HSS – S501	Introduction to Psychology	3	1	0	4
HSS – S502	Introduction to Sociology	3	1	0	4

Department of Computer Science & Engineering.

Detailed Syllabus of B.Tech program courses

Course Code: MTH-S101 **Breakup: 3 – 1 – 0 – 4**

Course Name: Mathematics-I

Course Details:

Unit I

Applications of Integrals : Areas between curves, Methods of finding volume : Slicing, Solids of revolution, Cylindrical shell, Lengths of plane curves, Areas of surface of revolution, Moments and Center of mass, Improper integrals .

Unit II

Sequences: Definition, Monotonic sequences, Bounded sequences, Convergent and Divergent Sequences**.**

Series: Infinite series, Oscillating and Geometric series, their Convergence, Divergence. Tests of Convergence: n^{th} Term test of divergence, Integral test, Comparison Test, Limit Comparison test, Ratio test, n^{th} root test (Cauchy root test), Alternating series, Absolute and Conditional convergence.

Power Series: Power series and its convergence, Radius and interval of convergence, Term by term differentiation, Term by term integration, Product of power series, Taylor and Maclaurin series, Convergence of Taylor series, Error estimates, Taylor's Theorem with remainder .

Unit III

Vector Calculus: Vector valued functions, Arc length and Unit Tangent vector, Curvature, Torsion and TNB frame **.**

Partial Derivatives: Function of two or more variables (Limit, Continuity, Differentiability , Taylors Theorem) , Partial derivatives, Chain Rule, Partial Derivatives of higher orders, , Maxima and Minima and Saddle Point, Lagrange Multipliers, Exact differential, Leibniz Theorem.

Directional derivatives, Gradient Vectors, Divergence and Curl, Tangent planes .

Unit III

Multiple Integrals: Double and triple integral, Change of order, Jacobian, Change of variables, Application to area and volume, Dirichlet integral and Applications.

Line, surface integrals , Path independence, Statement and problems of Green's, Stoke's and Gauss divergence theorems (without proof).

Text Books and Reference :

1. G.B.Thomas and R.L.Finney : Calculus and Analytical Geometry, 9^{th} edition, Pearson Educaion

B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005

Course Code: PHY-S101T **Breakup: 3 – 1 – 0 – 3**

Course Name: Physics-I

Course Details:

Unit-I: Newton's laws and their applications, Friction, conservative forces and potentials, Work energy theorem, conservation of energy and linear momentum, variable mass system (rocket), impulse, system of particles and collision, Elementary rigid body kinematics, rotation motion, moment of inertia, and Gyroscopic motion.

Unit-II: Rigid body motion, angular momentum, fundamental of classical mechanics, Lagrangian and Hamiltonian formulation.

Unit-III: Motion in non-inertial frames, fractious forces, special theory of relativity, central forces, Gravitation motion under central forces and Kepler's Laws.

Unit-IV: Simple harmonic motion (SHM), small oscillations and resonance; Wave particle duality, de-Broglie matter's waves, Phase and group velocities, Davisson-Germer experiment, Heisenberg uncertainty principle and its applications.

Unit-V: Wave function and its significance, Schrödinger equations (time dependent and independent), Schrödinger's wave equation for particle in one dimensional box, diffraction of X-rays by crystal planes, Bragg's spectrometer, Compton's effect.

Text Books and References:

1. Mechanics: D. S. Mathur
2. A textbook of Mechanics: J. C. Upadhyay
3. Concept of physics (I & II): H. C. Verma
4. Introduction to Mechanics: R. D. Kleppner and J. Kolenkow
5. Physics: Resnick, Halliday and Krane
6. Vector analysis: M. R. Spiegel
7. Classical Mechanics: Goldstien
8. Modern Physics: Author Beiser

Course Code: PHY-S101P **Breakup: 0 – 0 – 3 – 2**

Course Name: Physics Lab-I

Course Details:

1. Graphical Analysis (Ref. UIET Laboratory Manual)
2. Trajectory of projectile (Ref. UIET Laboratory Manual)

Apparatus Used (Trajectory Apparatus, Metal Balls, Channels, Vernier Callipers, Carbon & Graph Paper)

3. Moment of Inertia of Bicycle wheel (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Bicycle Wheel, Masses, Thread, Stopwatch, Meter Scale, Vernier Callipers)

4. Spring Oscillations (Ref. UIET Laboratory Manual)

Apparatus Used (Spring Oscillation Apparatus, Stop Watch, Masses)

5. Coupled Pendulum (Ref. UIET Laboratory Manual)

Apparatus Used (Coupled Pendulum Setup, Stop Watch, Scale)

6. Bifilar Suspension System (Ref. UIET Laboratory Manual)

Apparatus Used (Bifilar Suspension System Setup, Stop Watch, Masses)

7. Frequency of AC Mains by Melde's Method (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Electrical Vibrator, String, Pulley, Small Pan, Weight Box & Physical Balance)

8. Kater's(Reversible) Pendulum (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Kater's Pendulum, Stop Watch)

9. Inertia Table (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Inertia Table, Stop Watch, Vernier Callipers, Split Disc, Balancing Weights, and Given Body(Disc))

Course Code: TCA-S101 **Breakup: 0 –2 – 4 – 5**

Course Name: Engineering Drawing

Course Details:

Introduction- Drawing instruments and their uses, BIS conventions, lettering dimensioning and free hand practicing.

Orthographic projections: Lines, planes and surfaces of objects, Sectional views, Auxiliary views, Space geometry: lines and planes, True lengths and shapes, Properties of parallelism, Perpendicularity and intersections of lines and planes, Simple intersections of solids and development of lateral simple solids**.**

Isometric Projections: Introduction , isometric scale, isometric projection of simple plane figures, isometric projection of tetrahedron, hexahedron (cube), right regular prisms , pyramids, cylinders, cones, spheres, cut spheres and combinations of solids.

Introduction to computer graphics: Some problems on above topics on computer graphics.

Text Books and References:

1. Narayana,K.L. & Kannaiah,P. "Engg.Graphics". Tata McGraw Hill, New Delhi.
2. Bhatt,N.D. "Elementary Engg. Drawing" Charotar Book stall. Anand.
3. Lakshminarayanan ,V and Vaish Wannar , R. S. "Engg.Graphics".Jain Brothers , New Delhi.
4. Chandra, A.M. & Chandra Satish, "Engg.Graphics".Narosa.
5. French & Vireck, "The Fundamental Of Engg. Drawing & Graphic Tech.". McGraw Hill.
6. Gill, P.S. "A Text Book Of Machine Drawing" Katson Publishing House , Ludhiana.

Course Code: ESC-S101T **Breakup: 3 –1 – 0 – 3**

Course Name: Basic Electrical & Electronics Engineering

Course Details:

Unit – I

Sinusoidal steady state circuit analysis, voltage, current, sinusoidal & phaser presentation single phase AC circuit – behavior of resistance, inductance & capacitance & their combination, impedance concept of power, power factor. Series & parallel resonance – band width & quality factor. Three phase circuits – phase voltage & current, line & phase quantities, phasor diagram, balanced & unbalanced loads, Measurement of R, L, and C.

Unit –II

Network Theory: Network theorems – Thevenin's, Norton, maximum power transfer theorem, star delta transformation, circuit theory concept – mesh & nodal analysis.

Unit – III

Magnetic circuit concepts: self inductance , magnetic coupling analysis of single tuned & double tuned circuit involving mutual inductance , introduction to transformer.

Unit – IV

Basic Instruments, electrical measurement – measurement of voltage , current , power & energy, voltmeters & ammeter , wattmeter , energy meter , three phase power measurement , electronics instrument – multimeter, CRO(analog & digital),An overview of voltage regulator.

Unit – V

Introduction to basic electronics devices – junction diode, BJT, amplifier, op-amps & instrumentation amplifier with mathematical operation.

Number System: Introduction to binary, octal, decimal & hexadecimal systems, representation of negative numbers, 1's, 2's, 9's, 10's complement and their arithmetic.

Text Books and References:

1. W.H.Hayt & J.E. Kemmerly : Engg. Circuit Analysis , Mc Graw Hill.
2. N.N. Bhargava : 'Basic Electronics',Tata McGraw Hill.
3. Malvino, A.P. / "Electronics Principles" / Tata McGraw-Hill / 6th Ed.
4. Morris Mano, "Digital Computer Design" PHI
5 Del Toro : Principles of Electrical Engg. – PHI
6 Boylstad & Neshishkey, "Electronic devices & circuits" , PHI
7. Malvino & Leech "Digital Principle and application", TMH

Course Code: ESC-S101P **Breakup: 0 –0 – 3 – 2**

Course Name: Basic Electrical & Electronics Engineering Lab

Course Details:

1. Familiarization with the Electronic Instruments.
2. Familiarization with electronic components and Bread board.
3. To verify the Thevenin theorem.
4. To verify the Superposition theorem.
5. Measurement of voltage and frequency with CRO.
6. To study half wave rectifier.
7. To study full wave bridge rectifier.
8. To study full wave bridge rectifier with filter.
9. To study and verify the truth table of different logic gates using digital IC.
10. To study different type of transformer and there operation.
11. To study basic wiring and design a switchboard/extension board.
12. To study the polarity test of a single phase transformer.
13. To study the open & short circuit test of a transformer and calibration losses.
14. To study the load test and efficiency of a single phase transformer.

Course Code: HSS-S101 **Breakup: 3 –1 – 0 – 4**

Course Name: Communicative English

Course Details:

Unit 1: Basics of Technical Communication: Technical Communication: features; Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group); Barriers to Communication.

Unit 2: Constituents of Technical Written Communication: Word formation, Prefix and Suffix; Synonyms and Antonyms; Homophones; One Word Substitution; Technical Terms; Paragraph Development: Techniques and Methods -Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation- various steps.

Unit 3: Forms of Technical Communication: Business Letters: Sales and Credit letters; Letter of Enquiry; Letter of Quotation, Order, Claim and Adjustment Letters; Memos, Notices, Circulars; Job application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance.

Unit 4: Presentation Strategies: Defining Purpose; Audience & Locale; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Space; Setting Nuances of Voice Dynamics; Time- Dimension.

Unit 5: Value- Based Text Readings: Following essays form the suggested text book with emphasis on Mechanics of writing,

(i) The Language of Literature and Science by A.Huxley
(ii) Man and Nature by J.Bronowski
(iii) The Mother of the Sciences by A.J.Bahm
(iv) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior
(v) The Effect of Scientific Temper on Man by Bertrand Russell.

Text Books and References:

1. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi.
2. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press 2007, New Delhi.
3. Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.
5. How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.
6. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.
7. Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.
8. Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, Delhi.

Course Code: MTH-S102 Breakup: 3 – 1 – 0 – 4

Course Name: Mathematics-II

Course Details:

Unit-I

Linear Algebra
Matrices, Elementary row and Column operations, Echelon form, Determinants, Rank of matrix, Vector spaces, Linear dependence and Independence, Linear transforms and matrices, Consistency of linear system of equations and their solution, Special Matrices : Symmetric, Hermition etc, Characteristic equation, Cayley-Hamilton theorem(statement only), Eigen values and Eigen vectors, Diagonalization .

Unit-II

Differential Equations : Separable, Exact Differential Equation , Integrating Factors, Linear differential equations with constant coefficients, Homogeneous Linear differential equations, Bernoulli Equation, Simultaneous linear differential equations, Clairaut's equation, Homogeneous linear differential equations of second order with constant coefficients, Complex root case, Differential operators, Euler-Cauchy equation , Wronskian, Nonhomogeneous equations,
Solution by undetermined coefficients, solution by variation of parameters.
Series solution: Ordinary differential equations of 2^{nd} order with variable coefficients (Frobenius Method).

Unit-III: Laplace Transform

Laplace transform, Existence Theorem, Laplace transform of derivatives and integrals, Inverse Laplace transform, Unit step function, Dirac Delta function, Laplace transform of periodic functions, Convolution Theorem, Applications to solve simple linear and simultaneous differential equations.

Text Books and Reference :

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
3. C. Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd. 2003.
4. G.F. Simmons, Differential Equations, Tata McGraw-Hill Publishing Company Ltd. 1981.

Course Code: PHY-S102T **Breakup: 3 – 1 – 0 – 3**

Course Name: Physics-II

Course Details:

Unit-I: Vector analysis: scalars, vectors, vector differentiation, gradient, divergence and curl, vector, integration, Gauss divergence and Stoke's theorem, co-ordinate systems (spherical polar & cylindrical), Electrostatics: electric fields, potentials, Gauss's law, electric dipoles and multipoles, polarization, bound charges, linear dielectrics and force on dielectrics, electric displacement, boundary condition of E and D, work and energy of electrostatics, Laplace's equation and uniqueness theorem, image theory.

Unit-II: Motion of charge in electric and magnetic field, Magnetostatics: current density, magnetic fields, Ampére's law, Faraday's law, magnetic potential, magnetic polarization, bound current, magnetic properties of materials (para, dia and ferro), boundary condition of B and H, basic idea of superconductor.

Unit-III: Displacement current, Maxwell's equations for free space and matter (dielectric and conductor), Electromagnetic waves, Poynting vector.

Unit-IV: Origin the refractive index, Interference: division of wave-front and division of amplitude; diffraction: Fraunhoffer, Grating, Resolving power (grating, prism, telescope and microscope); polarization: Phenomena of double refraction, Nicol prism, optical activity Production and analysis of plane, circular and elliptical polarized light, Frenels theory of optical activities and Polarimeters.

Unit-V: Fiber optics and photonics: Fundamental ideas about optical fiber, types of fibers, Total Internal Reflection (TIR), critical angle, acceptance angle and application, basic principal of Laser and Holography and fundamental ideas about photonics.

Text Books and References

1. Optics: Ajoy Ghatak
2. A textbook of OPTICS: Subrahmanyam, Brijlal and Avadhanulu
3. Electrodynamics: David J. Griffith
4. Classical electrodynamics: J. D. Jackson
5. Modern Physics: Author Beiser
6. Photonic Crystals: J. D. Joannopoulos, R. D. Meade, and R. D. Winn

Course Code: PHY-S102P **Breakup: 0 – 0 – 3 – 2**

Course Name: Physics Lab-II

Course Details:

1. Newton's Ring (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Traveling Microscope, Support for Glass Plate inclined at 45^0 to the Vertical, Short Focus Convex Lens, Sodium Lamp, Plano Convex Lens, An Optically Plane Glass Plate)

2. Prism Spectrometer (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Spectrometer, Glass Prism, Reading Lens, Mercury Lamp)

3. Plane Transmission Grating (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Spectrometer, Diffraction Grating, Mercury Lamp)

4. Ballistic Galvanometer (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Ballistic Galvanometer, Morse key, Damping key, Condenser, Rheostat, Volt Meter, Storage Battery, Connection Wires)

5. Carey Foster's Bridge (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Carey Foster's Bridge, Laclanche cell, Resistance Box, Galvanometer, Plug Key, Copper Strip)

6. Fresnel's Biprism (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Sodium Lamp, Biprism, Convex Lens, Optical Bench with Four Uprights)

7. Variation of Magnetic Field (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Stewart and Gee type Tangent Galvanometer, Storage Battery, Commutator, Ammeter, Rheostat, One way Plug Key, Connection Wires)

8. Polarimeter (Ref. Book by K. K. Dey, B. N. Dutta)

Apparatus Used (Sodium Lamp, Polarimeter, Physical Balance)

Course Code: ISC – S101T Breakup: 3 – 0 – 0 – 3

Course Name: Programming & Computing(C & UNIX)

Course Details:

Basic concepts of Computers, Basic UNIX Concepts and Vi - Editor
Introduction to C: Basic Programming concepts, Program structure in C, Variables and Constants, Data types, Conditional statements, control statements, Functions, Arrays, Structures, Introduction to pointers, Introduction to File Systems.

Text Books and References:

1. Programming in C, Schaum Series, 3rd edition
2. The 'C' Programming, Denis Ritchi (PHI)
3. Programming in C, Venugopal (TMH)
4. Let us C, Yashant Kanetkar (BPB)
5. Programming in C, Balaguruswami (TMH)

Course Code: ISC – S101P Breakup: 0 – 0 – 3 – 2

Course Name: Computer Programming Lab:

Course Details:

Learning OS Commands
Practice of all Internal and External DOS Commands, Writing simple batch programs, Exposure to Windows environment, Practice of UNIX commands and Vi editor, Writing simple shell script

C Programming:

Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input Output Formatting, Control structures, arrays, functions, structures, pointers and basic file handling.

Course Code: TCA – S102T **Breakup:** 1 – 1 – 0 – 2

Course Name: Workshop Concepts

Course Details:

Historical perspectives; Classification of Manufacturing process.

Machining: Basic principles of lathe machine & operations performed on it. Basic description of machines & operations of shaper-planer, drilling, milling, grinding.Unconventional machining processes , Machine tools.

Casting processes:pattern & allowances. Moulding sands & its desirable properties. Mould making with the use of a core. Gating system. Casting defects & remedies. Cupola furnace. Die-casting & its uses.

Metal forming: Basic metal forming operations & uses of such as-forging, rolling, wire& tube drawing/making & extrusion, & its products/applications, press work & die & punch assembly, cutting & forming, its application. Hot working vs Cold working. Powder metallurgy: powder metallurgy process & its applications, plastic-products manufacturing, galvanizing & electroplating.

Welding: Importance & basics concepts of welding, classification of welding processes. Gas welding, types of flames, Electric arc welding. Resistance welding. Soldering & brazing and its uses. Modern trends in manufacturing, Automation. Introduction to NC/CNC/DNC,FMS,CAD/CAM,CIM and factory of future.

Text Books and References:

1. Chapman,W A J & Arnold ,E "Workshop Technology ; vol. I,II&III" Viva Low Priced Student Edition.
2. Raghuwanshi,B S "Workshop Technology ; vol. I&II" Dhanpat Rai & Sons
3. Chaudhary, Hajra "Elements of Workshop Technology ; vol. I&II" Media Promoters & Publishers.

Course code: TCA – S102P **Breakup:** 0 – 0 – 3 – 3

Course Name: Workshop Practice

Course Details:

1. Foundry (1 turn)
2. Welding (3 turns)
   a. Gas Welding (1 turn)
   b. Arc Welding (2 turns)
      (i). Lap Joint (1 turn)
      (ii) Butt Joint (1 turn)
3. M/C Shop (4 Turns)
4. Fitting & Sheet Metal Work (1 turn+1 turn)
5. Carpentry Shop(1 turn)
6. Black-smithy shop(1 turn)

Text Books and References:

1. Chapman,W A J & Arnold ,E "Workshop Technology ; vol. I,II&III" Viva Low Priced Student Edition.
2. Raghuwanshi,B S "Workshop Technology ; vol. I&II" Dhanpat Rai & Sons .
3. Chaudhary, Hajra "Elements of Workshop Technology ; vol. I&II" Media Promoters & Publishers.

Course Code: **CHM – S101T** **Breakup:** **3 – 0 – 0 – 3**

Course Name: **Chemistry - I**

Course Details:

UNIT-I - Atoms and Molecules:

1. Need for wave mechanical picture of atomic structure [Photoelectric effect, de Broglie concept of matter waves], Derivation of schrodinger wave equation [as an example particle moving in unidimensional potential well]
2. Chemical Bonding- Orbital concepts in bonding, V.B. and M.O. theory, M.O. diagrams, Intermolecular interactions.

UNIT-II - Reaction Dynamics:

Order, Molecularity, Rate law, Integrated rate equations, Methods of determining of order of reaction, Complex reaction kinetics- chain reactions and reversible reactions in detail, Catalysis and enzyme catalysis

UNIT-III - Electrochemistry:

Arrhenius theory of electrolytic dissociation, Transport number, Kohlrausch's law, Solubility product, Redox reaction, Electrochemical and concentration cells.

UNIT-IV- Stereochemistry:

Introduction, Chirality, Enantiomers, Diastereomers, Projection formula of a tetrahedral carbon, Geometrical isomerism, Conformers

UNIT- V- Spectroscopic Techniques:

General introduction to IR, NMR and Mass spectroscopy

UNIT-VI - Organic Reactions:

Introduction, Electron displacement effects, Organic intermediates, Types of reactions [addition, elimination and substitution reactions]

UNIT-VII - Photochemistry:

Photoexcitation of organic molecules, Jablonski diagram, Laws of photochemistry and quantum yield, Some examples of photochemical reactions, Chemistry of vision and other applications of photochemistry.

UNIT-VIII - Transition Metal Chemistry:

Stucture of coordination compounds corresponding to coordination number up to 6, Tpes of ligands, Isomerism [geometrical, optical, ionization, linkage and coordination], Theories of bonding in coordination compounds- crystal field theory, Valence bond theory, Chelation.

UNIT-IX - Laboratory Practical Classes:

Course Code: **CHM – S101P** **Breakup:** **0 – 0 – 3 – 2**

Course Name: **Chemistry Lab- I**

Course Details:

Exp. 01. To estimate the strength of the given unknown solution of Mohr's salt (Ferrous ammonium sulphate ($FeSO_4(NH_4)_2SO_4.6H_2O$) using $KMnO_4$ solution as an intermediate.

Exp. 02. To prepare a sample of p-nitroacetanilide.

Exp. 03. To prepare a sample of Aspirin.

Exp. 04. Preparation of Tris (Thiourea) Copper (I) sulphate.

Exp. 05. Preparation of Hexamine Nickel (II) chloride $[Ni(NH_3)_6]Cl_2$.

Exp. 06. Estimation of commercial caustic soda: Determination of the amounts of sodium carbonate and sodium hydroxide present together in the given commercial caustic soda.

Exp. 07. Estimation of calcium ions present in tap water.

Exp. 08. To determine the partition coefficient of acetic acid between n-butanol and water.

Exp. 09. To study the photochemical reduction of a ferric salt (Blue printing).

Exp. 10. To determine the viscosity of a given liquid (30% sugar solution) at room temperature using Ostwald's viscometer.

Exp. 11. To separate Ag(I), Hg (I) and Pb (II) ions by paper chromatography and calculate their RF values.

Exp. 12. Understanding reaction kinetics and calculating the rate and order of a reaction.

Exp.13. To study the kinetics of methyl acetate hydrolysis catalyzed by 0.5N HCl solution.

Text Books and Reference :

Physical Chemistry- 1. P.W. Atkins
2. Puri & Sharma

Organic Chemistry- 1. Morisson & Boyd
2. Bahl and Bahl

Inorganic Chemistry- 1. J.D. Lee
2. R.P. Rastogi

Engineering Chemistry- Shashi Chawla

Course Code: MTH-S201 **Breakup: 3 – 1 – 0 – 4**

Course Name: Mathematics - III

Course Details:

Unit – I : Function of a Complex variable
Complex numbers- power and roots, limits, continuity and derivative of functions of complex variable, Analytic functions, Cauchy-Reimann equations, Harmonic function, Harmonic conjugate of analytic function and methods of finding it, Complex Exponential, Trigonometric, Hyperbolic and Logarithm function.

Unit – II : Complex Integration
Line integral in complex plane(definite and indefinite), Cauchy's Integral theorem, Cauchy's Integral formula, Derivatives of analytic functions, Cauchy's Inequality, Liouville's theorem, Morera's theorem, Power series representation of analytic function and radius of convergence,Taylor's and Laurent's series, singularities, Residue theorem, Evaluation of real integrals, Improper Integrals of rational functions, Fourier integrals.

Unit – III : Fourier Series
Periodic functions, Trignometric series, Fourier series of period 2π , Eulers formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series, Complex fourier series.

Unit – IV : Partial Differential Equations
Linear partial differential equations with constant coefficients of second order and their classifications - parabolic, elliptic and hyperbolic with illustrative examples. Methods of finding solutions using separation of variables method. Wave and Heat equations up to two dimension (finite length)

Unit – V : Probability and Statistics
Basics of probability, Bayes theorem, Random variables, Probability and density fuctions, Binomial, Poisson and Normal distributions.

Text Books and Reference :
1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.

Course Code: ESC-S202 **Breakup: 3 – 1 – 0 – 4**

Course Name: Thermodynamics

Course Details:

Fundamental concepts: System, Property, Work and Heat interactions.

Zeroth law: Zeroth law of thermodynamics, Temperatutre & its measurement & scales.

First law: Thermodynamic processes, calculation of work in various processes, non flow work & flow work. Joule's experiment, First law of thermodynamics applied to open systems, study flow system and their analysis. Applications to closed systems and flow processes. Analysis of unsteady processes. Limitations of first law of thermodynamics, PMM1.Thermodynamics properties of fluids.

Second law: Devices coverting heat to work, Thermal reservoir, heat engines efficiency, Devices converting work to heat, heat pump, refrigerator, COP, Reversed heat engine, Kelvin planck statements, Clausius statement,reversible & irreversible processes, Carnot cycle ,PMM2, Entropy , Availability , equilibrium Criterion , Maxwell Relations Thermodynamics relations , Clapeyron equation , Gibb's Phase rule.

Properties of steam & thermodynamic cycles: pure substance, properties of steam, Phase Diagram, Power & Refrigeration cycles ,Psychrometry. Adiabatic flame temperature , Equilibrium conversion, Statistical definition of entropy Kinetic theory of Ideal Gases.

Text Books and Reference:

1. Y. A. Cengel and M. A. Boles, Thermodynamics-An Engineering Approach, McGraw Hill
2. Y.V.C. Rao, Introduction to Thermodynamics, Universities Press
3. P.K. Nag "Engineering Thermodynamics". Tata McGraw Hill.
4. D.B. Spalding & E.H. Cole " Engg. Thermodynamics" . Edward Arnold.
5. G.A Hawkins,. . " Engg. Thermodynamics" John Wiley & Sons.
6. G.H. Van Wylen, & R.E. Sonntag, "Fundamentals of Classical Thermodynamics". John Wiley & Sons.
7. J.P. Hollman , " Thermodynamics". McGraw Hill

Course Code: ESC-S201 **Breakup: 3 – 1 – 0 – 4**

Course Name: Engineering Mechanics

Course Details:

General Coplanar force systems : Basis concepts, Law of motions, principle of transmissibility of forces, Transfer of a force to parallel position, Resultant of a force system, simplest resultant of two dimensional concurrent & non concurrent force systems, free body diagrams, equilibrium & its equations, applications.

Trusses & Cables : Introductions, simple truss & solutions of simple truss, method of joints & method of sections.

Friction : Introductin , Laws of coulomb friction, equilibrium of bodies involving dry friction, belt friction, applications.

Centre of gravity , centroid, Moment of Inertia : Centroid of plane, curve, area ,volume & composite bodies, moment of inertia of plane area, parallel axis theorem, perpendicular axis theorem, principal moment inertia, mass moment of inertia of circular ring, disc, cylinder, sphere and cone about their axis of symmetry.

Beams: Introductions, shear force and bending moment , differential equations for equilibrium, shear force & bending moments diagrams for statically determinate beams.
Kinematics of rigid body: Introduction, plane motion of rigid bodies, velocity & acceleration under translation & rotational motion, Relative velocity, projectile motion.

Kinetics of rigid bodies: Introduction, force, mass & acceleration, work & energy, impulse & momentum, D'Alembert principles & dynamic equilibrium. Virtual work.

Text Books and Reference :

1. Beer F.P. & Johnston ,F.R. " Mechanics For Engineers", McGraw Hill.
2. Shames, I.H. " Engg. Mechanics" , P H I.
3. Meriam , J. L. " Statics" , J. Wiley.
4. Meriam , J. L. " Dynamics" , J. Wiley.

Course code: CSE - S201T Breakup: 3 – 0 – 0 – 3

Course Name: Data Structure

Course Details:

Basic concepts and notations, Mathematical background, Revision of arrays and pointers, Recursion and implementation of Recursion

Stacks and Queues : Sequential representation of stacks and queues

Lists: List representation techniques, Dynamics Storage allocation, Representation of stacks and queues using linked list, operations on linked list, Introduction to Doubly linked list.

Sorting Algorithms: Insertion sort, Bubble sort, Quick sort, Merge sort, Heap sort, Shell sort, Time and Space complexity of sorting algorithms

Tables: Searching sequential tables, Index sequential searching, Hash tables, Heaps.

Trees: Definition and basic concepts, Linked tree **r**epresentations, Binary tree traversal algorithms,(Preorder, Inorder, Postorder), Binary search tree, Insertion and Deletion in Binary search tree, Multiway search trees, B trees, B+ tree and their applications, Digital search trees and Trie structure.

Graphs: Introduction to Graphs, Implementation of Graphs, Depth first search, Breadth first search.

Introduction to External Sorting

Text Books and References:

1. Y. Langsam, M.J. Augenstein and A.M. Tenenbaum, Data Structure Using C and C++. Second Edition, Pearson education 2nd edition 2002.
2. John R. Husband – Schaum outline Data structure with C++, McGraw Hill
3. Lafore – Data structure & Algorithms in C++, (BPB Publication)
4. Sartaj Sahni – Data structure, Algorithms & application in C++ (McGraw Hill)

Course code: CSE - S201P Breakup: 0 – 0 – 3 – 2

Course Name: Data Structures Lab

Course Detail: Write Program in C / C++ for following:

1. Array implementation of Stack, Queue, Circular Queue
2. Linked list implementation using Dynamic memory Allocation, deletions and insertions, Linked Implementation of Stack, Queue, Circular Queue
3. Implementation of Tree Structures, Binary Tree, Tree Traversals, Binary Search Tree, Insertion and Deletion in BST, Simple implementation of Multiway search trees
4. Implementation of Searching and Sorting Algorithms
5. Graph Implementation, BFS, DFS.

Course code: CSE-S202T **Breakup: 3 – 0 – 0 – 3**

Course Name: Digital Electronics and Logic Design

Course Details:

Basic Concepts and Boolean Algebra
Number system and conversions, Boolean algebra and simplification, Minimum and maximum expansion, sum of products and product of sums, Minimization of Boolean functions, Karnaugh map Quine Mc Cluskey method, Prime implications and essential prime implicants.

Logic Gates and Gate Networks
Logic gates of different families circuits characteristics and comparisons tri-state gates, Multilevel gates networks, NAND and OR implementation use of alternate gate symbols, mixed logic and polarity indication, multiple output networks.

Combinational Logic Circuits
Problem formation and design of combinational circuits, Adder/Subtractor, Encoder/Decoder, MUX/DEMUX, Code converters and comparators, Design using standard IC's, Programmable Logic devices, ROM, PAL, PLA and PGAs, Design using PLDs.

Sequential Logic Circuits
Flip-Flops, SR, JK, D and T triggering, Master Slave Flip flops, Synchronous and Asynchronous, Analysis of clocked sequential circuits, State diagram, State table, Design of sequential circuits, counters, shift registers and sequence generation and detection.

Synchronous And An Asynchronous State Machines
State minimization, State assignment, Incomplete specified state machines, Fundamental mode and pulse mode sequential circuits, Hazards, Essential Hazards, Design of hazard free networks, VHDL.

Text Books and References:

1. Charles H. Roth, Jr., Fundamentals of Logic Design, JAICO PUBL. HOUSE, 6th Edition
2. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India, 1979
3. William I. Fletcher, An Engineering Approach to Digital Design, PHI
4. Alan B. Marcovitz, Introduction to Logic Design, McGraw Hill, 3rd edition 2009

Course Code: CSE-S202P Breakup: 3 – 0 – 0 – 4

Course Name: Digital Electronics and Logic Design Lab

Course Details:

Verification of All logic Gates, Other Gate implementation using Universal Gates NAND / NOR ,Implementation of Adder / Subtractor using Basic gates , Bread-board implementation of various flip-flops, Bread-board implementation of counters & shift registers, Adder/ Subtractor operation using IC7483 4 bit/ 8 bit, Demultiplexer / Decoder operation using IC-74138, Modulo N counter using programmable counter 74190.

Course Code: HSS-S401 **Breakup: 3 – 1 – 0 – 4**

Course Name: Industrial Economics

Course Details:

Unit -I
Definition and scope of engineering economics
Concept of supply and demand
Price elasticity and cross elasticity of demand
Production
Engineering costs and cost estimation
Concept of time value of money
Cash flow analysis

Unit-II
Perfect competition
Monopoly
Monopolistic competition

Unit-III
National Income, GDP
Inflation, Deflation and treatment

Unit-IV
Functions of RBI
Indian Tax System

Text Books and References:

1. Henderson, M. James and Quandt, E. Richards, "Microeconomic Theory: A Mathematical Approach".
2. Koutsoyiannis, A., "Modern micro economics".ardwick, Philip., Khan Bahadure., Langmeed, John, "An Introduction to modern economics".
3. Samuelson, A. Paul, "Economics".
4. Shapiro, Edward. "Macro economics".
5. Newnan, G. Donald, Eschenbach, G.Ted, Lavelle, P. Jerome, "Engineering Economic Analysis".

Course Code: CSE-S204T Breakup: 3 – 0 – 0 – 3

Course Name: Object Oriented Programming using C++/Java

Course Details:

Basic Concepts: Object, Class, Inheritance, Instant, Instant variable, Attribute, Encapsulation, Information hiding, Multiple Inheritance, Typing, Dynamic typing, Object analysis, Object–oriented issues

Programming in C++ / Java**:** Variables, Simple I/O, file I/O, Class data types, derived classes, Functions, function overloading, Overloading operators, Abstract classes, Class inheritance, Interface, Multiple Inheritance, Templates, C++ / Java Library.

Text Books and References:

1. G.Booch., Object Oriented analysis and design with application An Introduction to C++ programming by Jeny. Robert laffore, Introduction to C++.
2. Lafore – object oriented Programming in C++, Galgotia
3. Jeny liberty – Object Oriented Programming in C++.
4. Schaum Series – Programming with C++.
5. Herbert Schildt – Complete reference in C++
6. Herbert Schildt – The Complete reference Java2

Course Code: CSE-S204P Breakup: 0 – 0 – 3 – 2

Course Name: Object Oriented Programming Lab

Course Details:

1. Programs illustrating the use of destructor and the various types of constructors (constructors without arguments, constructors with arguments, copy constructor etc).
2. Program illustrating use of functions and parameter passing
3. Programs illustrating overloading of various operators
Ex: Binary operators, Unary operators, New and delete operators etc.
3. Programs illustrating the use of following functions:
a) Friend functions. b) Inline functions c) Static Member functions d) Overloaded Functions
4. Programs to create singly and doubly linked lists and perform insertion and deletion Operations. Using self referential classes, new and delete operators.
5. Programs illustrating various forms of inheritance: Ex. Single, Multiple, multilevel inheritance etc.
6. Programs on abstract class and derived classes
7. Programs illustrating the use of virtual functions.
8. Programs illustrating file handling operations:
Ex. a) Copying a text file b) Displaying the contents of the file etc.
9. Write programs illustrating the console I/O operations.
10. Write programs illustrating how exceptions are handled (ex: division-by-zero, overflow and underflow in stacks etc.).

Course Code: **CSE- S205** **Breakup:** **3 – 1 – 0 – 4**

Course Name: **Computer Organization**

Course Details:

Brief review of digital logic, Boolean algebra, flip flops, etc.
Data Representation: Integer representation-- number systems (binary, octal, Decimal, Hexadecimal), 1's and 2's Complements, Floating point numbers - - IE standard, normalization.

Computer Arithmetic: Half adder, Full adder, ripple carry and carry look-ahead adders, Multipliers - - Booth's algorithm. Processor Organization, Registers, Instruction cycle, ALU design, Instruction set of a processor, types of operands, types of operations, addressing modes, instruction formats.

Memory: RAM, ROM, DRAM Vs SRAM, Organization of memory cells inside a memory

chip, Interfacing of memory with processor; Cache memory - mapping function emplacement algorithm,

Write policy.

Input Output Organization: Program controlled, Interrupt driven (priority interrupts Daisy chaining),

Direct memory access**.**

Control Unit: Micro–operations - - hardwired implementation, Micro -programming.
Computer Peripheral Organization: Keyboard, Monitor, Hard disk, CD-ROMs, Printers, etc.

Text Books and References :

1. V.C. Hamacher, Z.G. Vranesic and S.G.Zaky, Computer Organization, Fourth Edition, McGraw Hill, 1996. Patterson, Computer Organization & Design.
2. William Stalling – Computer Organization & Architecture PHI
3. David A Paterson and John L. hennery – Computer Organization & Design Harcourt Asia.
4. Morris Mano – Computer System & Architecture (TMH),Third edition
5. Pal Chaudhari- Computer Organization & Design (PHI)

Course Code: **CSE-S206** **Breakup:** **3 – 2 – 0 – 5**

Course Name: **Operating System**

Course Details:

Introduction and history of operating system

Process Management: Process Synchronization and mutual exclusion, Two process solution and Dekker's algorithm, semaphores monitors, Examples (Producer – consumer, reader- writer, dining philosophers, etc.)

CPU Scheduling: Multiprogramming and time sharing, Scheduling approaches (shortest–job–first, first–in–first–out, Round Robin, etc.)

Deadlock: Modeling, detection and recovery, prevention and avoidance.

Interprocess communication: Shared memory, message passing pipes.

Input/ output: Devices controllers and device drivers, disk scheduling, other devices

Memory Management: with and without swapping, virtual memory- paging and segmentation, page replacement algorithm, Implementation.

File System: FS services, Disk source management, Directory and data structure .Security, Protection, Access right.

Text Books and References:

1. A.Silberschatz and P.B. Galvin, Operating system concepts, Wiley, 8th edition
2. Harris Schaum's outline operating System TMH
3. Tanenbaum – Advanced operating System
4. Milan Milankovic – Operating System
5. William stallings – Operating System
6. Crowley – Operating system design.

Course Code: MTH-S301 **Breakup: 3 – 1 – 0 – 4**

Course Name: Discrete Mathematics

Course Details:

Unit-I
Logic: Introduction to formal logic, Formulae of prepositional logic, Truth tables, Tautology, Satisfiability, Contradiction, Normal and principle normal forms, Completeness. Theory of inference. Predicate calculus: Quantifiers, Inference Theory of predicate logic, Validity, Consistency and Completeness.

Unit-II
Sets, Operations on sets, Ordered pairs, Recursive definitions, Relations and Functions, Equivalence relations, Composition of relations, Closures, Partially ordered sets, Hasse Diagram's,
Lattices (Definition and some properties).

Unit-III
Algebraic Structures : Definition, Semi groups, Groups, Subgroups, Abelian groups, Cyclic groups.

Unit-IV
Graph Theory: Incidence, Degrees, Walks, Paths, Circuits, Charactarization theorems, Connectedness, Euler graphs, Hamiltonian graphs, Travelling salesman problem, Shortest distance algorithm (Djkstra's), Trees, Binary trees, Spanning trees, Spanning tree algorithms Kruksal's and Prim's .

Unit-V
Introduction to Combinatorics: Counting techniques, pigeon–hole principle, Mathematical induction, Strong induction , Permutations and Combination.

Unit-VI
Generating functions, Recurrence relations and their solutions.

Text Books and Reference :

1. C.L.Liu : Discrete Mathematics
2. B.Kolman, R.C.Busby, and S.C.Ross, Discrete mathematical structures, 5/e, Prentice Hall, 2004
3. J.L.Mott, A.Kandel and T.P.Baker : Discrete mathematical structures For computer scientists & Mathematicians , Prentice–Hall India
4. J.P.Trembley, R. Manohar, Discrete mathematical structures with applications to computer science, McGraw –Hill, Inc. New York, NY,1975

Course Code: **CSE-S301T** **Breakup:** **3 – 0 – 0 – 3**

Course Name: **Database Management Systems**

Course Details:

File organization techniques: sequential direct, indexed, hashed, inverted, B-trees. Static and dynamic hash function. Comparison of indexing and hashing. Multiple-key access.

Data models: Relational, Entity-Relationship, Object-oriented, Network, Hierarchical.

Relational Model: Relational algebra, relational calculus, SQL examples, Integrity constraints.

Relational Database Design: Anomalies, Decomposition.

Normal Forms: Third normal form, Boyce-Code normal form.

Query processing: query interpretation, equivalence of expressions, query optimization.

Crash recovery: Transaction models, log-based recovery, check pointing, shadow paging.

Concurrency Control: Serializability, lock-based protocols, timestamp-based protocols.

Transaction Processing: storage model, recovery from transaction failure, deadlock handling, weak levels of consistency.

Introduction to Distributed Database Systems.

Case Studies. Can be of any Database engine: Oracle, Sybase, DB2, Ingres, etc.

Text Books and References:

1. A. Silberschatz, H.F. Korth and S. Sudarshan, Database System Concepts, 5th Edition, McGraw Hill, 1999.
2. C. J. Date – Data base system Concepts Addision Wesley Publication
3. Sham Nawathe – Data base Management systems, 5th Edition 2007.
4. Thomas & Begg – Database System, 4th Edition, Addision Wesley
5. Arun K. Majumdar and Bhattacharyya – Database Management System (TMH)

Course Code: **CSE-S301TP** **Breakup:** **0 – 0 – 3 – 2**

Course Name: **DBMS Lab**

Course Details:

1. Creating tables for various relations (in SQL)
2. Implementing the queries in SQL for

a) Insertion

b) Retrival (Implement all the operation like Union, Intersect, Minus, in, exist, aggregate functions (Min.,Max…) etc…

c) Updation d) Deletion

3. Creating Views
4. Writing Assertions
5. Writing Triggers
6. Implementing Operations on relations (tables) using PI/SQL
7. Creating FORMS
8. Generating REPORTS.

Course Code: CSE-S302 Breakup: 3 – 1 – 0 – 4

Course Name: Design and Analysis of Algorithms

Course Details:

Notion of algorithm, Big Oh, Small–oh, Theta and Omega notations, Space and Time complexities of an algorithm

Sorting and Order Statistics: Revision of complexity analysis of different sorting algorithms and introduction to recurrence relations

Introduction: A first problem: Stable matching

Graph Algorithms: Breadth First search, Depth First search, single source shortest paths, minimum spanning trees, all pair shortest paths, Traveling sales person problem

Fundamental design paradigms:

Divide and Conquer: Mergesort, Binary search, Quick sort, Matrix multiplication,etc

Greedy methods: Shortest path algorithms, fractional knapsack problem, task scheduling problem,etc

Dynamic Programming: 0/1 knapsack problem, Longest common subsequence, Matrix chain multiplication, etc

Network Flow: The maximum flow problem and Ford Fulkerson algorithm, maximum flows and minimum cuts in a network

Theory of NP completeness: Polynomial time, NP complete problems, concept of reducibility.

Measure of approximation: ratio bound and relative error, Polynomial time approximation scheme.

Text Books and References:

1. E. Horowitz and S. Sahni, Fundamentals of Computer Algorithms, Galgotia, 2011
2. Jon Kleinberg and Eva Tardos, Algorithm Design (pearson)
3. Thomas H. Corman, Charles E. leiserson, Ronald L. Rivest. Introduction to Algorithms,2nd edition(PHI).
4. Sara Baase & Gelder – Computer Algorithms (Pearson),Third Edition
5. Alfred V.Aho, John E. Hoperoft, J.D Ullman – Design & Analysis of Computer Algorithms, Addision Wesley

Course Code: CSE-S303T Breakup: 3 – 0 – 0 – 3

Course Name: Microprocessor.

Course Details:

Introduction to microprocessor, Microprocessor Computer and assembly language, Microprocessor Architecture (8085) & Memory interfacing, Interfacing I/O Device, 8085 assemble language programming, Programming technique with 8085 Instruction set.

Counters & Delays, Stack & Subroutines, Code conversion, BCD Arithmetic & 16 bit data operations.

Interrupts, D/A & A/D converters, Programmable Interface Device (8155, 8355, 8279, 8255, 8254, 8259) DNA Controller, Serial I/O & Data Communication, Microprocessor application & future aspects of Microprocessor Technology.

Text Books and References:

1. Douglas V. Hall , Microprocessor & Interfacing Programming & Hardware,2nd Edition.
2. B.Ram – Fundamentals & Microprocessors & Microcomputer (Dhanpat Rai Publication)
3. Ramesh S. Gaonkar – Microprocessor Architecture, Programming & Application with 8085 (Prentice Hall),Fifth Edition
4. Steven Holzner – 'C' with Assembly Language
5. Uffenback – Microcomputers & Microprocessors (8080, 8085 & Z-80) Interfacing & Troubleshooting,3rd Edition, Prentice Hall

Course Code: CSE-S303P Breakup: 0 – 0 – 3 – 2

Course Name: Microprocessor Lab

Course Details:

1. 8 bit Addition,16-bit addition
2. 8 bit Subtraction, 16 bit Subtraction
3. BCD Addition and Subtraction
4. Sorting the n numbers in ascending & descending order.
5. Sum of squares of n numbers, sum of cubes of n numbers
6. Arithmetic average of n numbers.
7. Programs using subroutines
8. 8 bit counter with 5ms Delay.
9. Interfacing of switch and display
10. Interfacing of A/D converter
11. Interfacing of D/A converter
12. Microprocessor based traffic controller

Course Code: **CSE-S304** **Breakup:** **3 – 1 – 0 – 4**

Course Name: **Theory of Computation**

Course Details:

Model of Computation
Classification, Properties and equivalence's

Regular languages models:
finite state machine (deterministic and non – deterministic). Regular grammars, regular expression, Equivalence of deterministic and non – deterministic machines, **Properties:** closure, decidability, minimization of automata, iteration theorems.

Context – free languages models:
Context – free grammars, simplification if CFGs , Chomsky normal form , Greibach normal form. Pushdown Automata, and their equivalence with context free languages, Properties closure , iteration theorems, parsing.

Recursive and recursively innumerable sets models:
Turing machines, computable languages and function, Modification of Turing machines, Restricted Turning machines equivalents to the basic model, grammars recursive function , and their equivalence Church's thesis, Properties: closure, decidability, undecidability/ non – computability, notion of reductions.

Text Books and References:

1. J.E. Hopcroft and J.D.Ullman & Motwani Introduction to Automata Theory, Language and Computation,3rd edition Addision wesley, 2007.
2. Peterlinz – An Introduction to formal Language & automata (Narosa Publication House), 4th edition
3. K.L.P Mishra & N. Chandrasekaran – Theory of computer Science automata language & computation (PHI), 3rd edition
4. Daniel I.A Cohen – Intorduction to Computer Theory (Wiley),2nd edition
5. John Martin – Theory of Computation (TMH),4th edition
6. Michael Sipser, Introduction to Theory of Computation, 2nd Edition, Thomson course technology

Course Code: **CSE-S305** **Breakup:** **3 – 2 – 0 – 5**

Course Name: **Compiler Design**

Course Details:

Compiler Structure: Analysis – Synthesis model of compilation, various phases of a compiler, Tool based approach to compiler construction.

Lexical Analysis: Interface with input , parser and symbol table, Token, lexeme and patterns. Difficulties in lexical analysis. Error reporting . Implementation, Regular definition, Transition Diagrams, Lex.

Syntax Analysis: CFGs, Ambiguity, associativity, precedence, top down parsing, recursive descent parsing, transformation on the grammars predictive parsing , bottom up parsing, operator precedence grammars, LR parsers (SLR.LALR, LR), YACC.

Syntax Directed definition: Inherited and synthesized attributes, dependency graph, Evaluation order, bottom up and top down evaluation of attributes, L- and s-attributes definition.

Type checking: type system, type expression , structural and name equivalence of types, type conversion , overloaded function and operators, polymorphic function.

Run time system: Storage organization, activation tree activation record parameter passing, symbol table, dynamic storage allocation.

Intermediate code generation: Intermediate representation translation of declaration, assignments, control flow Boolean expressions and procedure calls. Implementation issues.

Code generation and Instruction selection: Basic block and flow graph register allocation, code generation , dag representation of program, code generation from DAGs, peep hole optimization.

Text Book and References:

1. A.V. Aho, R. Sethi and J.D. Ullman, Compilers: Principle Techniques and Tools, Addition- Wesley 2007, 2nd edition.
2. Steven Muchnick – Advance Compiler Design Implementation (Elsevier India),2008
3. Tremblay & Sorenson – Compiler Construction(T.M.H)
4. Holub – Compiler Design in C (PHI)

Course Code: **CSE-S306** **Breakup:** **3 – 2 – 0 – 5**

Course name: **Computer Networks**

Course Details:

Introduction: history and development of computer networks, Local area networks, Metropolitan area networks, wide area networks, networks topology ISO/OSI seven layer architecture, connectionless versus connection oriented.

Data Communication: Data encoding and transmission ,data link control, Multiplexing, packet switching, LAN Architecture, LAN Systems(Ethernet, Token Ring), Network devices switches, Gateways , Routers

Physical Layer: transmission media, analog transmission, digital transmission.

Data link layer: framing error detection and correction, stop-and wait protocol, sliding window protocols, HSLC protocol.

MAC Layer: Aloha protocols, CSMA/CD: Ethernet, token ring, token bus Logical link control, Bridges and switches, FDDI, fast Ethernet, FDM, TDM.

Network layer: Virtual circuit, datagrams, Routing Algorithms shortest path, distance vector, link state routing, flooding, hierarchical routing, congestion control algorithms. Internetworking tunneling, Encapsulation , Fragmentation. Multicasting, Inter network protocols (IP) – header structure, addresses, option, etc. Routing protocols, (Example : RIP,HELLO,OSPF,BGP)classless Inter- domain routi9ng other protocols, ICMP,ARP, RARP,BOOTP,DHCP.

Asynchronous Transfer mode (ATM); cell format, connection setup, switching, quality –of – services, ATM adaptation layers.

Text Book and References:

1. A.S. tannenbaum, Computer network,4th Edition, PHI 2003.
2. William Stallings– Data Communication and Networks,8th edition.
3. Behrouz A. Forouzan – Data Communication and Networks. (TMH),4th edition
4. Unix network programming volume 1 3rd edition, Richard Stevens,Bill Fener,Andrew M.Rudoff
5. Computer networks: a systems approach Larry L petterson, Bruce S.Davie 5th edition elsevier

Course code: **CSE-S307** **Breakup:** **3 – 1 – 0 – 4**

Course name: **Software Engineering.**

Course Details:

Introduction: what is software engineering, software development life- cycle: requirements analysis, software design, coding, testing, maintenance, etc. Software development process models: waterfall model, prototyping, iterative enhancement, spiral model. Role of management in software development. Role of metrics and measurement.

Software requirements specification: problem analysis, requirement specification, validation, metrics monitoring and control.

System Design: problem partitioning, abstraction, top down and bottom up design, structure approach, functional versus object – oriented approach, design specification and verification metrics monitoring and control.

Testing: levels of testing, functional testing, structural testing test plan, test cases specification, reliability assessment.

Software project, management: cost estimation, project scheduling, staffing, software configuration, management, quality assurance project monitoring. Risk management etc.

Text Book and References:

1. Pankaj Jalote, Integrated approach to software engineering,springer 3rd edition 2005
2. Software Engineering A Practitioner approach 7th edition, Roger S. Pressman
3. pfleeger – S/W Engineering Theory and Practice (Pearson),2009
4. Sommerville – S/W Engineering (Pearson),8th edition
5. Hans, Van, Vliet – S/W Engneering Principles & Practice,3rd edition (johnWiley and sons)

Course Code: HSS – S301 **Breakup:** **1 – 1 – 1 – 2**

Course Name: Professional Communication

Course Details:

Unit 1- Presentation Techniques

- Meaning and importance of presentation technique
- Use of presentation techniques in everyday life
- Presentation skills required for business organization
- Types of business presentations-meetings, seminars, Conferences

Unit 2-Oral presentations

- Effective oral presentation techniques
- Tips for good oral delivery; debates, elocution, impromptu speeches
- Levels and models of organizational Communication
- Interviews-types of interviews
- Group discussions

Unit 3- Written communication

- Style and tone of writing business messages and Documents.
- Writing for websites, internet e-mails and short messages
- Applications, letters, memos
- Proposals and report writing

Unit 4 - Nonverbal presentations

- Nonverbal communication techniques
- Business manners, ethics and personality development
- Audio/visual presentations, power point presentations
- Art of delivery

Unit 5- Literary concepts

- Stories, essays, comprehension
- Reading techniques-skimming and scanning methods
- Listening skills

Recommended Books:

1. "Business Communication Today", Bove'e, Thill and Schatzman: Pearson Education(Singapore),2003

2. "Business Communication-a framework of success", H.Dan O'Hair, James S.O'Rourke and Mary John O' Hair: South Western College Publishing 2001.

3. "Basic Business Communication", Raymond V.Lesikar, Marie E.Flatley: Tata McGraw Hill Publishing Company Ltd., 2002.

Course Code: HSS-S201 Breakup: 3 – 0 – 0 –4

Course Name: Industrial Management

Course Details:

Introduction to Industrial management, Brief history of industries in India, Brief definition of management, organization and administration. Characteristics of management, Principle of management, Function of management like, planning, organization, direction, co-ordination etc.

Level of management, skills of management, inter relation between skills and levels of management, scientific management, Introduction to Schools of Management thoughts, introduction to organization, study of basic type of organization for ex. Line and staff organization, project organization, metrics organization, Informal organization, Introduction to industrial Psychology, Motivation theory and study of Maxlow, Need, Hierarchy Theory, Planned Location, Planned Layout. Study of different forms of layout like line layout, process layout, product layout, combinational layout, sixth position layout etc.

Objective of planned layout, introduction to material management, scope of material management, study of inventory control method, introduction to different types of inventory control techniques, introduction to work study, motion study etc, introduction to conflict management.

Text Book and References:

1. Khanna O.P. : Industrial Engineering
2. T.R. Banga : Industrial Engineering and Management
3. Mahajan : Industrial and Process Management

Course Code: CSE-S401T Breakup: 3 – 1 – 0 – 3

Course Name: Computer Graphics

Course Details:

Introduction: Areas of Graphics, What is Computer Graphics, Video Display Devices, Fundamental problem in geometry.
Line drawing algorithm, Circle and Ellipse generating algorithms, Polynomial and Spline curves, Filling (Boundary fill, Flood fill etc.), Attributes of lines, Curves, Filling, Characters, etc.
Geometric Manipulation:
Transformation (Translation, Rotation, Scaling, Reflection etc), Matrix representation, Homogeneous coordinate systems
Two dimensional viewing: Viewing coordinate reference frame, line clipping, polygon clipping
Elementary 3D Graphics: Plane projection, Perspective, Orthographic projection, Surface vendering, Hidden lines Removal, Vanishing points, Specification of 3D view.
3D Transformations : Rotation, Scaling, Shearing, Translation, Reflection.

Visibility: Image and Object precision, z-buffer algorithm, Area-based algorithm.

Text Book and References:

1. Hill – Computer Graphics using openGL (Pearson)
2. Foley, Feiner & Hughes – Computer Graphics Principles & Practices in C(Addision wesley)
3. Hearn & Baker – Computer Graphics (PHI) Revised edition
4. Rozers – Principles of Computer Graphics (TMH)
5. Yashwant Kanetkar – Computer Graphics Programming in C (BPB)

Course Code: **CSE-S401P** **Breakup:** **0 – 0 – 3 – 2**

Course Name: **Computer Graphics Lab**

Course Details:

1. Implementation of line generation using slope's method, DDA and Bresenham's algorithms.
2. Implementation of circle generation using Mid-point method and Bresenham's algorithms.
3. Implementation of ellipse generation using Mid-point method.
4. Implementation of polygon filling using Flood-fill, Boundary –fill and scan line algorithms.
5. Implementation of 2-D transformation: Translation, Scaling, rotation, Mirror Reflection and sharing (write a menu driven program).
6. Implementation of line clipping using Cohen-Sutherland algorithm and Bisection Method.
7. Implementation of Polygon clipping using Sutherland-Hodgeman algorithms.
8. Implementation of 3-D geometric transformations: Translation, Scaling and rotation.
9. Implementation of curve generation using Interpolation methods.
10. Implementation of Curve generation using B-spline and Bezier curves.
11. Implementation of any one of back face removal algorithm (such that depth-buffer algorithm, Painter's algorithm, Warnock's algorithm, Scan line algorithm)

Departmental Elective Courses

Course Code: CSE-S501 Breakup: 3– 1 – 0 – 4

Course Name: Digital Image Processing

Course Details:

UNIT-I
The image model and image acquisition image shape, sampling, intensify images, color images, range images, image capture, scanners.

UNIT-II
Statistical and spatial operations Grey Level transformations, histogram equilization, multi image operations. Spatially dependent transformations, templates and convolution window operations, Directional smoothing, other smoothing techniques.

UNIT-III
Segmentation and Edge detection region operations, Basic edge detection, second order detection, crack edge detection edge following, gradient operators, compass & laplace operators.

UNIT-IV
Morphological and other area operations, basic morphological operations, opening and closing operations, area operations morphological transforms.

UNIT-V
Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression.

Text Books and References:

1. Andrion Low-Introductory computer Vision and Image Processing MCGraw Hill International Edition.
2.Rafel C Gonzalez, Richards E.Wood – Digital Image Processing, 3rd Edition.

Course Code: CSE-S502 Breakup: 3 – 1 – 0 – 4

Course Name: Digital Signal Processing.

Course Details:

Discrete Time Signals and Systems:
Analysis of discrete time linear shift invariant systems - Convolution sum- Discrete-time systems described by difference equations- Implementation of discrete time systems - Z-transform and system analysis.

Discrete time Fourier transform (DTFT): DFT and properties - computation of DFT and IDFT using Fast Fourier Transform (FFT), radix-2 DIT and DIF algorithms

Structures for FIR systems: direct, cascade, frequency sampling and lattice structures - Structures for IIR systems: direct, cascade, parallel and lattice structures- Representation of numbers - Quantization of filter coefficients - Round-off effects in digital filters.

Digital Filters: Design of linear phase FIR filters using window methods, frequency sampling method - Design of IIR filters from analog filters, Frequency transformation.

Application: Multirate Digital Signal Processing, Sampling rate conversion – Sub-band coding of speech signals - Musical sound processing.

Text Books and References:

1. John G.Proakis and Dimitris G.Manolakis, "Digital Signal Processing Principles Algorithms and Applications, 4th edition, Prentice Hall of India Pvt.Ltd. 2007.
2. Sanjit K. Mitra, "Digital Signal Processing – A Computer based Approach", Tata McGraw Hill 4th Edition, 2010.
3. Alan Oppenheim V., Ronald Schafer W., "Discrete Time Signal Processing", Pearson Education India Pvt Ltd., New Delhi, 2002.
4. Anil K. Jain – Fundamental of Digital image Processing (Pearson)

Course Code: CSE-S503 Breakup: 3 – 1 – 0 – 4

Course Name: Parallel Processing

Course Details:

Introduction to Parallel Processing:
Supercomputers and grand challenge problems, Modern Parallel Computers, Data Dependence Graph, Data Parallelism, Functional Parallelism, Pipelining and Data Clustering.

Interconnection Networks:
Switch Network Topologies, Direct and Indirect Network Topology, Bus, Star, Ring, Mesh, Tree, Binary Tree Network, Hyper Tree Network, Hybrid, Hypercube, Perfect Shuffle Network, Torus and Butterfly Network.

Performance Analysis:
Introduction, Execution Time, Speedup, Linear and Superlinear Speedup, Efficacy and Efficiency, Amdahl's Law and Amdahl Effect, Gustafson-Barsis's Law, Minsky's Conjecture, The Karp-Flatt Metric, The Isoefficiency Metric, Isoefficiency Relation, Cost and Scalability.

Parallel Computational Models:
Flynn's Taxonomy, PRAM, EREW, CREW, ERCW, CRCW, Simulating CRCW, CREW and EREW, PRAM algorithms.

Introduction to Parallel Algorithms:
Parallel Programming Models, PVM, MPI Paradigms, Parallel Programming Language, Brent's Theorem, Simple parallel programs in MPI environments, Parallel algorithms on network, Addition of Matrices, Multiplication of Matrices.

Text Books and References:

1. Hwang and Briggs, advance Computer Architecture and Parallel Processing, McGraw Hill.
2 .Crichlow, Introduction to Distributed and Parallel Computing, PHI.
3. M.J.Quinn, Designing Efficient Algorithms for Parallel Computers, McGraw-Hill.
4. V.Rajaraman, Elements of Parallel Computing, Prentice-Hall of India.
5. Joseph JA JA, Introduction to Parallel Algorithms, Addison Wesley.
6. S.G.Akl, The Design and Analysis of Parallel Algorithms, PHI.
7. Shashi Kumar M et al. Introduction to Parallel Processing, PHI New Delhi.

Course Code: CSE-S504 Breakup: 3 – 1 – 3 – 5

Course Name: Advance Java Programming

Course Details:

Introduction to Java- Architecture of Java, Data types, arrays, Classes Packages, interface, string handling etc.

Introduction to HTML

Java Applets & application

Exception Handling in Java

I/O in Java

Multithreaded Programming in Java

Networking in Java

Bust Handling in Java

AWT controls, Layout Manager and Menus

Introduction to Java Beans, Servlets

Introduction to Java Database Connectivity JDBC) And Remite Method Invocation (RMI)

Text Books and References:

1. The complete Reference – Java 2 (Latest Edition) by Patrick Naughton & Herbert Schildt, TMT
2. Java 2 Plate Form Unleashed (BPB Publication)
3. Java Collection – John Zukowski (Apress)2001
4. Java Swing – Loy & Cole (Oreilly)
5. Mastering Java Beans – Laurence Vanhelsuwe (BPB)
6. Advanced Programming for Java 2 – Austin & Pawlan (Pearson)

Course Code: CSE-S505 **Breakup:** 3 – 1 – 0– 4

Course Name: Distributed Processing

Course Details:

Introduction
Introductory Concept of Process, Concurrent Process, Synchronization Problems like Dining Philosopher, Producer Consumer, Readers writers problem, Process Deadlocks, Deadlock Vs Starvation, Models of Deadlocks, Model of Resources, Graph Theoretic Model of State, Necessary & sufficient condition for deadlock, Introduction of Distributed Processing , Issues in Distributed systems, Global knowledge, naming, scalability, Compatibility, Process Synchronization, Security issues.

Theoretical Foundation for Distributed Systems: Limitation of Distributed System, absence of global clock, shared memory, Logical Clocks, Lamports & Vectors logical Clocks, casual ordering of messages, global state, termination detection

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion algorithm, Token Based and non token based algorithm, performance metric for distributed mutual exclusion Algorithms

Distributed Deadlock Detection: System model, resource vs communication deadlocks, dead lock prevention, avoidance, detection & Resolution, Centralised deadlock detection, distributed dead lock detection, path pushing algorithm, Edge chasing algorithm

Agreement Protocols: Introduction, System Model, Classification of Agreement Problem, Byzantine Agreement Problem Consensus Problem, Interactive Consistency Problem, Solution to Byzantine Agreement Problem Application of Agreement Protocol, Atomic Commit in Distributed Database System

Distributed Resource Management: Distributed File System, Mechanism for building distributed file system, Mounting caching Hints Bulk Data Transfer, Encryption , Design Issues , Naming & Naming Resolution, Caches on Disk or Main Memory, Writing Policy, Distributed Shared Memory, Architecture & Motivation, Algorithms for Implementing Distributed Shared Memory, Client Server, Migration, Read Application full Replication Algorithms, Memory Coherence protocols.
Advanced issues in Distributed System: Distributed Scheduling , issues in load distribution, Component of load distributing algorithm, stability Performance comparison, task migration, Introduction to Fault Tolerance, Data Security Encryption , Distributed resource management, Multiprocessing Operating System, Database

Operating system
Distributed Algorithms: Introduction to Communication protocols, Balanced Sliding Window Protocol, Routing Algorithm Destination based routing, APSP Problem, Deadlock Free Packet Switching, Introduction to Wave Traversal Algorithms, Election Algorithms.

Text Books & References:

1. Mukesh Singhal &Niranjan Shivaratri “Advanced Concepts in Operating System” McGrawhill
2. Tel , Gerald, “Introduction to Distributed Algorithm” Oxford University Press
3. Colourisis” Distributed System” Addision Wesley
4. Andrew S Tanenbaum – Distributed System (Pearson)

Course Code: CSE-S506 **Breakup:** 3 – 1 – 0 – 4

Course Name: VLSI Design

Course Details:

Basic MOS Transistor
Enhancement mode & Depletion mode – Fabrication (NMOS, PMOS, CMOS, BiCMOS) Technology – NMOS transistor current equation – Second order effects – MOS Transistor Model.

NMOS & CMOS Inverter and Gates
NMOS & CMOS inverter – Determination of pull up / pull down ratios – Stick diagram – lamda based rules – Super buffers, BiCMOS & steering logic.

Sub System Design and Layout
Structured design of combinational circuits – Dynamic CMOS & clocking – Tally circuits – (NAND-NAND, NOR-NOR and AOI logic) – EXOR structure – Multiplexer structures – Barrel shifter.

Design Of Combinational Elements and Regular Array Logic
NMOS PLA – Programmable Logic Devices - Finite State Machine PLA – Introduction to FPGA.

VHDL Programming
RTL Design – Combinational logic – Types – Operators – Packages – Sequential circuit – Sub-programs – Test benches. (Examples: address, counters, flipflops, FSM, Multiplexers / Demltiplexers).

Text Books & References:

1. D.A.Pucknell, K.Eshraghian, 'Basic VLSI Design', 3rd Edition, Prentice Hall of India, New Delhi, 2011.
2. Eugene D.Fabricius, 'Introduction to VLSI Design', Tata McGraw Hill, 1990.
3. N.H.Weste, 'Principles of CMOS VLSI Design', Pearson Eduction, India, 2002.
4. Charles H.Roth, 'Fundamentals of Logic Design', Jaico Publishing House, 1992.
5. Zainalatsedin Navabi, 'VHDL Analysis and Modelling of Digital Systems', 2nd Edition, Tata McGraw Hill, 1998.
6. Douglas Perry, 'VHDL Programming by example', Tata McGraw Hill, 4th Edition, 2002.

Course Code: **CSE-S507** **Breakup:** **3 – 1 – 0 – 4**

Course Name: **Advanced Computer Networks**

Course Details:

Revision of Computer Networks, Seven Layer Architecture, TCP/IP Suite of protocols etc.
Transport Layer: Flow and error control, multiplexing, establishing and releasing a connection, Transmission control protocol – header, services, connection management, convention control, sliding window and timers. User datagram protocol, Domain name services.

Unix network programming, socket abstraction client – server architecture.

Session presentation, application layers, Example protocols: Email (SMTP) Telnet, FTP, etc.

Internet security: firewalls. Network managements: SNMP.

IPV6: IPV6 Versus IPV4, Structure of IPV6 Protocol : general header structure , extension headers , IPV6 addressing : Types , notation, prefix notation , unicast, anycast , multicast addresses etc.

Security in IPV6: Basic Security Requirement and techniques, open security issues in current internet, IPSec frame work Quality of service in IPV6

ICMPV6: error messages, neighbor discovery, Auto configuration, path MTU discovery.

Wireless networks: Overview of 802.11 networks, 802.11 MAC, wired Equivalent privacy, Wireless communication technology: FHSS, DSSS, CDMA etc.

Mobility networks: Mobile IP, security related issues

Text Books and References:

All books used in the computer network

1. 802.11 wireless networks : The definitive guide, Mathew S. Gast, O'relly,2nd edition 2005
2. Wireless communication & networks: William Stallings
3. IPV6 Essentials , Silvia Hagen O'relly
4. IPV6 Clearly Explained , Peter Morgan , Kauffman
5. Mobile IP design , Principle & Practices , Charles Perkin, Bobby Woolf, Sherman R. Alpert Addison Wesley

Course Code: **CSE - S508** **Breakup:** **3 – 1 – 0 – 4**

Course Name: **Natural Language Processing**

Course Details:

Introduction to Natural Language Understanding

Linguistic Background: Outline of English Syntax

Knowledge Representation and Reasoning: A Representation Based on FOPC

Grammars and Parsing: Grammars and Sentence Structure, What Makes a Good Grammar, A Top-Down parser, Bottom-Up Chart Parser, Transition Network Grammars, Top-Down Chart Parsing, Finite State Models and Morphological Processing, Grammars and Logic Programming

Features and Augmented Grammars: Feature Systems and Augmented Grammars, Augmented Transition Networks

Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomena in Language, Toward Efficient Parsing, Human Preferences in Parsing

Encoding Uncertainty: Shift-Reduce Parsers, A Deterministic Parser, Techniques for Efficient Encoding of Ambiguity

Ambiguity Resolution: Statistical Methods, Basic Probability Theory, Estimating Probabilities, Part of Speech Tagging, Obtaining Lexical Probabilities, Probabilistic Context Free Grammars

Semantics and Logical form: Semantics and Logical form, Word senses and ambiguity, Encoding ambiguity in the logical form, Verbs and states in logical Form, Thematic roles

Text Books & References:

1. James Allen, Natural Language Understanding, 2nd edition
2. Jurafsky & Martin – Speech & Language Processors (Pearson)

Course Code: CSE-S509 Breakup: 3-1-0-4

Course Name: Neural Networks, fuzzy logic and Genetic algorithms

Course Details:

Neural network
Basic Concepts of Neural Network, Models of artificial Neural network, Characteristics of Neural Networks Network Architectures, Artificial Intelligence and Neural Networks

Leaning Processes
Introduction, Error-Correction Learning, Memory-Based Learning, Hebbian Learning, Competitive Learning,Boltzmann Learning, Credit Assignment Problem, Learning with a Teacher, Learning Tasks, Statistical Nature of the Learning Process, Statistical Learning Theory, Probably Approximately Correct Model of Learning

Single Layer Perceptrons
Adaptive Filitering Problem, Unconstrained Optimization Techniques, Linear Least-Squares Filters, Learning Curves, Learning Rate Annealing Techniques, Perceptron, Perceptron Convergence Theorem

Multi Layer Perceptrons
Some Preliminiaries, Back-Propagation Algorithm, Summary of the Back-Propagation Algorithm, XOR Problem, Heuristics for Making the Back-Propagation Algorithm Perform Better, Output Representation and Decision Rule, Computer Experiment, Feature Detection, Back-Propagation and Differentiation

Fuzzy Logic
Fuzzy Set Theory: Fuzzy verses crisp , crisp sets , Fuzzy sets, Crisp relations, Fuzzy relations
Fuzzy systems: Crisp logic, predicate logic , fuzzy logic , fuzzy rule based system , De fuzzification systems , applications

Genetic Algorithms
Fundamental of genetic algorithm ,Genetic algorithms , basic concept of genetic algorithm , creation of rings, working principal , encoding, fitness function, reproduction

Genetic Modeling:
Inheritance operators, cross over , inversion and deletion , mutation operation, bitwise operators, bitwise operators used in genetic algorithm , generational cycle, convergence of genetic algorithm.

Text Books and references :
1. Neural Network, Fuzzy Logic and genetic algorithm by S. Rajshekharan, G. A. Vijaylaxmi Pai, Publication PHI
2. Introduction to neural network By ANDERSON, JAMES A. Publication PHI
3. Introduction to genetic algorithm by Melanie Mitchell
4. Genetic algorithm by Goldberg ,2nd edition

Course Code: **CSE-S510** **Breakup:** **3 – 1 – 0 - 4**

Course Name: **Cryptography and Network Security**

Course Details:

Unit I:

Introduction to security attacks and mechanisms, Introduction to cryptology.
Conventional Encryption: Convention encryption model, Classical encryption techniques – substitution ciphers & transposition ciphers, cryptanalysis, stereography, stream & block ciphers.
Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data Encryption Standards (DES), Strength of DES, Differential & Linear Cryptanalysis of DES, Block Cipher modes of Operation, Triple DES, IDEA encryption and decryption. Strength of IDEA, Confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

Unit II:

Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's & Euler's Theorem, primarily testing, Euclid's Algorithm, Chinese remainder theorem, Discrete algorithms.
Principles of Public-Key cryptosystems, RSA algorithm, Security of RSA, Key management, Diffle-Hellman key exchange algorithm, Introductory idea of Elliptic curve cryptography, Elganal encryption.

Unit III:

Message authentication and hash functions: Authentication requirements, Authentication functions, message authentication codes, hash function, birthday attacks, security of hash function. & MACS, MD5 message digest algorithm, Secure Hash Algorithm (SHA).
Digital signatures: Digital signatures, Authentication protocol, digital signature standard (DSS), proof of digital signature algorithm.

Unit IV:

Authentication Application: Kerberos & X.509, directory authentication service, electronic mail security- Pretty Good Privacy (PGP), S7 MIME.

Unit V:

IP Security: Architecture, Authentication Header, Encapsulating security payloads, combining security associations, Key management.
Web security: Secure Socket Layer & Transport security, Secure electronic Transaction (SET).
System security: Intruders, Viruses and related threads, Firewall design principles, trusted systems.

Text Books and References:

1. William Stallings, "Cryptography and Network Security: Priciples and Practice", Prentice Hall, New Jersey,5th edition 2010
1. Johannes A. Buchmann, Introduction to Cryptography", Springer- Verlag,2nd edition 2004.
2. Bruce Schneier, "Practical Cryptography".

Course Code: CSE-S511 **Breakup:** 3 – 0 – 3 – 5

Course Name: Adv. Database Management System

Course Details:

Design Theory for Relational Database:

Functional Dependencies, Decomposition of Relation schemes, Normal Forms for Relations. Schemes, Multivalued and other kinds of Dependencies.

Query Optimization:

Basic Optimization Strategies, Algebraic Manipulation, Optimization of Selections in System, Exact Optimization for a Subset of Relational Queries, Optimization under Weak Equivalence.

Database Protection: Integrity, Constraints in Query-by-Example, Security, Security in query-by-Example, Security in Statistical Databases.

Concurrent Operations on the Database:

Basic Concepts, A simple Transaction Model, Model with Read- and Write-Locks, Read-only, Write-only Model, Concurrency for Hierarchically Structured Items, Protection against Crashes, Optimistic Concurrency Control.

Principles of Distributed Data Bases:

Framework for distribution. Translation of global queries into fragment queries. Query optimization and management of distributed transaction. Concurrency control and reliability in distributed databases. Administration of Distributed Data Bases. Example Systems.

Text Books and References:

1. J.D.Ullman, Principles of Database Systems, Galgotia, New Delhi.
2. S.Ceri, G. Relagatti, Distributed Databases, McGraw-Hill.
3. C. Papadimitriou, The Theory of Database concurrency Control, Computer Science Press.
4. T. Ozsu, P. Valduriez, Principles of Distributed Database Systems, Prentice-Hall.

Course Code: CSE-S512 Breakup: 3 – 1 – 0 – 4

Course Name: Computational Geometry

Course Details:

Convex hulls:
construction in 2d and 3d, lower bounds; Triangulations: polygon triangulations, representations, point-set triangulations, planar graphs; Voronoi diagrams: construction and applications, variants; Delayney triangulations: divideand- conquer, flip and incremental algorithms, duality of Voronoi diagrams, min-max angle properties;

Geometric searching:
pointlocation, fractional cascading, linear programming with prune and search, finger trees, concatenable queues, segment trees, interval trees;

Visibility:
algorithms for weak and strong visibility, visibility with reflections, art-gallery problems; Arrangements of lines: arrangements of hyperplanes, zone theorems, many-faces complexity and algorithms;

Combinatorial geometry:
Ham-sandwich cuts, Helly's theorems, k-sets, polytopes and hierarchies, polytopes and linear progarmming in d-dimensions, complexity of the union of convex sets, simply connected sets and visible regions; Sweep techniques: plane sweep for segment intersections, Fortune's sweep for Voronoi diagrams, topological sweep for line arrangements;

Randomization in computational geometry: algorithms, techniques for counting; Robust geometric computing; Applications of computational geometry.

Textbooks and Refrences

1. M. de Berg, M. van Kreveld, Mark Overmars & Otfried Schwarzkopf, "Computational Geometry: Algorithms and Applications," Second Edition, Springer-Verlag, 2000. ISBN: 3-540-65620-0.
2. Computational Geometry (An Introduction), by Franco P Preparata and Michael Shamos, Springer-Verlag, 1985.
3. Computational Geometry In C (Second Edition), by Joseph O'Rourke, Cambridge University Press, 1998.

Course Code: CSE-S513 **Breakup:** 3 – 1 – 0 – 4

Course Name: Computer Vision

Course Details:

Image Formation Models
Monocular imaging system, Orthographic & Perspective Projection , Camera model and Camera calibration. Binocular imaging systems.

Image Processing and Feature Extraction
Image representations (continuous and discrete), Edge detection.

Motion Estimation
Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion.

Shape Representation and Segmentation
Deformable curves and surfaces, Snakes and active contours, Level set representations Fourier and wavelet descriptors, Medial representations, Multiresolution analysis.

Object recognition
Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis, Shape priors for recognition.

Text Books and Refrences:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall,2003
2. Robot Vision, by B. K. P. Horn, McGraw-Hill.
3. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.

Course Code: CSE-S514 **Breakup:** 3 – 1 – 0 – 4

Course Name: Embedded Systems

Course Details:

Introduction

Introduction to embedded systems – hardware and software components – types – examples – characteristics – challenges in Embedded computing system design – embedded system design processes.

Architecture of Embedded System

Hardware components – SOC – Processors – CPU – Types of memory – Memory management – I/O devices and interfacing – Software components – Interpreter – Compiler – Assembler – Cross Assembler – RTOS – Languages for embedded applications – Hardware and software architecture. Examples: Cellphone, Smartcard, Digital Thermometer.

OS for Embedded Systems

Introduction to real time theory – Operating System Services – Real time Operating System Concepts – Basic design using a RTOS – Underground tank monitoring system.

Performance Issues of an Embedded System

CPU performance – CPU Power Consumption – Analysis and Optimization of CPU Power Consumption program execution time – Analysis and optimization of energy and power – Analysis of program size – Hardware accelerators.

Design Examples

Personal Digital Assistants – Set Top Boxes – Ink Jet Printers – Telephone PBX.
Introduction to Micro C/OS-II operating system and its uses.

Text Books and References:

1.Wayne Wolf, (2001). "Computer as Components – Principles of Embedded Computing System Design", Harcourt India Pvt Ltd.,
2.David E Simon, (2004) "An Embedded Software Primer", Pearson Education,
3.Raj Kamal, (2003) "Embedded Systems – Architecture, Programming and Design", Tata McGraw Hill,.
4.Sriram V Iyer, Pankaj Gupta, (2004) "Embedded Realtime Systems Programming", Tata McGraw Hill,
5.K.V.K.K. Prasad, (2004) "Embedded/Realtime Systems: Concepts, Design and Programming", Dreamtech Press,.

Course Code: CSE-S515 Breakup: 2 – 0 –3 – 4

Course Name: Web Technology

Course Details:

Introduction and Web Development Strategies
History of Web, Protocols governing Web, Creating Websites for individual and Corporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target ,Users, Web Team, Planning and Process Development.

HTML, XML and Scripting
List, Tables, Images, Forms, Frames, CSS Document type definition, XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX, Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script.

Java Beans and Web Servers
Introduction to Java Beans, Advantage, Properties, BDK, Introduction to EJB, Java Beans API. Introduction to Servelets, Lifecycle, JSDK, Servlet API, Servlet Packages: HTTP package, Working with Http request and response, Security Issues.

JSP
Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages- Sharing Session and Application Data.

Database Connectivity Database Programming using JDBC, Studying Javax.sql.*package, accessing a database from a JSP page, Application-specific Database Action, Developing Java Beans in a JSP page, Introduction to Struts framework.

Text Books and References:
1. Jessica Burdman, “Collaborative Web Development” Addison Wesley.
2. Chris Bates, “Web Programing Building Internet Applications”, 2nd Edition, WILEY, Dreamtech
3. Joel Sklar , “Principal of web Design” Vikash and Thomas Learning,4th edition
4. Horstmann, “CoreJava”, Addison Wesley.
5. Herbert Schieldt, “The Complete Reference:Java”, TMH.
6. Hans Bergsten, “Java Server Pages”, SPD O’Reilly

Course Code: CSE-S516 Breakup: 3 – 0 – 0 – 4

Course Name: Bioinformatics Concepts: A computer Science Perspective

Course Details:

Unit 1: Cell Structure and function of cell, Introduction of DNA, RNA, Protein, Carbohydrate and Lipids, Structure of Protein (primary, secondary Tertiary and quaternary), Gene and non coding RNA. Protein folding and function, Nucleic acid-Protein interaction. Enzymes: details of enzyme nomenclature and classification; units of enzyme activity; coenzymes and metal cofactors; temperature and pH effects; Michaelis-Menten kinetics; Inhibitors and activators; active site and catalytic mechanisms; covalent and non-covalent regulations; isoenzymes; osmolytes and intracellular modulation of enzymes.

Unit 2: Biological Databases both protein and Nucleotide, Sequence similarity search program and Algorithm , Pairwise and Multiple sequence Alignment program, Shannon Entropy, BLAST Algorithm , FASTA Algorithm, Protein Substitution Matrix (BLOSUM and PAM), Nucleotide Substitution Matrix, Profile, Heuristic based approach

Unit 3: Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

Unit 4: Hidden Markov Model and their application for profile analysis, Genetic Algorithm and its use in Structure Prediction of biomolecules , Nussinov algorithm for RNA secondary structure prediction, SOM, Cluster Analysis :Nearest neighbour search ,Search using stem numbers ,Search using text signatures, Phylogenetic Analysis Tools: Maximum Likelihood, Parsimony methods, Distance methods, Model Comparison.

Text Books and References:

1. Fundamentals of Biochemistry, D., Voet, Voet, J.G. & Pratt, C. W. (John Wiley & Sons, 2nd edition, 2006)
2. Computational Molecular Biology: An Algorithmic Approach, Pavel Pevzner (MIT Press, 2000)
3. An Introduction to Bioinformatics Algorithms, Neil C. Jones (The MIT Press 2004)
4. Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids**,** Richard Durbin, Sean R. Eddy , Anders Krogh, Graeme Mitchison (Cambridge University Press 1998)
5. Bioinformatics: Sequence and Genome Analysis, David W. Mount **(**Cold Spring Harbor Laboratory Press 2001
6. Statistical methods in bioinformatics: an introduction, Ewens, W. J. & Grant, G. R., (New York. Springer, 2001)

Course Code: CSE-S517 Breakup: 3 – 1 – 0 – 4

Course Name: Wireless & Mobile Computing

Course Details:

Introduction:
History of wireless communication, Cellular Telephone system, Mobile & Wireless devices, GSM, CDMA standards, Mobile services.

Wireless Transmission:
Frequencies for radio Transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation.

Modern Wireless Communication System:
2G Cellular networks, 3G wireless networks, WLL, WLANs, Bluetooth & Personal Area Network**.**

The Cellular Concept:
Frequency Reuse, channel assignment strategies, Handoff strategies, Interference & system capacity, improving coverage & capacity.

Mobile Radio Propagation: (Large Scale Path Loss):
Introduction to radio wave propagation, free space propagation model, Relating power to electric field, Three basic propagation mechanisms, Reflection, Ground reflection.

Small Scale Fading & Multipath: Small scale multipath propagation, Impulse response model of a multipath channel, small scale multipath measurements, parameters of mobile multipath channels.

Wireless Networking:
Introduction, Difference b/w fixed & wireless telephone networks, Development of Wireless Networking, Traffic Routing in wireless networks, CCS, ISDN.

Speech coding:
Introduction, characteristics of speech signals, Quantization Techniques, ADPCM, Frequency Domain Coding of Speech, Vocoders.

Text Books and References:

1. Wireless Communication –Theodore . S. Rappaport(PHI 2002),2nd edition
2. Mobile Communication - Jochen Schiller, Adison Wisley, 2nd Edition 2003

Course Code: **CSE-S518** **Breakup:** **3 – 1 – 0– 4**

Course Name: **Artificial Intelligence**

Course Details:

Introduction:
Introduction to AI, Foundations of AI, History of AI, Concept of AI techniques, the underlying assumptions, the state of art

Intelligent agents:
Agents and Behavior, The concept of rationality, Agent Architecture

Problem solving:
Problems, problem space and search – Formulating problems, Designing the problems as state space search, Issues in the design of search programs

Uninformed Search Techniques: Breadth first, Depth first, Depth limited, Iterative deepening, bidirectional, etc
Heuristic/Informed Search Techniques:
Generate and test, Best first search, A* search, Memory bounded heuristic search, Hill climbing search, Simulated annealing search, local beam search, genetic algorithms

Constraint Satisfaction Problem, Means End Analysis Adversial Search: Optimal decitions in games, Minmax algorithm, Alpha Beta Pruning

Knowledge Representation – knowledge representation issues, the predicate calculus representing knowledge using rules, symbolic reasoning, uncertainty, Probabilistic reasoning.

Languages and programming technique for AI:
An Introduction to PROLOG or LISP

Text Books and References:

1. S.J. Russell and P. Norvig , Artificial intelligence : A Modern Approach , PHI
2. Elaine Rich and Kaven Knight – Artificial Intellegence 2nd Ed. TMH
3. Nils J. Nilsson – Artificial Intelligence (Harcourt India Pub.Ltd.)
4. Charnick Mc Dermott – Introduction to Artificial Intelligence (Pearson)
5. Turban Aronson – Decision Support System & Intelligent System (Pearson)

Course code: **CSE-S519** **Breakup:** **3 – 1 – 0 – 4**

Course name: **Advance Computer Architecture**

Course Details:

Review of pipelining, example of some pipelining in modern processors, Pipeline hazards, data hazards, control hazards, techniques to handle hazards. Performance improvement with pipelines and effect of hazards on the performance.

Vector processor – use and effectiveness, memory to memory vector architectures vector register architecture. Vector length and stride issues. Compiler effectiveness in vectorization. Example of modern vector processors. Single instruction multiple data stream (SIMD) architecture, array processors, comparison with vector processors, example of array processors such as MMX technology.

Advance pipeline techniques, instruction level parallelism, basic instruction scheduling to avoid conflicts, dynamics scheduling, effect of loop unrolling. Branch prediction and their effectiveness in reducing control stalls, multiple issue of instruction compiler support for exploiting instruction level parallelism, issues of cache design.

Memory hierarchy. Cache Introduction, technique to reduce cache misses, techniques to reduce cache penalties, techniques to reduce cache hit times. Effect of main memory bandwidth, effect of bus width memory access time virtual memory etc.

RISC architectures, addressing modes, instruction formats, effect of simplification, on the performance example processors such as MIPS, PA-RISC, SPARC, PowerPC etc.

MIMD Multiprocessors. Centralized shared memory architectures, distributed shared memory architecture, synchronization and memory consistency models, message passing architectures, compiler issues. Dataflow architectures.

Interconnection networks: World wide parallel processing projects, Architecture of multiprocessor and multicomputer machines like hypercube, MMS, mesh CM*, CMP Iliac IV, Monsoon machine, dataflow architecture CM machine, teraflop computers.

Text Book and References:

1. Kai. Hwang, Advance computer architecture, MacGraw Hill, 1993.
2. Carter Schaum's Outline Computer Architecture – TMH
3. Andrew S Tanenbaum – Structural Computer Organization (PHI)
4. David E Culler, Jaswinder Pal Singh – Parallel Computer Architecture (Morgan Kaufmann)
5. Advance computer architecture by Amit Mishra

Course Code: **CSE-S520** **Breakup:** **3 – 1 – 0 – 4**

Course Name: **Machine Learning**

Course Details:

Introduction
The concept learning task. General-to-specific ordering of hypotheses. Version spaces. Inductive bias. Decision Tree Learning. Rule Learning: Propositional and First-Order, Over-fitting, Cross-Validation. Experimental Evaluation of Learning Algorithms

Instance-Based Learning:
k-Nearestneighbor algorithm, Radial basis functions. Case-based learning. Computational

Learning Theory:
probably approximately correct (PAC) learning. Sample complexity. Computational complexity of training. Vapnik-Chervonenkis dimension.

Artificial Neural Networks :
Linear threshold units, Perceptrons, Multilayer networks and backpropagation, recurrent networks. Probabilistic Machine Learning Maximum Likelihood Estimation, MAP, Bayes Classifiers Naive Bayes. Bayes optimal classifers. Minimum description length principle. Bayesian Networks, Inference in Bayesian Networks, Bayes Net

Structure Learning Unlabelled data:
EM, preventing overfitting, cotraining Gaussian Mixture Models, K-means and Hierarchical Clustering, Clustering and Unsupervised Learning, Hidden Markov Models, Reinforcement Learning Support Vector Machines

Ensemble learning:
Boosting, bagging.

Text Books and Refrences

1. Christopher M.Bishop, "Neural Networks for Pattern Recognition", 1995
2. Duda, Hart, Stork, "Pattern Classification", 2nd edition 2006
3. Hastie, Tibshirani and Friedman, "Elements of Statistical Learning: Data Mining, Inference and Prediction", 2nd edition (springer)
4. David J.C MacKay, "Information Theory, Inference, and Learning Algorithms", 2003.
5. Tom M. Mitchell, "Machine Learning", 1997.

Course Code: CSE-S521 Breakup: 3 – 0 – 0 – 4

Course Name: Data Mining and Data Warehousing

Course Details:

Unit I: Data Warehousing: Need for data warehousing , Basic elements of data warehousing, Data Mart, Data Warehouse Architecture, extract and load Process, Clean and Transform data, Star ,Snowflake and Galaxy Schemas for Multidimensional databases, Fact and dimension data, Partitioning Strategy-Horizontal and Vertical Partitioning.

Unit II: Data Warehouse and OLAP technology, Multidimensional data models and different OLAP Operations, OLAP Server: ROLAP, MOLAP, Data Warehouse implementation ,Efficient Computation of Data Cubes, Processing of OLAP queries, Indexing data.

Unit III: Data Mining: Data Preprocessing ,Data Integration and Transformation, Data Reduction, Discretizaion and Concept Hierarchy Generation , Basics of data mining, Data mining techniques, KDP (Knowledge Discovery Process), Application and Challenges of Data Mining, Introduction of Web Structure Mining, Web Usage Mining, Spatial Mining, Text Mining, Security Issue, Privacy Issue, Ethical Issue.

Unit IV: Mining Association Rules in Large Databases: Association Rule Mining, Single-Dimensional Boolean Association Rules, Multi-Level Association Rule, Apriori Algorithm, Fp-Growth Algorithm, Time series mining association rules, latest trends in association rules mining.

Unit V: Classification and Clustering Distance Measures, Types of Clustering, K-Means Algorithm,Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Categorization of methods, Partitioning methods, Outlier Analysis.

Text Books and References:

1. J. Han, M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India / Morgan Kauffman
2. P.Ponnian, “Data Warehousing Fundamentals”, John Wiley.
3. M.H.Dunham, “Data Mining Introductory & Advanced Topics”, Pearson Education.
4. Ralph Kimball, “The Data Warehouse Lifecycle Tool Kit”, John Wiley.
5. M.Berry , G.Linoff, “Master in Data Mining”, John Wiley.
6. W.H.Inmon, “Building the Data Ware houses”, Wiely Dreamtech.
7. E.G. Mallach , “The Decision Support & Data Warehouse Systems”, TMH
8. Sam Anahory, Dennis Murry, “Data Warehousing in the real world”, Pearson Education 2003.
9. David Hand, Heikki Manila, Padhraic Symth, “Principles of Data Mining”, PHI 2004..
10. Alex Bezon, Stephen J.Smith, “Data Warehousing, Data Mining & OLAP”, MeGraw-Hill Edition

Course Code: CSE-S522 **Breakup:** 3 – 1– 0 – 4

Course Name: Multi-core architectures

Course Details:

Introduction to multi-core architectures, issues involved into writing code for multi-core architectures, how to develop programs for these architectures, program optimizations techniques.

OpenMP and other message passing libraries, threads, mutex etc.

Introduction to parallel computers:
Instruction level parallelism (ILP) vs. thread level parallelism (TLP); Performance issues: Brief introduction to cache hierarchy and communication latency; Shared memory multiprocessors: General architectures and the problem of cache coherence.

Synchronization primitives:
Atomic primitives; locks: TTS, ticket, array; barriers: central and tree; performance implications in shared memory programs.

Chip multiprocessors:
Why CMP (Moore's law, wire delay); shared L2 vs. tiled CMP; core complexity; power/performance; Snoopy coherence: invalidate vs. update, MSI, MESI, MOESI, MOSI; performance trade-offs; pipelined snoopy bus design; Memory consistency models: SC, PC, TSO, PSO, WO/WC, RC; Chip multiprocessor case studies: Intel Montecito and dual-core Pentium4, IBM Power4, Sun Niagara.

Introduction to optimization:
Overview of parallelization; Shared memory programming, introduction to OpenMP; Dataflow analysis, pointer analysis, alias analysis; Data dependence analysis, solving data dependence equations (integer linear programming problem); Loop optimizations; Memory hierarchy issues in code optimization; Operating System issues for multiprocessing Need for pre-emptive OS.

Scheduling Techniques:
Usual OS scheduling techniques, Threads, Distributed scheduler, Multiprocessor scheduling, Gang scheduling; Communication between processes, Message boxes, Shared memory; Sharing issues and Synchronization, Sharing memory and other structures, Sharing I/O devices, Distributed Semaphores, monitors,spin-locks,

Text Books and References:

1. J. L. Hennessy and D. A. Patterson. Computer Architecture: A Quantitative Approach. Morgan Kofmann publishers, 3rd Edition.
2. D. E. Culler, J. P. Singh, with A. Gupta. Parallel Computer Architecture: A Hardware/Software .
3. Approach. Morgan Kofmann publishers, 2nd Edition.
4. Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kauffman.
5. Kai hwang advance computer architecture Mac Graw Hill 1993

Mathematics Electives

Course Code: MTH-S501 **Breakup: 3 – 1 – 0 – 4**

Course Name: Numerical Methods

Course Details:

Unit I: Errors, Finding zeroes of transcendental and polynomial equation using Bisection method, Regula-falsi method and Newton- Raphson method, Rate of convergence of above methods.

Unit II: Interpolation: Finite differences, difference tables, Newton's forward and backward interpolation , Lagrange's and Newton's divided difference formula for unequal intervals.

Unit III: Solution of system of linear equations: Gauss- Elimination method, Gauss Jordan method, Gauss-Seidal method, Crout method.

Unit IV: Numerical differentiation, Numerical integration , Trapezoidal , Simpson's one third and three-eight rules.

Unit V: Solution of ordinary differential (first order, second order and simultaneous) equations by Euler's, Picard's and fourth-order Runge- Kutta mehthods.

Lab Work: Programming in C/ C++. One three hour lab per week . At east two programs from each chapter should be done .

Text Books and Reference :

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House, 2002.
2. Devi Prasad, An introduction to Numerical Analysis, Narosa Publication house, New Delhi 2006.
3. T. Veerajan & T. Ramchandrandran, Theory & Problems in Numerical Methods, TMH, New Delhi,2004

Course code: MTH-S502 **Breakup: 3 – 1 – 0 – 4**

Course name: Operations Research

Course Details:

UNIT- I
Introduction: Uses, scope and applications of operations research.
Linear Programming: Mathematical formulation of Linear programming problems. Solution of LPP by Graphical method, Simplex method, Duality in Linear Programming Problem, Dual Simplex method, Sensitivity analysis.

UNIT-II
Transportation Problems: Various methods for finding initial basic feasible solution and optimal solution .
Assignment Problems: Hungarian method for solving assignment problems.
Sequencing problem: Basic assumptions, n- jobs on two machine, n- jobs on three machines, two jobs on three machines.

UNIT-III
Game Theory: Two persons zero sum game, pure and mixed strategy games, saddle point, solutions of a game with or without saddle point ,dominance rule, different methods of solving (Algebraic, Graphical, Linear programming).
Inventory Control Models: Deterministic EOQ inventory models.

UNIT-IV
Network Models: Minimal spanning tree algorithm, Shortest route problem, Maximal flow model.
Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

Text Books and Reference :

1. Wayne L. Winston,"Operations Research" Thomson Learning,2003.
2. Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education,2003.
3. R. Panneer Seevam, "Operations Research" PHI Learning, 2008.
4. V.K.Khanna, "Total Quality Management" New Age International, 2008.
5. Kanti swroop , Manmohan and Gupta-operations research , sultan chand & sons new delhi.
6. V.K.Kapoor- operations Research (S.Chand,4th Edition)

Course Code: MTH-S503 **Breakup: 3 – 1 – 0 – 4**

Course Name: Graph Theory

Course Details:

Unit –I

Graphs, Sub graphs, Some basic properties, Different types of graphs (Regular, Bipartite, Induced, Quotient etc) walks, paths & circuits, connected graphs, disconnected graphs and its components, Euler graphs and its properties, Fluery's algorithms and Chinese postman problem Operation on graphs, Hamiltonian graphs and its properties, Hamiltonian paths and circuits, the traveling sales man problem. Shortest distance algorithms (Dijkstra's) .

Unit –II

Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets , connectivity and separability , Rank, Nullity of a graph.

Digraphs : Definition, Types of Digraphs, Digraphs and Binary relations, Directed path and connectedness, Euler Digraphs.

Unit- III

Trees and its characterization, Distance, Height, Diameters, Radius of a tree, Weighted Tree, Rooted and Binary trees, Spanning trees , Weighted spanning tree , Minimum weight spanning tree algorithms prim's and Kruskal's. Chords, Branches, Fundamental circuits.

Unit –IV

Matrix representation of graphs : Incidence, Adjacency, Circuit, Cut-set and Path matrices and their properties. Matrix representation of Digraphs (Adjacency matrix).

Unit –V

Planarity: Planer graphs, Regions, Euler formula, Kuratowski two graphs, Characterization of planarity, detection of planarity, Thickness and Crossings number of a graph.

Colouring of graphs: Vertex colouring , Edge colouring, Five colour Theorem, Chromatic number, chromatic polynomials, Methods of finding the chromatic polynomial, Chromatic partitioning, Independence number and Covering number.

Matchings , Maximal matching, Augmenting path, Hall's marriage problem

Unit -VI

Enumeration : counting labelled and unlabelled graphs and trees. Cycle index, Figure counting series, Configuration counting series, Polya's Theorem(without Proof). Application to simple and multiple graphs with at most two edges between vertices.

Transportation networks : Network flows, Max flow-Min cut Theorem.

Text Books and Reference :

1. Deo, N, Graph theory with applications to Engineering and Computer Science, PHI
2. V. Balakrishnan, Schaum's Outline of Graph Theory, TMH
3. Robin J. Wilson, Introduction to Graph Theory, Pearson Education
4. Harary, F, Graph Theory, Narosa
5. Geir Agnarsson, Graph Theory: Modeling, Applications and Algorithms, Pearson Education
6. Bondy and Murthy: Graph theory and application. Addison Wesley

Course Code: MTH-S504 Breakup: 3 – 1 – 0 – 4

Course Name: Probability & Statistics

Course Details:

UNIT- I

Joint Distribution Functions, Necessary and Sufficient conditions for independence of random variables, Central Limit Theorem, Statistic, Sufficient Statistic.

UNIT- II

Estimation Theory; Methods of Estimation, Unbiased, Consistent, Maximum likelihood estimators, Minimum Variance, Unbiased Estimators .

UNIT- III

Testing of Hypotheses; Simple and Composite Hypotheses, Two types of error, Power of a test, Neyman Pearson Lemma for most powerful Tests, Application of the Lemma, Various tests of significance for the mean and variance, Contingency tables and X^2 - tests. Confidence Interval Estimation .

Text Books and Reference :

1. V.K.Rohatgi & Saleh: An introduction to Probability and statistics, Wiley Eastern
2. Ramana: Higher Engineering Mathematics, McGraw Hill
3. E. Kreyszig, Advanced Engineering Mathematics (Chapter 22), John Wiley & Sons, 2005 .

Humanities Electives

Course Code: HSS-S501 **Breakup: 3 – 1 – 0 – 4**

Course Name: Psychology

Course Details:

Unit 1: Introduction to Psychology: Definition, Perspectives and Approaches, Difference with other Disciplines.
Unit 2: Basic Concepts: Person, Consciousness, Behaviour and Experience, Perception, Learning, Memory, Motivation and Emotion, Intelligence.
Unit 3: Methods of Psychology: Observation, Experiment, Interview, Case-Study.
Unit 4: The Bases of human Behaviour: Biological and Cultural Roots, Nervous System, Genetic bases of Behaviour, Culture and Human Behaviour.
Unit 5: Developmental Psychology: Infancy, Childhood, Adolescence, Adulthood and Old Age.
Unit 6: Social Psychology: Methods Adopted, Aggression and Violence, Attitude.
Unit 7: Psychology of Adjustment: Psychological Disorders, Anxiety, Stress and Burn-out, Depression and Suicide, Psychotherapies.
Unit 8: Environmental Psychology: Environmental Changes, Natural and Man-made Disasters, Ecological Concerns, Cultural factors in Ecological Psychology.
Unit 9: Engineering Psychology: Situation Awareness, Mental Workload and Related Phenomena, Computers and Automation, Human-Computer Interaction.

Text Books and Reference :

1. Stephen Michael Kosslyn and Robin S. Rosenburg---Fundamentals of Psychology in Context
2. P.O.Gray--Foundations for the Study of Psychology
3. R.A. Baron, N.R. Branscombe and D. Byrne--Social Psychology
4. C.D. Wickens and J.G. Hollands—Engineering Psychology and Human Performance.

Course Code: HSS-S502 **Breakup: 3 – 1 – 0 – 4**

Course Name: Sociology

Course Details:

Unit 1: What is Sociology: Definition, Subject Matter, Difference with other Disciplines.
Unit 2: Basic Concepts: Society, Community, Associations, Institutions, Customs, Folkways and mores, Individual and Society.
Unit 3: Major Theorists: Auguste Comte, Emile Durkheim, Karl Marx, Max Weber.
Unit 4: Stratification-Different Perspectives: Functionalists, Marxist, Weberian. Indian context: Caste, Class, tribe, Sansritisation, Westernisation, Modernisation.
Unit 5: Religion: Origin, Evolution. Various Perspectives: Functionalist, Marxist, Weberian. Indian Perspective: Secularism, Communalism.
Unit 6: Family: Definition, Function, Types. Perspective: Functionalist, Marxist, Changing Patterns of Family.
Unit 7: Methodology: Positivism and Sociology, Phenomenology and Sociology, Research methods and Techniques.

Text Books and Reference :

1. Alex Inkeles—What is Sociology?
2. Maciver and Page—Society: An Introductory Analysis.
3. David Mandelbaum—Society in India
4. Yogendra Singh—Modernization of Indian Tradition.