DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION
AND
COURSE CURRICULUM

B. Tech. (SOFTWARE ENGINEERING)

CONTENT

Scheme of Examination................................................................. 2-6

Course Curriculum
First Year......................................................................................... 7-13
Second Year..................................................................................... 13-20
Third Year......................................................................................... 20-27
Fourth Year......................................................................................... 27-46
### SCHEME FOR B.TECH. FIRST SEMESTER (SOFTWARE ENGINEERING)

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A  Allied Engineering  
C  Core (include major project and practical training also)  
H  Humanities, Social Studies and Basic Sciences  
M  Mandatory
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A  Allied Engineering  
C  Core (include major project and practical training also)  
H  Humanities, Social Studies and Basic Sciences
### SCHEME FOR B.TECH. FIFTH SEMESTER (SOFTWARE ENGINEERING)

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**Industrial Training**  
(Duration of 4 weeks to be carried out after V Semester exam)

**TOTAL**  
Practice: 30 hrs 1000 30

### SCHEME FOR B.TECH. SIXTH SEMESTER (SOFTWARE ENGINEERING)

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(Based on Industrial training of 4 weeks duration carried out after Vth Semester exams) | 3 0 70 | 100 | 2 M |

**Industrial Training**  
(Duration of Six-Eight weeks to be carried out after VI Semester exam)

**TOTAL**  
Practice: 30 hrs 1000 30

A  Allied Engineering  
C  Core (include major project and practical training also)  
H  Humanities, Social Studies and Basic Sciences  
M  Mandatory  

**Note:**  
- Industrial training of 4 weeks during winter vacation after 5th Semester and 8 Weeks during summer vacation after
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<td>SE-416</td>
<td>Major Project- II</td>
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<td>PR-3</td>
<td>SE-417</td>
<td>Self Study Seminar -III</td>
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<td><strong>TOTAL Practice</strong></td>
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<td>30 hrs</td>
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</tbody>
</table>

A Allied Engineering  
C Core (include major project and practical training also)  
H Humanities, Social Studies and Basic Sciences  
M Mandatory  

Note:  
- Industrial training of 4 weeks during winter vacation after 7th Semester and 8 Weeks during summer vacation after 8th Semester.
<table>
<thead>
<tr>
<th>Departmental Electives - I</th>
<th>Open Electives - I</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE-403-1 Software Quality and Metrics</td>
<td>SE-404-1 Digital Image Processing</td>
</tr>
<tr>
<td>SE-403-2 Distributed Computing Systems</td>
<td>SE-404-2 Soft Computing</td>
</tr>
<tr>
<td>SE-403-3 Real Time Systems</td>
<td>SE-404-3 Computer Vision</td>
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<tr>
<td>SE-403-4 Mobile Computing</td>
<td>SE-404-4 Neural Network and Fuzzy Logic</td>
</tr>
<tr>
<td>SE-403-5 Software Architecture &amp; Design Pattern</td>
<td>SE-404-5 Pattern Recognition</td>
</tr>
<tr>
<td>SE-403-6 E-Business Management</td>
<td>SE-404-6 Optimization Techniques</td>
</tr>
<tr>
<td>SE-403-7 Natural Language Processing</td>
<td>SE-404-7 Computer and Professional Ethics</td>
</tr>
<tr>
<td>SE-404-8 Selected Topics</td>
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</table>

<table>
<thead>
<tr>
<th>Departmental Electives - II</th>
<th>Open Electives - II</th>
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<tbody>
<tr>
<td>SE-412-1 Advanced Computer Networks</td>
<td>SE-413-1 Network and Information Security</td>
</tr>
<tr>
<td>SE-412-2 Advanced Database Management Systems</td>
<td>SE-413-2 Multimedia Technology and Applications</td>
</tr>
<tr>
<td>SE-412-3 Advances in Software Engineering</td>
<td>SE-413-3 Information Theory and Coding</td>
</tr>
<tr>
<td>SE-412-4 Grid Computing</td>
<td>SE-413-4 Fault Tolerant and Reliable System Design</td>
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<tr>
<td>SE-412-5 Bioinformatics</td>
<td>SE-413-5 Optical Networks</td>
</tr>
<tr>
<td>SE-412-6 Business of IT</td>
<td>SE-413-6 Virtual Reality</td>
</tr>
<tr>
<td>SE-412-7 Component Based Technology</td>
<td>SE-413-7 Embedded System</td>
</tr>
<tr>
<td>SE-412-8 Selected Topics</td>
<td>SE-413-8 Selected Topics</td>
</tr>
</tbody>
</table>
UNIT I
Infinite series: Tests for convergence of series (comparison, ratio, root, integral, Raabe’s, logarithmic), Alternating series, Absolute convergence, Conditional convergence.

UNIT II
Calculus of single variable: Taylor’s & Maclaurin’s expansion, Radius of curvature, applications of definite integral to area, arc length, surface area and volume (in Cartesian, parametric and polar co-ordinates).

UNIT III
Calculus of several variables: Partial differentiation, Euler’s theorem, total differential, Taylor’s theorem, Maxima-Minima, Lagrange’s method of multipliers, Application in estimation of error and approximation.

UNIT IV
Multiple Integrals: Double integral (Cartesian and polar co-ordinates), change of order of integration, triple integrals (Cartesian, cylindrical and spherical co-ordinates), Gamma and Beta functions. Applications of multiple integration in area, volume, centre of mass, and moment of inertia.

UNIT V
Vector Calculus: Continuity and differentiability of vector functions, Scalar and vector point function, Gradient, Directional derivative, divergence, curl and their applications. Line integral, surface integral and volume integral, applications to work done by the force. Applications of Green’s, Stoke’s and Gauss divergence theorems.

Text Books/Reference Books:
2. "Calculus and Analytic Geometry" by Thomas/Finney; Narosa.
4. "Advanced Engineering Mathematics" by Taneja ; I K international

UNIT II
Basics of Writing:
(A) Presentation of Technical Information: Technical description of simple objects, tools, appliances; Processes and operations; Scientific Principles; Definitions ; Interpretation of Visual Data (graph, charts etc)
(B) Writing of: Paragraph; Summary and Abstract; Taking and Making Notes.
(C) Comprehension of Unseen Passages based on reading exercises like Skimming, Scanning and Inference making.

UNIT III
Oral Communication: Phonetics: Speech Sounds and their articulation; Phonemes, syllable, Stress, Transcription of Words and Simple Sentences; Presentation and Seminar; Language Lab Practice for Oral Communication.

UNIT IV
Texts for Appreciation and Analysis:
(A) Wings of Fire by APJ Abdul Kalam
(B) The Fortune at the Bottom of the Pyramid by C.K. Prahalad.
(C) The Branded (Uchalya) by Laxman Gaikwad
(D) Geetanjali by Ravindranath Tagore.

Text Books/Reference Books:
10. Rabindranath Tagore, Gitanjali, Filiquarian Publishing, LLC.

UNIT I
Functional English:
(A) Parts of speech; Tense and concord; Conditional clauses; Question tags & short responses; Punctuation; Common errors.
(B) Vocabulary and Usage: Synonyms & Antonyms; One word substitutions; Words often confused; Idioms / Idiomatic expressions.

AP – 103 Applied Physics - I

UNIT I
UNIT II
Oscillations, waves: Damped and forced oscillations, Resonance (amplitude and power), Q – factor, Sharpness of resonance. Equations of longitudinal and transverse waves and their solutions, Impedance, Reflection and transmission of waves at a boundary, Impedance matching between two medium.

UNIT III
Physical optics: Interference by division of wave front and amplitude, Multiple beam interference and Fabry-Perot interferometer, Fresnel diffraction through a straight edge, Fraunhofer diffraction, Zone plate, single slit and N-slit / grating, Resolving power of telescope, prism and grating. Polarization by reflection and by transmission, Brewster’s law, Double refraction, elliptically and circularly polarized light, Nicol prism, Quarter and half wave plates.

UNIT IV
Optical Instruments: Cardinal points of co-axial lens systems, spherical and chromatic aberrations and their removal, Huygens and Ramsden’s eyepiece.

UNIT V
Laser optics: Coherence and coherent properties of laser beams, Brief working principle of lasers, Spontaneous and stimulated emission, Einstein’s co-efficient, Ruby laser, He-Ne laser.

UNIT VI
Optical Fiber: Classification of optical fibers, Refractive index profile, Core cladding refractive index difference, Numerical aperture of optical fiber, Pulse dispersion in optical fiber (ray theory).

Text Books/Reference Books:
2. “Vibrations and Waves” by A.P. French.
4. “Optics” by A. Ghatak.

UNIT I
(a) Conventional Analysis: Volumetric Analysis, Types of titrations, Theory of indicators.
(b) Spectral Analysis: Electromagnetic radiation, Lambert-Beer’s Law, UV-VIS, IR, instrumentation & applications.

UNIT II
Thermal Methods of Analysis: Principle, working and applications of Thermo-gravimetry, Differential thermal analysis and Differential scanning calorimetry.

UNIT III

UNIT IV
Electrochemistry
Electrochemical cells, components, characteristics of batteries. Primary and Secondary battery systems, Zinc-Carbon cells, Lead storage and lithium batteries. Fuel Cells, Electro-deposition, Electrical and chemical requirements. Electroplating bath and linings. Agitation, Circulation and filtration equipment. Plating of copper, gold and rhodium.

UNIT V
Phase Equilibrium: Definitions of Phase, component and degree of freedom, Gibb’s phase rule. One component systems: Water and sulphur. Two component systems: Pb-Ag and Cu-Ni system.

UNIT VI

Text Books/Reference Books:
5. “Polymer Science and Technology” by Billmeyer; John Wiley.
6. “Polymer Science and Technology” by Fried; Prentice Hall.
conversion, Superposition Theorem, Thevenin’s Theorem, Norton’s theorem, Maximum Power Transfer Theorem, Tellgen Theorem.

UNIT II
Single Phase AC Circuits: Single phase EMF generation, average and effective values of sinusoids, complex representation of impedance, series and parallel circuits, concept of phasor, phasor diagram, power factor, power in complex notation, real power, reactive power and apparent power. Resonance in series and parallel circuits, Q-factor, bandwidth and their relationship, half power points.

UNIT III
Three-Phase AC Circuits: Three phase EMF generation, delta and Y connection, line and phase quantities. Solution of three phase circuits: balanced supply voltage and balanced load, phasor diagram, measurement of power in three phase circuits.

UNIT IV

UNIT V
Measuring Instruments: Analog indicating instruments, devices, Damping devices, PMMC ammeters and voltmeters, shunt and multipliers, Moving iron ammeter and voltmeters, dynamometer type wattmeters, multimeters, AC watt-hour meters. Digital voltmeters, ammeters and wattmeters.

Text Books/Reference Books:
4. Relevant Indian Electricity Supply rules & BIS codes.

IT – 106 Fundamentals of Information Technology

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<thead>
<tr>
<th>IT – 106 Fundamentals of Information Technology</th>
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UNIT I
Fundamental Concepts of Information: Definition of information, Data Vs Information, Introduction to Information representation in Digital Media, Text, image, graphics, Animation, Audio, Video etc., Need, Value and Quality of information

UNIT II

UNIT III
Programming Language Classification & Program Methodology: Computer Languages, Generation of Languages, Translators, Interpreters, Compilers, Flow Charts, Dataflow Diagram, Assemblers, Introduction to 4GL and 5GL.

UNIT IV

UNIT V

UNIT VI

Text Books/Reference Books:
2. ‘Introduction to Computers’ by Peter Norton; Tata McGraw-Hill.
3. “Introduction to Computers” by Rajaraman; EPI.
4. “Data Compression” by Nelson; BPB.
6. “Information Technology: Breaking News” by Curtin; TMH.
8. “Internet 101” by Lehngart; Addison Wesley.
UNIT I
Matrices: Rank of a matrix, inverse of a matrix using elementary transformations, consistency of linear system of equations, Eigen-values and eigenvectors of a matrix, Cayley-Hamilton theorem, diagonalization of matrix.

UNIT II

UNIT III
Special Functions: Power series method, Frobenious method, Legendre equation, Legendre polynomials, Bessel equation, Bessel function of fist kind, Orthogonal Property, Rodrigues’ Formula.

UNIT IV
Laplace Transforms: Basic properties, Laplace transform of derivatives and integrals, Inverse Laplace transform, Differentiation and Integration of Laplace transform, Convolution theorem, Unit of Step Function, Periodic function, Laplace transform to IVP and boundary value problem Applications system of linear Simultaneous differential equations.

UNIT V
Fourier series: Fourier series, Dirichlet conditions, Even and odd functions, half range series, harmonic analysis.

UNIT VI

Text Books/Reference Books:
1. “Advanced Engineering Mathematics” by Greenberg; Pearson Education.

UNIT I

UNIT II
Ecosystems: Concept of ecosystem biotic & abiotic components, types of ecosystems, functional components of ecosystem- biodiversity, productivity, food chains & food webs, material cycling and energy flow, different ecosystems- forest, grassland, desert, aquatic.

UNIT III
Water Pollution: Water quality, physical, chemical & biological characteristics of water & waste water, ground water pollution, water borne diseases.

UNIT IV

UNIT V
Energy & Solid Waste Management: Conventional energy resources- coal, thermal, petroleum, hydroelectricity, nuclear power, wood, non conventional sources- solar, biogas, wind, ocean & tidal energy, geothermal energy. Hazardous and non hazardous solid waste management. Environmental laws and acts.

Text Books/Reference Books:
1. “Environmental Studies” by De Anil Kumar & De Arnab Kumar; New Age International (P) Ltd.
2. “Environmental Studies” by Basak Anindita; Pearson Education South Asia.
UNIT II

UNIT III

UNIT IV
Nuclear Physics : Nuclear properties, constituent of the nucleus, binding energy, stable nuclei, radioactive decay law (alpha and beta spectrum), Q-value of nuclear reaction, nuclear models-liquid drop and shell model, nuclear fission and fusion, elementary ideas of nuclear reactors.

UNIT V
Electrodynamics : Maxwell’s equations, concept of displacement current, Derivation of wave equation for plane electromagnetic wave, Poynting vector. Poynting theorem, Energy density, wave equation in dielectric & conducting media.

Text Books/Reference Books:
1. “Nuclear Physics” by Erwin Kaplan.
2. “Concept of Nuclear Physics” by Cohen.

SECTION – B (CHEMISTRY)
UNIT IV
Introduction to engineering materials for mechanical construction. Composition, mechanical and fabricating characteristics and applications of various types of cast irons, plain carbon and alloy steels, copper, aluminum and their alloys like duralumin, brasses and bronzes cutting tool materials, super alloys thermoplastics, thermosets and composite materials.

UNIT V

UNIT VI

NOTE: Two hrs per week load for Applied Physics Department.
Two hrs per week load for Applied Chemistry Department.

Text Books/Reference Books (PHYSICS):

Text Books/Reference Books (CHEMISTRY)
2. “Speciality Polymers “ by R.W.Dyson; Chapman and Hall, New York, USA.

<table>
<thead>
<tr>
<th>ME 115 Basic Mechanical Engineering</th>
<th>L T P</th>
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</table>

**PART A**

**UNIT I**


**UNIT II**


**UNIT III**

Properties & Classification of Fluids, Ideal & real fluids, Newton’s law of viscosity, Pressure at a point, Pascal's law, Pressure variation in a static fluid, Introduction to Bio-fluid Mechanics General description of fluid motion, stream lines, continuity equation, Bernoulli’s equation, Steady and unsteady flow. Turbines and pumps.

**PART-B**

**UNIT IV**

Introduction to Manufacturing processes for various machine elements. Introduction to Casting & Welding processes. Fabrication of large & small components and assemblies- example Nuts and Bolts, Water turbine rotors, Large Electric Generators, introduction to turning, milling, shaping, drilling & boring processes.

**UNIT V**

Introduction to quality measurement for manufacturing processes; standards of measurements, line standards and, end standards, precision measuring instruments and gauges: vernier calipers, height gauges, micrometers, comparators, dial indicators, and limit gauges.

**Text Books/Reference Books**


**COE– 116 Programming Fundamentals**

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<th>L T P</th>
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**UNIT I**

**Introduction:** Concepts of algorithm, flow chart, Introduction to different Programming Languages like C, C++, Java etc.

**Elementary Programming:** Data types, assignment statements, conditional statements and input/output statements. Iterative programs using loops. Concept of subprograms. Coding style: choice of names, indentation, documentation, etc.

**UNIT II**

**Arrays:** Array representation, Operations on array elements, using arrays, multidimensional arrays.

**Structures & Unions:** Declaration and usage of structures and Unions.

**Pointers:** Pointer and address arithmetic, pointer operations and declarations, using pointers as function argument.

**File:** Declaration of files, different types of files. File input/ output and usage.

**UNIT III**

**Object Oriented Programming:** Functional and data decomposition, Characteristics of Object-Oriented Languages: Abstraction, Encapsulation, Information hiding, abstract data types,

**Classes and Objects:** Concept of Object & classes, attributes, methods, C++ class declaration, private and public memberships, Constructors and destructors, instantiation of objects. Introduction to Class inheritance and operator overloading.

**UNIT IV**

**Files:** Streams and files, error handling, over view of Standard Template Library.

**Text Books/Reference Books**


<table>
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<th>AP 117 Applied Physics - II Lab</th>
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<td>Laboratory Practical Based on course work corresponding AP113</td>
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<th>COE 118 Programming Lab</th>
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<th>ME– 119 Engineering Graphics</th>
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**General:**
Importance, Significance and scope of engineering drawing Lettering, Dimensioning, Scales, Sense of Proportioning, Different types of Projections, B.I.S. Specification, line symbols, rules of printing.

**Projections of Points and Lines:**
Introduction of planes of projection, Reference and auxiliary planes, projections of points and lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on auxiliary planes, shortest distance, intersecting and non-intersecting lines.

**Planes Other than the Reference Planes:**
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., projections of points lines in the planes, conversion of oblique plane into auxiliary plane and solution of related problems.

**Projections of Plane Figures:**
Different cases of plane figure (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes). Obtaining true shape of the plane figure by projection.

**Projection of Solids:**
Simple cases when solid is placed in different positions, Axis, faces and lines lying in the faces of the solid making given angles.

**Isometric and Orthographic:**
First and Third angle of system of projection sketching of Orthographic views from pictorial views and vice versa principles and type of sectioning. Development of Surface

**Text Books/Reference Books**

<table>
<thead>
<tr>
<th>PE 120 Mechanical Workshop</th>
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Fitting shops, Welding shops, Foundry Shops, Sheet Metal Shop, Smithy Shop.

<table>
<thead>
<tr>
<th>SE-201 Object Oriented Programming</th>
<th>L T P</th>
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**UNIT I**
Object oriented paradigm & C++ at a glance: Evolution of programming paradigm, structured versus object-oriented development, elements of object-oriented programming, Objects, classes, methods, popular OOP languages, software reuse.

**UNIT II**
Classes and objects: Introduction, Class revisited, constant objects and constructor, static data members with constructors and destructors, constructor overloading, nested classes, objects as arguments, returning objects, friend functions and friend classes, constant parameters and member functions, static data and member functions Dynamic objects: Introduction, pointers to objects, array of objects, pointers to object members, this pointer, self-referential classes

**UNIT III**
Operator overloading and Inheritance: overloading of new and delete operators, conversion between objects and basic types, conversion between objects of different classes, overloading with friend functions, abstract classes, inheritance types, virtual base classes, virtual functions, pointer to derived class objects, and base class objects, pure virtual functions, virtual destructors.

**UNIT IV**
Generic programming with templates: Introduction, function templates, overloaded function templates, class templates, inheritance of class template, class template containership, class template with overloaded operators.

**UNIT V**
Introduction: Byte code, security and portability, Data Types, variables, operators, arrays, type conversion and casting, type promotion, Control statements, standard input-output, Designing Classes, constructors, methods

**UNIT VI**
Access specifies: public, private, protected, inheritance, packages and interfaces, Math, String, Vectors, and Array List classes, polymorphism: function and operator overloading, function overriding, abstract classes.

**UNIT VII**
Latest Research in OOPS: Static analyzer for finding dynamic programming error, Accurate interprocedural null deference analysis in Java.
Text Books:
1. Patrick Naughton, Herbert Schildt, “The Complete Reference: Java 2”, TMH.
2. C Thomas Wu : “An Introduction to OO programming with Java”, TMH.

Reference Books:
2. Mastering C++ K.R Venugopal Rajkumar, TMH.
4. Maria litvin, Gary litvin, “Programming in C++”, VPH.

Reference Papers:

SE-202 Analog Electronics

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UNIT I
Semiconductors Diodes and Rectifiers: Review of p-n junction diode, clipping clamping ckt, rectifier ckt, Power supply filters, Zener diode, & Zener regulators. different types of diodes (zener, varator, schottky, power tunnel, photodiode & LED).

Bipolar junction transistor: Introduction, Transistor, Construction, transistor operations, BJT characteristics, load line, operation point, leakage currents, saturation and cut off mode of operations.

UNIT II
Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respects of variations in Ico, Vbe & b, stabilization factors, thermal stability.

UNIT III
Small Signal Amplifiers: CB, CE, CC configurations, hybrid model for transistor at low frequencies, RC coupled amplifiers. Field Effect Transistors: Classification & characteristics, operating point, biasing, enhancement & depletion type MOSFETS, Design of Amplifiers

UNIT IV
Feedback Amplifiers: Introduction, various feedback arrangements & stability, oscillators.

Operational Amplifier: Ideal OPAMP, OPAMP stages, OPAMP Parameters, equivalent circuit, Ideal voltage transfer curve, open loop OPAMP configuration, closed loop OPAMP configuration.

UNIT V
Applications of other analog IC’s: timer 555, voltage regulators, PLL and function generators.

UNIT VI
OPAMP applications: comparator, current sources, rectifiers, first and second order filters, summer, integrator, differentiators, voltage to current, current to voltage converter Clipper, clamper, waveform generators, instrumentation amplifier, log, antilog amplifier. As table multi-vibrator, mono-stable multi-vibrator, square & triangular wave generators.

Text Books:
2. Salivahanan, Suresh Kumar, Vallavaraj, “Electronic devices and circuits” TMH, 1999

Reference Books:

SE-203: Data structures

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UNIT I
Introduction: Introduction to Algorithmic, Complexity-Time-Space Trade off. Introduction to abstract data types, design , implementation and applications. Introduction of data structure list.

Arrays and Strings: Representation of Arrays in Memory: one dimensional , Two dimensional and Multidimensional, Accessing of elements of array ,performing operations like Insertion, Deletion and Searching. Sorting elements of arrays. Strings and String Operations

Stacks and Queues: Introduction to data structures like Stacks and Queues. Operations on Stacks and Queues, Array representation of Stacks , Applications of Stacks : recursion, Polish expression and their compilation conversion of infix expression to prefix and postfix expression, Operations of Queues, Representations of Queues Applications of Queues, Priority queues.

UNIT II
Linked Lists: Singly linked lists, Representation of linked list, Operations of Linked list such as Traversing, Insertion and Deletion, Searching, Applications of Linked List .Concepts of Circular linked list and Doubly linked list and their Applications. Stacks and Queues as linked list.
UNIT III
Trees: Basic Terminology, Binary Trees and their representation, binary search trees, various operations on Binary search trees like traversing, searching, Insertion and Deletion, Applications of Binary search Trees, Complete Binary trees, Extended binary trees,
General trees, AVL trees, Threaded trees, B-trees.

UNIT IV
Sorting: Insertion Sort, Quick sort, Merge sort, Heap sort, sorting on different keys, External sorting.

UNIT V

UNIT VI

UNIT VII
Advances in Data Structures: Data Acquisition for Probabilistic Nearest-Neighbor Query, Probabilistic Nearest-Neighbor Query on Uncertain Objects

Text Books:
   Galgotia publications
2. An introduction to data structures and application by
3. Tannenbaum, “Data Structures”, PHI

Reference Books
1. R.L. Kruse, B.P. Leary, C.L. Tondo, “Data structure and program design in C”, PHI

Reference Papers:
2. DOI 10.1109/TKDE.2013.2297916, IEEE Transactions on Knowledge and Data Engineering

UNIT II
Introduction Logic Gates, Logic Families TTL, Tristate Logic, ECL, CMOS and T2 L Logic Logic parameters etc. Bistable, Monostable, Astable and Schmitt trigger circuit.

UNIT III
Gated memories, M/S flip flips, Shift Registers Serial & Parallel Counters, Ring counters, Up Down counters. Designing of combinational circuits like code converter, address, comparators, etc.

UNIT IV
Introduction to semiconductor memories: ROM, PROM, EPROM, STATIC & DYNAMIC RAM. Introduction to Encoders, Decoders, Multiplexer, Demultiplexer, Designing Combinational circuits with multiplexers and other digital logic blocks, PROM. Concept of digital to Analog Conversion Ladder Networks, and Concept of Analog to digital conversion: Dual Slope method.

UNIT V
V-F conversion, stair case Ramp-method/counter method successive approximation type of A/D converters etc.

UNIT VI
Introduction to design of synchronous & asynchronous sequential circuit flow table realization from verbal description, ASM charts, minimization of flow table and concept of state assignment.

Text Books:
1. Digital Fundamentals by Thomas L. Floyd
2. Getting Started in Electronics by Forrest Mims
3. Schaum’s Outline of Digital Principles by Roger L. Tokheim
UNIT III
Role of Science, Engineering and Technology in economic development: Some of the burning problems of rural and slum areas in India and how engineering and technology may be used to alleviate them, example of Green Revolution and White revolution. Reasons for their success and can we replicate them. Sustainable development.

UNIT IV
Elementary Economics Analysis; Interest formulas and their Applications; Calculations of economic equivalence, Bases for Comparison of Alternatives: Present Worth Method, Future Worth Method, Annual Equivalent, Internal Rate of Return; Evaluating Production Operations, Business Risk Management.

Text Books:

SE-206 Discrete Mathematics

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UNIT I

UNIT II
Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Closets, Lagrange’s theorem, Normal Subgroups, Permutation and Symmetric groups, Group, Abelian Group, Homeomorphisms, Introduction of Rings and Fields.

UNIT III

UNIT IV

UNIT V
Trees and Graphs: Terminology, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring

UNIT VI
Functions: Recurrence Relation & Generating function: Method of solving recurrences.

Text Books:

Reference Books:

SE-207 Object Oriented Programming Lab

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Programming based on SE-201 using the Object Oriented Concepts

SE-208 Electronics Lab

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Based on course work corresponding SE-202, SE-204.

SE-209 Data Structure Lab

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Based on course work corresponding SE-203.

SE-210 Self Study / Seminar - I

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Students are to study latest topic of interest using e-books and journals and give presentation at end.

SE-211 Database Management Systems

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UNIT I
Introduction: Data base system concepts and its architecture, Data models schema and instances, Data independence and data base language and interface, Data definition languages, DML. Overall data base structure.
Data modeling using Entity Relationship Model: ER model concept, notation for ER diagrams mapping constraints, Keys, Concept of super key, candidate key, primary key generalizations, Aggregation, reducing ER diagrams to tables, extended ER model.

UNIT II
Relational Data Model and Language: Relational data model concepts, integrity constraints, Keys domain constraints, referential integrity, assertions, triggers, foreign key relational algebra, relational calculus, domain and tuple calculus, SQL data definition queries and updates in SQL.

UNIT III
Data Base Design: Functional dependencies, normal forms, 1NF, 2NF, 3NF and BCNF, multi-valued dependencies fourth normal forms, join dependencies and fifth normal forms. Inclusion dependencies, loss less join decompositions, normalization using FD, MVD and JDs, alternatives approaches to database design

UNIT IV
File Organization, Indexing and Hashing Overview of file organization techniques, Indexing and Hashing- Basic concepts, Static Hashing, Dynamic Hashing, Ordered indices, Multi-level indexes, B-Tree index files, B+ Tree index files, Buffer management

UNIT V
Transaction processing concepts: Transaction processing system, schedule and recoverability, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recovery from transaction failures, deadlock handling.

Concurrency Control Techniques: Locking Techniques for concurrency control, time stamping protocols for concurrency control, concurrency control in distributed systems. multiple granularities and multi-version schemes.

UNIT VI
Advance in DBMS & Case Studies: Commercial databases, Oracle, Postgress, MySQL, Implementation of Projected Clustering based on SQL queries and UDFs in Relational Databases, Efficient Mutation Analysis of Relational Database StructrurUsing Mutant Schemata and Parallelisation

Text Books:
1. Elmasri, Navathe, “Fundamentals of Database systems”, Addison Wesley

Reference Books:
1. Date C.J., “An Introduction to Database systems”

Reference Papers:
1. Efficient Mutation Analysis of Relational Database StructurUsing Mutant Schemata and Parallelisation in 2013 IEEE Sixth International Conference on Software Testing, Verification, and Validation Workshops.
2. Implementation of Projected Clustering based on SQL queries and UDFs in Relational Databases 2013 IEEE Recent Advances in Intelligent Computational Systems (RAICS)

SE-212 Computer System Organization

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UNIT I
Introduction: Digital computer generation, computer types and classifications, functional units and their interconnections, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. REGISTER TRANSFER LANGUAGE: Data movement around registers. Data movement from/to memory, arithmetic and logic micro operations. Concept of bus and timing in register transfer.

UNIT II
Central Processing Unit: Addition and subtraction of signed numbers, look ahead carry adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Processor organization, general register organization, stack organization and addressing modes.

UNIT III
Control Unit: Instruction types, formats, instruction cycles and sub-cycles (fetch and execute etc), micro-operations, execution of a complete instruction.

Hardwired and microprogrammed control: microprogramme sequencing, wide branch addressing, micro-instruction with next address field, pre-fetching microinstructions, concept of horizontal and vertical microprogramming.

UNIT IV
Memory: Basic concept and hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memories: concept and design issues, associative mapping, Direct mapping, set-associative mapping, cache writing and initialization.

UNIT V
UNIT VI
Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access. I/O channels and processors. Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.

UNIT VII
Advance Topics: An Approach to Balance the Load h Security for Distributed File System in Cloud, ICCI: In-Cache Coherence Information

Text Books:
2. William Stalling, Computer Organization, PHI
3. Mano, Computer System Architecture, PHI

Reference Books:
1. Vravice, Hamacher & Zaky, Computer Organization, TMH
2. Tannenbaum, Structured Computer Organization, PHI

Reference Papers:
2. ICCI: In-Cache Coherence Information, Citation information: DOI 10.1109/TC.2014.2308185, IEEE Transactions on Computers.

SE-213 Operating System Design

UNIT I
Introduction: Operating system and function, Evolution of operating system, Batch, Interactive, Time Sharing and Real Time System, System protection.


UNIT II

CPU Scheduling: Scheduling Concept, Performance Criteria Scheduling Algorithm, Evolution, Multiprocessor Scheduling.

UNIT III
Deadlock: System Model, Deadlock Characterization, Prevention, Avoidance and Detection, Recovery from deadlock combined approach.

UNIT IV
Memory Management: Base machine, Resident monitor, Multiprogramming with fixed partition, Multiprogramming with variable partition, Multiple base register, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Organization, Impact on performance.

UNIT V


UNIT VI

Text Books:
3. Tannenbaum, “Operating system design and implementation”, PHI.

Reference Books:

Reference Papers:
2. CMOS Startup Charge Pump With Body Bias and Backward Control for Energy Harvesting Step-Up Converters, 1549-8328 © 2014 IEEE P

SE-214 Algorithm Design and Analysis

UNIT I

UNIT II
Searching and Sorting: Structure of divide-and-conquer algorithms; examples: binary search, quick sort, Stassen Multiplication; merge sort, heap sort and Analysis of divide and conquer run time recurrence relations.
UNIT III

UNIT IV
Dynamic programming: Principle of dynamic programming. Applications: Floyd-Wars hall algorithm for all pair shortest paths. Matrix multiplication, Traveling salesman Problem, longest Common sequence,


UNIT V
Branch and bound: LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem,

UNIT VI

UNIT VI
Research Topics in Algorithms:- Semantic Web Search- various models and techniques, query interface mechanism and ontologies, concept matching and natural language queries.

Text Books:

Reference Books:
1. Aho ,Ullman “ Principles of Algorithms ”


UNIT II
Software Requirement Specification: Requirements Elicitation Techniques, Requirements analysis, Models for Requirements analysis, requirements specification, requirements validation,

UNIT III
System Design: Design Principles: Problem partitioning, abstraction. Top down and bottom up – design, structured approach. Functional versus object oriented approach of design, design specification, Cohesiveness and Coupling. Overview of SA/SD Methodology, structured analysis, data flow diagrams, extending DFD to structure chart

UNIT IV

UNIT V
Software Reliability and Quality Assurance: Reliability issues, Reliability metrics, reliability models, Software quality, ISO 9000 certification for software industry, SEI capability maturity model.

UNIT VI
Testing: Verification and validation, code inspection, test plan, test case specification. Level of testing: Unit, Integration Testing, Top down and bottom up integration testing, Alpha and Beta testing, System testing and debugging. functional testing, structural testing, Software testing strategies


UNIT VII
Advanced Research Topics: Object oriented methodologies, quality assurance, quality criteria, extreme programming, object oriented analysis and design, object oriented metrics, software verification techniques, software rejuvenation

Text Books:

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<th>SE-215-Software Engineering</th>
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UNIT I
Introduction: Introduction to software Engineering, Software characteristics, Software components, Software applications, Software Engineering Principles, Software metrics and measurement, monitoring and control.
Reference Books:

SE-216 Introduction to Telecommunication

UNIT I
Introduction to analog and digital communication: Bandwidth and information capacity, transmission modes, signal analysis, Noise considerations.

UNIT II
Modulation and demodulation concepts (AM, FM, PM), TDM and FDM concepts.

UNIT III

UNIT IV
Satellite communication, orbital patterns, geostationary satellites, frequency band allocation. Orbital Patterns, Geostationary satellite, Frequency band allocation, design of satellite communication link, noise consideration; Free space loss; Low Earth Orbit, Medium earth orbit satellite, geo-synchronous earth orbit satellite

UNIT V
Optical fiber communication: Mode of signal transmission, signal sources and detectors, attenuators and channel capacity, optical link design, single mode and multi mode fibers; step index and graded index fibers.

UNIT VI
Cellular and Mobile communications.

Text Books:

Reference Books:
Text Books:

Reference Books:
4. PHP and MySQL for Dynamic Web Sites, Ullman, Larry, Peachpit Press.
5. Modeling the Internet and the Web, Pierre Baldi, Paolo Frasconi, Padhraic Smyth, John Wiley and Sons Ltd, ISBN 0470849061

SE-302 Object Oriented Software Engineering

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UNIT I
Introduction: Object Oriented system concepts and Principles, Object Oriented system development, Component reuse, The common process framework for Object Oriented processes, System Development and Methodologies, object oriented software estimation.

UNIT II
System development: System as model building, model architecture, The importance of modeling, principle of modeling, object oriented modeling, Introduction to Object-oriented Methodologies such as Unified Modeling Language, Overview of UML, conceptual model of UML, architecture, software development lifecycle using Rational Unified Process

UNIT III
Object Oriented Analysis: requirement model, analysis model, Object oriented analysis using methods of Rumbaugh.

Software Design: Software design Models, Object oriented methodologies of Booch, design model, System development using various UML Diagrams.

UNIT IV
UML Methodology: Detailed study of various UML Diagrams, System Analysis using UML Diagrams

UNIT V

SE-303 Theory of Computation

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UNIT I
Introduction; Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem.

UNIT II
Regular expression (RE), Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

UNIT III
Context free grammar (CFG): Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF.

UNIT IV
Context Free Languages (CFL): Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.
UNIT V
Push Down Automata (PDA): Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA.

UNIT VI

UNIT VII:
Latest Research Topics: Design and Analysis of Approximate Compressors for Multiplication, Extended Closed-Form Expressions for the Robust Symmetrical Number System Dynamic Range and an Efficient Algorithm for Its Computation

Text Books:
1. Hopcroft, Ullman, “Introduction to Automata Theory, Languages and Computation”, Pearson Education
3. Martin J. C., “Introduction to Languages and Theory of Computations”, TMH

Reference Books:

Reference Papers:
1. Design and Analysis of Approximate Compressors for Multiplication, DOI 10.1109/TC.2014.2308214, IEEE Transactions on Computers
2. Extended Closed-Form Expressions for the Robust Symmetrical Number System Dynamic Range and an Efficient Algorithm for Its Computation, IEEE TRANSACTIONS ON INFORMATION THEORY, VOL. 60, NO. 3, MARCH 2014

UNIT II

UNIT III

UNIT IV
Programming: Assembly language programming based on Intel 8085/8086. Instructions, data transfer, arithmetic, logic, branch operations, looping, counting, indexing, programming techniques, counters and time delays, stacks and subroutines, conditional call and return instructions

UNIT V
Peripheral Interfacing: Peripheral Devices: 8237/8257 DMA Controller, 8255 programmable peripheral interface, 8253/8254 programmable timer/counter, 8259 programmable interrupt controller, 8251 USART and RS232C.

UNIT VI:
Advance research topics: Chip-Level Multiple Quantum Well Modulator-Based Optical Interconnects, A Single-Chip Solution for Interfacing Transducers to Sensor Networks Using FPGAs

Text Books:
2. Ray A K , Bhurchandi K M , Advanced Microprocessors and Peripherals, TMH
3. Hall D V ,Microprocessor Interfacing, TMH

Reference Books:
1. Liu and Gibson G A , Microcomputer System: The 8086/8088 family ,PHI
2. Aditya P Mathur, Introduction to Microprocessor, TMH
3. Brey, Barry B, INTEL Microprocessors, PHI
4. Renu Sigh & B.P . Sigh, Microprocessor, Interfacing and Applications
5. B. Ram, Fundamentals of Microprocessors and Microcomputers

Reference Papers:

SE-305 Computer Network

UNIT I:

UNIT II

UNIT III

UNIT IV

UNIT V
Presentation Layer- Data compression techniques, cryptography.

UNIT VI

UNIT VII
Latest Research : Behavior Signature for Big Data Traffic Identification, Clock Synchronization in Wireless Sensor Network With Selective Convergence Rate for Event Driven Measurement Applications

Text Books:
2. Data Communications and Networking, 4/e, Behrouz A. Forouzan, Mc Graw Hill.

Reference Books:

Reference Papers:
1. Behavior Signature for Big Data Traffic Identification, 978-1-4799-3919-0/14/$31.00 ©2014 IEEE
2. Clock Synchronization in Wireless Sensor Network With Selective Convergence Rate for Event Driven Measurement Applications, IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT

SE-306 Web Technology Lab

Based on course work corresponding SE-301

SE-307 Software Engineering Lab

Based on course work corresponding SE-302

SE-308 Microprocessors Lab

Based on course work corresponding SE-304

SE-309 Minor Project-I

System Development/innovation project Based on course

SE-311 Software Validation Verification and Testing

UNIT 1
Introductory concepts: Verification &Validation Terminologies like Goals, Role, Objectives, Limitations, Approaches & Applicability.

UNIT II

UNIT III

Functional Testing techniques: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.
UNIT IV

UNIT V


UNIT VI

Text Books:

Reference Books:

UNIT III
LR Parsers, the canonical collection of LR(0)items, constructing SLR Parsing Tables, Constructing canonical LR Parsing tables and LALR parsing tables, An Automatic Parser Generator, YACC.

UNIT IV

UNIT V

UNIT VI
Error detection and Recovery: Lexical phase errors, syntax phase errors, semantic errors. And Error recovery techniques, Code Optimization: Loop optimization, the DAG representation of basic blocks, value numbers and Algebraic Laws, Global Data – Flow Analysis and Code generation.

Text Books:

SE – 313 Computer Graphics

UNIT I

UNIT II
Output primitives: DDA Line drawing algorithm, Bresenham’s Line Drawing Algorithm, Mid-point circle algorithm, Mid-point Ellipse algorithms, filling algorithms, boundary fill and flood fill algorithms, scan-line filling, character generation, line attributes, fill styles, anti-aliasing.

UNIT III
Transformations: Basic 2D Transformations, Matrix representations & Homogeneous Coordinates, Matrix Representations for basic 2D and 3D transformations, Composite Transformations, reflection and shear transformations, affine transformation, transformations between coordinate systems.
UNIT IV
Two dimensional viewing: The viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-Viewport Coordinate Transformation, Two Dimensional Viewing Functions, Barky line clipping algorithm, Algorithm for polygon clipping, Sutherland-Hodgeman polygon clipping, Waier-Atherton polygon clipping, curve clipping, Text clipping.

UNIT V
Curves and Surfaces: Representation of surfaces, polygon meshes, plane equations, parametric cubic curves, Hermite Curves, Bezier Curves, 4 point and 5 point Bezier curves using Bernstein Polynomials, Conditions for smoothly joining curve segments, Bezier bi-cubic surface patch, B-Spline Curves, Cubic B-Spline curves using uniform knot vectors, Testing for first and second order continuities

UNIT VI
Projection: Parallel Projection, Oblique Projection on XY plane, Isometric Projection, Perspective Projection, One Vanishing Point (V.P.) projection, Generation of 2 V.P. Projection, planar geometric projections.


UNIT VII:
Latest Research Topics: Identifying computer graphics using HSV color model and statistical moments of characteristic functions, Instrument for Haptic Image Exploration

Text Books:

Reference Books:

Reference Papers:
1. Identifying computer graphics using HSV color model and statistical moments of characteristic functions, ICME,IEEE 2007

UNIT I
Introduction: AI Problems, Task Domains of AI, AI Techniques: search knowledge, abstraction. Introduction to Intelligent program and Intelligent agents

Problem Solving: Basic Problem solving Method: state space search, problem characteristics, Production systems characteristics, issues in design of Intelligent search algorithm.

UNIT II

Game Playing: Game Tree, Searching procedure Minimax, alpha-beta pruning.

UNIT III

UNIT IV

Programming Languages: Fundamental and concepts of Programming languages like Prolog or Lisp. Relationship of languages with Knowledge representation and inferences.

UNIT V

UNIT VI
Research issues in AI: Study of Computational Intelligence methodology such as machine learning, fuzzy systems and swarm intelligence.

Latest research issues in computational intelligence and engineering systems based on computational intelligence.
Text Books:

Reference books and research papers:
3. "Neural Networks in Computer Intelligence" by KM Fu, McGraw Hill
4. "AI: A modern approach" by Russel and Norvig, Pearson Education
5. Introduction to AI and Expert Systems, D.W. Patterson, PHI, 1992

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UNIT I
Introduction
Introduction to parallel computing, need for parallel computing, parallel architectural classification schemes, Flynn's , Fang's classification, performance of parallel processors, distributed processing, processor and memory hierarchy, bus, cache & shared memory, introduction to super scalar architectures, quantitative evaluation of performance gain using memory, cache miss/ hits.

UNIT II
Multi-core Architectures
Introduction to multi-core architectures, issues involved into writing code for multi-core architectures, development of programs for these architectures, program optimizations techniques, building of some of these techniques in compilers, OpenMP and other message passing libraries, threads, mutex etc.

UNIT III
Multi-threaded Architectures
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

UNIT IV
Compiler Optimization Issues
Introduction to optimization, overview of parallelization; Shared memory programming, introduction to Open MP; 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.

UNIT V
Operating System Issues and Applications
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, Implementation techniques on multi-cores; OpenMP, MPI and case studies

UNIT VI
Case studies from Applications: Digital Signal Processing, Image processing, Speech processing.

UNIT VII
Advance Research Topics: A Systematic Design Methodology for Low-Power NoCs, Autonomous Decentralized High-Assurance Surveillance System for Air Traffic Control

Text Books:
Reference Books:
1. D.A.Patterson, J.L.Hennessy, “Computer Architecture :A 

Reference Papers:
1. A Systematic Design Methodology for Low-Power 
NoCs, IEEE TRANSACTIONS ON VERY LARGE SCALE 
INTEGRATION (VLSI) SYSTEMS
2. Autonomous Decentralized High-Assurance Surveillance 
System for Air Traffic Control, 2014 IEEE 15th International 
Symposium on High-Assurance Systems Engineering

UNIT I
Introduction: Project Management concepts, Process 
Framework, Project Planning Software Life Cycle Models, 
Artifacts of the Project Management Process.

UNIT II
Cost and Scheduling Estimation Models: Various Levels 
of COCOMO for Cost , Effort, Schedule and Productivity 
Estimation. Approaches to Effort, Cost Estimation, and 
Schedule Estimation factors through COCOMO II, Putnam 
Estimation Model, Algorithmic models.

UNIT III
Project Management Techniques: Project Organizations 
and Responsibilities, Establishing Project Environment, Risk 
Management Process, Project Tracking and Control Defect 
Tracking Concepts such as Process monitoring and audit, 
Reviews, Inspections and Walkthroughs.

UNIT IV
Project Closure: Project Closure Analysis, Role of Closure 
Analysis in a project, Performing Closure Analysis, Closure 
Analysis Report

UNIT V
Software Project Management Renaissance Conventional 
Software Management, Evolution of Software Economics, 
Improving Software Economics, The old way and the new 
way,

UNIT VI
Advance Topics in Software Project Management: 
Discussion on future Software Project Management 
Practices & Modern Project Profiles, Next- Generation 

Text Books:
1. Managing the Software Process, Watts S. Humphrey, 
Pearson Education
2. Software Project Management, Walker Royce, Pearson 
Education

Reference Books:
1. Software Project Management Readings and Cases, Chris 
Kemerer.
2. Software Project Management in Practice, Pankaj Jalote, 
Pearson Education.

UNIT I
Introduction: Production Function types of manufacturing 
systems productivity and quality management, ISO-9000 
systems, CMM System.

Management concepts – development of management 
principles, scientific management, human relations aspects.

UNIT II
Industrial psychology, personnel management, and labour 
relations, methods of remuneration.

Plant Organization: Organization, Principles of organization, 
organization structure – line and staff organizations.

UNIT III
Plant location, layout: Process layout, Product layout and 
combination layout – methods of layout, economic of layout.

UNIT IV
Production planning and control: Types of Product, Demand, 
Demand Forecasting, marketing strategies, Scheduling and 
control of scheduling; production control.
UNIT V
**Work and method study:** Definition and concepts: method study-procedures, symbols, advantages. Flow process charts. Motion study-micro motion, SIMO charts, procedures system concepts value and ABC analysis: system concepts, classification, analysis, techniques.

UNIT VI
**Industrial maintenance – types, organization of maintenance department. Breakdown and preventive maintenance.**

**Inventory control and replacement analysis:** Introduction, replacement policy and methods adopted.

**Project Management – CPM and PERT**

**Text Books:**

**Elective – I**

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**UNIT I**
**Software Quality Assurance Framework:** What is Quality? Software Quality Assurance, Components of Software Quality Assurance, Software Quality Assurance Plan. Steps to develop and implement a Software Quality Assurance Plan

**UNIT II**
**Quality Standards:** ISO 9000 and Comparison ISO Standards, CMM, CMMI, PCMM, Malcolm Balridge, 3 Sigma, 6 Sigma, Software Quality Models.

**UNIT III**

**UNIT IV**
**Software Quality Assurance Metrics and Measurement:** Software Quality Metrics, Product Quality metrics, Process Quality Metrics, Metrics for Software Maintenance, Software Quality metrics methodology, Object Oriented Metrics in quality.

**UNIT V**
**Software Quality Estimation Tools:** Desirable features in software Quality estimation tools, Study of some existing Tools for quality estimation,

**UNIT VI**
**Computer Aided Quality Engineering (CAQE) Concepts, Design Techniques for CAQE.**

**Text Books:**

**Reference Books:**
4. CMMI, Mary Beth Chrissis, Mike Konrad and Sandy Shrum, Pearson Education (Singapore) Pvt Ltd, 2003

**SE 403-2 Distributed Computing Systems**

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**UNIT I**
Introduction to Distributed Systems, Design Goals, Types of Distributed systems, system architectures and fundamental models, middleware, Threads, virtualization, client-Server Model, Code migration

**UNIT II**
Communication fundamentals, Remote Procedure Call, message oriented communication, stream oriented communication, multicast communication.

**UNIT III**
**Synchronization:** clock synchronization, logical clocks, mutual exclusion algorithms: centralized, decentralized, distributed and token ring algorithms, election algorithms.

**UNIT IV**
**Replication management:** need for replication, consistency models: data centric and client centric consistency models, replica management, consistency protocols: continuous, primary-based, replicated-write and cache-coherence protocols.

**UNIT V**
**Fault tolerance:** basic concepts and failure models, process resilience, reliable client-server and group communication, distributed commit, recovery mechanisms.

**UNIT VI**
Security in distributed systems, secure channels, authentication, integrity and confidentiality, access control, security management. Naming: Flat naming approaches,
structured naming, name space and resolution, attribute-based naming, directory services, LDAP, decentralized implementations.

Text Books:

<table>
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<tr>
<th>Unit</th>
<th>Description</th>
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Text Books:
2. H. Kopetz, "Real time systems for distributed embedded applications, Kluwer Academic |
3. Douglass, Real Time UML: Advances in the UML for Real-Time Systems, 3/e, Addison-Wesley

Reference Books:

Reference Papers:
2. Tei-Wei Kuo, ; Jun Wu, ; Hsin-Chia Hsih, "Real-time concurrency control in a multiprocessor environment", IEEE Transactions on Parallel and Distributed Systems, Volume.13, Issue.6, pp.659, ISSN: 10459219, 2002

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<td>UNIT III</td>
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</table>
UNIT IV
Data management issues, data replication for mobile computers, Replication through data allocation, User profile replication scheme, optimistic replication and active replication, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

UNIT V

UNIT VI
Ad Hoc networks, localization, Routing protocols: Global state routing (GSR), Destination sequenced distance vector routing (DDSV), Fisheye state routing (FSR), Dynamic source routing (DSR), ABR, Route Discovery, Route Repair/Reconstruction, Establishment, Maintenance; Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), Quality of Service in Ad Hoc Networks, and applications.

Text Books:
1. J. Schiller, Mobile Communications, Addison Wesley.
2. A.K. Talukder and R.R. Yavagal, Mobile Computing, TMH

Reference Books:
2. Charles Perkins, Ad hoc Networks, Addison Wesley.

UNIT IV
Moving from Architecture to Systems Software: Product Lines, Building systems from off the shelf components, Reuse of Architectural assets within an organization.

UNIT V
Patterns Definition: Pattern categories, Pattern Description, Patterns and Software Architecture, Pattern Systems, Classification, Selection, Design Patterns Catalog Creational Pattern, Structural Pattern, Behavioral Patterns, Pattern Community, Designing a document editor

UNIT VI Advanced Studies: Key word in Context, The World Wide Web a case study in interoperability, Instrumentation software, cruise control, Flight Simulation - a case study in architecture for integration

Text Books:
1. Design Patterns: Elements of Reusable Object-Oriented Software, by Erich Gamma et al, Addison Wesley.

Reference Books:
Selling Chain Management Process: Definition, Business & Technology Drivers, Infrastructure, Sales & Distribution configuration.

UNIT IV


UNIT V


m-Commerce: Strategies for m-Commerce, Key Benefits, Technologies, Key Issues & Solutions.


UNIT VI


Text Books:
1. e-Business: Roadmap for Success: Dr Ravi Kalakota and Robinson, Marcia –Addison-Wesley, 2000

Reference Books:
5. Knowledge Management: Classic and Contemporary Works, edited by Daryl Morey, Mark Maybury and Bhavani Thuraisingham.

UNIT I

Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems.

UNIT II

Language processors: recognizers, transducers, parsers, generators Linguistic Background: An outline of English syntax.

Elements of formal language theory: alphabet, string, language, grammar, productions, symbol vocabulary, generator, recognizer, procedure.

UNIT III

Introduction to semantics and knowledge representation, Network Logic and inference. Pragmatics, Graph Models and Optimization. Prolog for natural semantic. Some applications like machine translation, database interface.

UNIT IV


UNIT V


UNIT VI


UNIT VII

Text Books:
1. Allen, Natural Language Understanding Pearson Education.

Reference Books:

Reference Papers:

UNIT III


UNIT IV
Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation.

UNIT V
Representation and Description: Representation schemes like chain coding, Polygonal Approximation, Signatures, Boundary Segments, Skeleton of region, Boundary description, Regional descriptors, Morphology.

UNIT VI
Recognition and Interpretation: Elements of Image Analysis, Pattern and Pattern Classes, Decision-Theoretic Methods, Structural Methods, Interpretation.

UNIT VI

Text Books:
1. Rafael C. Gonzalez & Richard E. Woods,-Digital Image Processing, AWL.
2. A.K. Jain,-Fundamental of Digital Image Processing, PHI.

Reference Books:

Reference Papers:

### SE 404-2 Soft Computing

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**UNIT I:**
**Neural Networks:** History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

**UNIT II:**
**Fuzzy Logic:** Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

**UNIT III:**
**Operations on Fuzzy Sets:** Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

**UNIT IV:**
**Fuzzy Arithmetic:** Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

**UNIT V:**
**Uncertainty based Information:** Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

**UNIT VI**
**Introduction of Neuro-Fuzzy Systems:** Architecture of Neuro Fuzzy Networks.

**Text Books:**
1. “An Introduction to Neural Networks”, Anderson J.A., PHI.

**Reference Books:**
1. “An Introduction to Genetic Algorithm”, Melanie Mitchell, PHI.

### SE-404-3 Computer Vision

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**UNIT I:**
**Image Formation Models:** Monocular imaging system, Orthographic & Perspective Projection, Cameras – lenses, projections, sensors, Radiometry – Measuring Light, light and surfaces Representation – color spaces, Camera model and Camera calibration, Binocular imaging systems, Sources, Shadows and Shading.

**UNIT II**
**2D/3D Vision:** Filters, Binary Images, Features, Edge Detection, Texture, Shape, Segmentation, Clustering, Model Fitting, Probabilistic, 3D Vision: Multiview geometry, Stereo, Shape from X, 3D data

**UNIT III**
**Image Processing and Feature Extraction:** Image representations (continuous and discrete), Linear Filters, Texture, Edge detection.

**UNIT IV**
**Motion Estimation:** Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion.

**UNIT V**
**Shape Representation and Segmentation:** Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multi-resolution analysis.

**UNIT VI**
**Object recognition:** Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis, Shape priors for recognition

**UNIT VII**
**Latest trends in computer vision:** Computer Vision Interaction For People With Severe Movement Restrictions, DARWIN: A Framework for Machine Learning and Computer Vision Research and Development, Computer Vision Face Tracking For Use in a Perceptual User Interface.

**Text Books:**

**Reference Papers:**

UNIT I
Introduction to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT II
Essentials of Artificial Neural Networks: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

UNIT III

UNIT V

UNIT VI
Classical & Fuzzy Sets: Introduction to classical sets-properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods. Applications: Neural network applications: Process identification, control, fault diagnosis; Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

UNIT VII

Text Books:
3. Fuzzy Logic: Intelligence, Control and Information, John Yen and Reza Langan, Pearson Education.

Reference Books:
1. Neural Networks- A comprehensive foundation, Simon Haykin, Pearson Education.
2. S.N. Sivanandam, S. Sumathi, et al, Introduction to Neural Networks using MATLAB 6.0, TMH.
3. James A Freeman and Davis Skapura, Neural Networks Pearson Education.

Reference Papers:
density and Discriminant functions, Discrete features, Missing and noisy features, Bayesian networks (Graphical models) and inferencing.

UNIT III

UNIT IV

UNIT V
Linear Discriminant functions: Gradient descent procedures, Perceptron criterion function, Minimum-squared-error procedures, Ho-Kashyap procedures, Support vector machines

UNIT VI

UNIT VII
Latest trends in Pattern Recognition: Speed-up Template Matching through Integral Image based Weak Classifiers, Statistical Pattern Recognition: A Review.

Text Books:
1. Pattern Classification, R.O. Duda, P.E. Hart and D.G. Stork, John Wiley.

Reference Books:

Reference Papers:

SE 404-6: Optimization Techniques

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Death Process, Queuing Models Based on the Birth-and-Death Process, Queuing Models involving non exponential distributions.

UNIT VII

Text Books:

Reference Books:
1. Kanti Swarup, Gupta Pk, Man Mohan, Operations Research, Sultan Chand & Sons

Reference Papers:

UNIT-I
Introduction: The need for ethics in ICT: Computers in Social Context, moral issues, legal issues, Philosophical ethics: Distinguishing descriptive and normative claims, ethical relativism, Utilitarianism, virtue ethics, individual & social policy ethics.

UNIT-II
Professional Ethics: Computers in the workplace, Professional responsibility, professional relationships, conflicting responsibilities, code of ethics, professional ethics.

Ethics and the internet: Hacking & hacker ethics, Computer crimes, Netiquette, Polity Approaches.

UNIT-III
Intellectual Property Rights in Computer Software: Definition, current, legal protection, why copying propriety software is illegal, open source software, freeware.

UNIT-IV
Privacy protection and Anonymity
Accountability in Information Technology: Responsibility, ISP Liabilities

UNIT-V
Social implications and social values for internet ethics:
Technology and social change, globalization, embedded, enhanced and impeded values with regard to internet, democratic values, access and the digital divide, gender issues in computer ethics, future issues.

UNIT-VI
Emerging Trends : in Professional Ethics

Text Books:
1. Deborah G.Johnson “Computer Ethics”, Pearson Education Asia

SE-404-8 Selected Topics

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Advanced Topics in Computer Science and Software Engineering

SE-405 SPM Lab

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Based on course work corresponding SE-401

SE-406 Elective –I Lab

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Based on course work corresponding SE-403

SE-407 Major Project-I

SE-408 Industrial Training - II

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SE-411 Data Warehousing & Mining

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UNIT 1
Data Warehousing: - Basic concepts in data warehousing, Collecting the requirements of data warehouse, Data Warehouse Architecture, Design, Implementation & Maintenance, OLAP in data warehouse, Data warehousing and the web, Data Cube Technology, From Data Warehousing to Data Mining.
UNIT 2
Data Mining Concepts: Data mining primitives, Basics of data mining, Query language, Architectures of data mining systems

UNIT 3
Mining Association Rules in Large Databases: Association Rule Mining, Mining Single Dimensional Boolean Association Rules from Transactional Databases, Mining Multi-level Association Rules from Transactional Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint Based Association Mining.

UNIT 4
Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT 5
Cluster Analysis in Data Mining: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Outlier Analysis.

UNIT 6
Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time Series and Sequence Data, Mining Text Databases. Applications and trends in Data Mining: - Applications, Systems products and research prototypes, Additional themes in data mining, Trends in Data mining, spatial mining, and Web Mining.

UNIT 7
Latest trends in Data Warehousing and Mining: Temporal data warehousing, Data warehouse and OLAP technology.

Text Books:
1. Data Warehousing Fundamentals, P.Ponnian, John Welley.
2. Data Mining Introductory & Advanced Topics, M.H.Dunham, Pearson Education.
3. Data Mining Concepts & Techniques, Han,Kamber, M.Kaufman.

Reference Books:
1. The Data Warehouse Lifecycle Tool Kit, Ralph Kimball, John Wiley
2. Master in Data Mining, M.Berry , G.Linoff, John Wiley
3. Building the Data Ware houses, W.H.Inmon, Wiely Dreamtech

Reference Papers:

Elective –II

<table>
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<th>SE 412-1: Advanced computer Networks</th>
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UNIT 1
Review of Basic Network Architectures: OSI reference model, TCP/IP reference model, ATM reference model; Applications(WWW, Audio/Video Streaming, Video conference, Networked Games, Client/Server); Traffic Characterization (CBR, VBR);

UNIT II
Switching Paradigms; Multiplexing; Error Control; Flow Control, FTH, DTH, PON, ISDN, DSL, CATV, SONET, Optical Networks.

UNIT III
Local Area Network Technologies: Fast Ethernet, Gigabit Ethernet, IEEE 802.11 WLAN, Bluetooth, Connecting LANs, VLANS.

UNIT IV
Internetworking: Interdomain Routing, BGP, IPv6, Multicast Routing Protocols, Multi Protocol Label Switching, Virtual Private Networks, High speed transport protocols, Quality of Service Mechanisms, Improving QoS in Internet, DiffServ and IntServ Architectures, RSVP.

UNIT V

UNIT VI
UNIT VII

Text Books:

Reference Books

Publication:
UNIT III
Critical System Development
Critical System: a simple safety critical system, system dependability, availability and reliability, safety and security.

UNIT IV
Critical System Specification
Risk driven specification, safety specification, security specification, software reliability specification

UNIT V
Research Topics in Software Engineering Topics.

Text Books:

SE-412-4 Grid Computing

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UNIT I
Cluster Computing Introduction to concepts in Cluster based distributed computing Hardware technologies for cluster computing and software for cluster computing, and different Software Architecture for Cluster Computing.

UNIT II
Programming; Programming Models and Paradigms, features and performance of standard MPI variants, Derived data types, communicators.

UNIT III
Resource management and scheduling Managing, cluster resources: single system images, system level middleware, distributed task scheduling, monitoring and administering system resources Parallel I/O and Parallel Virtual File System. Scheduling: Condor, Maui Scheduler, Portable Batch System (PBS)

UNIT IV

UNIT V
Standard application development tools and paradigms Performance evaluation tools, HINT, netperf, netpipe, ttcp, lperf.message

UNIT VI
Data Management Application Case Study: Molecular Modeling for Drug Design and Brain Activity Analysis, Resource management and scheduling.

UNIT VII

Text Books:
2. Introduction to grid computing - Bart Jacob, Michael Brown

Reference Books:
2. Parallel Programming with MPI by Peter Pacheco, Morgan Kaufmann, 1998.

Reference Papers:
UNIT I
The Biologist & Internet
Internet basics, FTP, World Wide Web, Introduction to Primary & Secondary database, GenBank, GCG, ACDEB.
Structure Databases: Introduction to structures, PDB, MMDDB, Structure file formats, Visualizing structural information, Database structure viewers, Introduction to the NCBI database, SeqIDS, Seq. Annot: Annotating the sequence, Seqdiscr: Describing the sequence.

UNIT II
Information Retrieval from Biological Databases & submission of DNA Sequences to the Databases
Retrieving database entries, Integrated information retrieval: The ENTREZ system, sequence databases beyond NCBI, Medical Databases; Where to submit nucleotide sequences, How to submit on the world wide web, How to submit with sequin, Molecular modeling.

UNIT III
Sequence Alignment and Database Searching:
Introduction, Evolutionary basis of sequence alignment, Optimal alignment methods, Substitution scores & gap penalties, Statistical significance of alignments, Database similarity searching, FASTA, BLAST, Low complexity regions, Repetitive elements.

UNIT IV
Multiple Sequence Alignment & Genome Mapping
Progressive alignment methods, Motifs and patterns, Probe, Presentation methods, Abscript; Different types of maps: physical, genetical, etc. Synteny, Human genome project, Application of genome mapping, Chromosome maps.

UNIT V
Predictive Methods Using Nucleotide & protein Sequences
Framework, marking repetitive DNA, Database search, Codon bias detection, Detecting function sites in the DM, Protein identity based on composition.

UNIT VI
Latest trends in Bioinformatics: Guest Editorial: Data Mining in Bioinformatics, Biomedicine, and Healthcare Informatics.

Text Books:

Reference Papers:

UNIT I
Introduction and Concepts: Networks and commercial transactions – Internet and other novelties; networks and electronic transactions today, Model for commercial transactions; Internet environment – internet advantage, worlds wide web and other internet sales venues; Online commerce solutions.

Security Technologies: Insecurity Internet; A brief introduction to Cryptography; Public key solution; Key distribution and certification; prominent cryptographic applications.

Electronic Payment Methods: Updating traditional transactions; secure onine transaction models; Online commercial environments; digital currencies and payment systems; Offline secure processing; private data networks.

UNIT II
Protocols for Public Transport of Private Information: Security protocols; secure protocols; Secure hypertext transfer protocols; Secure sockets layers; Integrating security protocols into the web; Non technical provide.


Electronic Payment Systems: Digital payment systems; First virtual internet payment system; cyber cash model.

UNIT III
On-line Commerce Environments: Servers and commercial environments; Netscape product line; Netscape commerce server; Microsoft internet explorer and servers; open market.

Digital Currencies: Optional process of Digicash, Ecash Trail; Using Ecash; Smart cards, Electronic Data Interchange; Its basics; EDI versus Internet and EDI over Internet.

UNIT IV
Strategies, Techniques and Tools: Internet Strategies: Internet Techniques, Shopping techniques and online selling techniques; Internet tools.

Electronic Commerce Online Resources and Guide to the CD-ROM
UNIT V


UNIT V1
ERP – Information System Perspective: Evolution of Application Software Technology Management, EDP, MIS, DBMS, DSS OLAP (Online Analysis and Processing), TP, OAS, KBS, MRP, BPR, SCM, REP, CRM, Information Communication Technology, E-Business, E-Commerce, EDI


Text Books:

Reference Books:

UNIT II
Component Integration, Verification & Validation Verification of component against its specification across all viewpoints, checking consistency, analyzing potential interferences between conflicting requirements, formal verification testing of components integration.

UNIT III
Soft Real Time Including the formalization and reasoning about soft real-time and quality of service requirements,

UNIT IV
Combination of hard & soft real-time requirements.

UNIT V
Intelligent Middleware, Viewpoint Support & Optimization Providing Service supporting all viewpoints in making intelligent decisions for deployment architectures.

UNIT VI
Synthesis and Deployment Knowledge based component retrieval based on requirement specifications and Architectural Patterns.

Text Books:
2. Component Software: Beyond object-oriented programming Clemens Szyperski, Addison-Wesley, 2002

Reference Books:

SE-412-8 Selected Topics

Advanced Topics in Computer Science and Software Engineering

Open Elective -II

SE- 413-1 Network & Information Security

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UNIT I
Need for security, Introduction to security attacks, services and mechanism, introduction to cryptography, Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers, Intruders, Viruses and related threads.

UNIT II
Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, key distribution.

UNIT III
Introduction to group, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primarily testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms, Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffie-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption.

UNIT IV

UNIT V
Authentication Applications: Kerberos and X.509, directory authentication service, password, challenge-response, biometric authentication, electronic mail securitypretty good privacy (PGP), S/MIME.

UNIT VI

Web Security: Secure Socket Layer(SSL) and transport layer security, TSP, Secure Electronic Transaction (SET), Electronic money, WAP security, firewall design principals, Virtual Private Network (VPN) security.

UNIT VI:
Impossible Differential cryptanalysis, Attribute-based signatures from RSA, Security of SSL/TLS enabled applications, ECC for wireless security, Error propagation property and application in DES cryptography, Certificate Legitimation.

Text Books:

Reference Books:
2. Bruce Schiener, “Applied Cryptography”.

Reference Papers:

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<th>SE-413-2: Multimedia Technology and Applications</th>
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UNIT I
Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work, Convergence of Computer, Communication and Entertainment Products, Stages of Multimedia Projects: Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools.

UNIT II
Multimedia Building Blocks: Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

UNIT III
Data Compression: Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modeling, Finite Context
Modeling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio loss less & lossy compression.

UNIT IV
Speech Compression & Synthesis : Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression.

UNIT V
Images: Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file formatic animations Images standards, JPEG Compression, Zigzag Coding,

UNIT VI
Multimedia Database. Content based retrieval for text and images, Video:Video representation, Colors, Video Compression, MPEG standards, MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast Services, indexing and retrieval of Video Database, recent development in Multimedia.

UNIT VII
Latest trends in Multimedia: Cross-Layer Dynamic Admission Control for Cloud-Based Multimedia Sensor Networks

Text Books:

Reference Books:
1. Mark Nelson “Data Compression Book” BPB.
2. David Hillman “Multimedia technology and Applications” Galgotia Publications.

Reference Papers:

UNIT II
Discrete memory less channel, channel capacity BSC and other channels

UNIT III
Information measure for continuous ensembles capacity of AWGN channel. Error control coding. The channel coding Theorem, Application to BSC , Source Coding with fidelity criteria. Types of codes, error and error control strategies, Linear block codes, syndrome and error detection, Minimum distance, Error detecting and correcting capabilities of a block code, Syndrome decoding, Hamming codes.

UNIT IV
Cyclic codes, Generator and parity – check matrices, encoding, syndrome computation and error detection and decoding .BCH codes, decoding, of the BCH codes Introduction to RS codes. Convolution codes, Maximum likelihood decoding The Viterbi algorithm. Introduction to Turbo codes.

UNIT VI:

Text Books:
1. Information Theory by R Ash, Dover Science Publications.
2. Element of Information Theory by Cover and Thomas, John Wiley & Sons.

Reference Books:
2. Communications in the presence of noise – Shannon - 1949

REFERENCE PAPERS:

UNIT I
Fundamental Concepts : Definitions of fault tolerance, fault classification, fault tolerant attributes and system structure.
UNIT II
Fault-Tolerant Design Techniques: Information redundancy, hardware redundancy, and time redundancy.

UNIT III
Dependability Evaluation Techniques: Reliability and availability models: (Combinatorial techniques, Fault-Tree models, Markov models), Performance Models.

UNIT IV

UNIT V
Software Fault Tolerance: Software faults and their manifestation, design techniques, reliability models.

UNIT VI

UNIT VII

Text Books:
2. Design and Analysis of Fault-Tolerant Digital Systems, B.W.Johnson, Addison-Wesley

Reference Books:

Reference Papers:
1. Shekhar Borkar, “Designing Reliable Systems From Unreliable Components: The Challenges Of Transistor Variability And Degradation and”, Published by the IEEE Computer Society 0272-1732, 2005
2. Subhasish Mitra, Norbert Seifert, Ming Zhang, Quan Shi and Kee Sup Kim, “Robust System Design with Built-In Soft-Error Resilience”, Published by the IEEE Computer Society, 2005

UNIT I
Introduction to Optical Networking: Introduction to SONET/SDH, SONET/SDH, Dense Wavelength-Division Multiplexing, The Future of SONET/SDH and DWDM.

UNIT II

UNIT III

UNIT IV
Wavelength-Division Multiplexing: The Need for Wavelength-Division Multiplexing, Wavelength-Division Multiplexing, Coarse Wavelength-Division Multiplexing, Dense Wavelength-Division Multiplexing, The ITU Grid, Wavelength-Division Multiplexing Systems, WDM Characteristics and Impairments to Transmission, Dispersion and Compensation in WDM.

UNIT V
SONET Architectures: SONET Integration of TDM Signals, SONET Electrical and Optical Signals, SONET Layers, SONET Framing, SONET Transport Overhead, SONET Alarms, Virtual Tributaries, SONET Multiplexing, SONET Network Elements, SONET Topologies, SONET Protection Architectures, SONET Ring Architectures, SONET Network Management.

UNIT VI
SDH Architectures: SDH Integration of TDM Signals, SDH Layers, SDH Multiplexing, SDH Framing, SDH Transport Overhead, SDH Alarms, SDH Higher-Level Framing, SDH Network Elements, SDH Topologies, SDH Protection Architectures, SDH Ring Architectures, SDH Network Management.

UNIT VII

Text Books:
1. Optical Network Design and Implementation, Vivek Alwayn
Reference Papers:

SE 413-6 Virtual Reality

UNIT I
Virtual reality & Virtual reality systems Real-time computer graphics, Overview of application areas.

UNIT II
Virtual Reality Hardware Sensor hardware, display systems, acoustic hardware, integrated VR systems

UNIT III
3D Computer Graphics The virtual world space, Perspective projection, Stereo vision, 3D clipping, Color theory, 3D modeling, illumination models, shading algorithms, Hidden surface removal, realism.

UNIT IV
Geometrical transforms Frames of reference, 3D transforms, instances, picking, flying, scaling the VE, Collision detection.

UNIT V
Animating the Virtual Environment Animation basics, Using MAYA.

UNIT VI
Human Factors Perception, Persistence of vision, Stereopsis, Sound perception, Equilibrium, Physical Simulation Simulation of physical systems, mathematical modeling, collisions, projectiles, introduction to dynamics, motion kinematics.

UNIT VII
Latest trends in Virtual reality: Change Blindness Phenomena for Virtual Reality Display Systems

Text Books:
3. 3D Modeling and surfacing, Bill Fleming, Elsevier(Morgan Kaufman).

Reference Books:
1. 3D Game Engine Design, David H.Eberly, Elsevier.

Reference Papers:

SE-413-7 Embedded Systems

UNIT I
Introduction Evolution of embedded systems & their applications, architectural diversity for embedded system development.

UNIT II
Techniques and tools for embedded software development Embedded Programming principles, Instruction Set Architectures for embedded software development: arithmetic and logical, program control, string instructions, special or privileged instructions, Interrupt system, Input-output programming, Memory management, Using High level languages for embedded programming, structured and Object Oriented Programming

UNIT III
Re-configurable FPGA for embedded computing R-FPGA and hardware software development, issues in Reconfigurable computing, placement and scheduling techniques, Design of digital systems on FPGAs, fault tolerant design on FPGAs, Re-targetable assembling and compilation.

UNIT IV
Applications Specific applications. Emerging trends.

UNIT V
Latest trends in embedded system: On-chip networks: scalable, communication-centric embedded system design paradigm, Systematic Approach to Exploring Embedded System Architectures at Multiple Abstraction Levels, Selective Instruction Compression For Memory Energy Reduction in Embedded Systems

2. Practical FPGA Programming in C by David Pellerin, Prentice Hall.

Reference Books:
1. Jean-Pierre Deschamps, Gery J.A. Bioul, Gustavo D. Sutter, Wiley.
3. Embedded Software Development with eCos (Bruce Perens’ Open Source Series), Anthony J. Massa.
Reference Papers:

SE-413-8 Selected Topics

Advanced Topics in Computer Science and Software Engineering

SE-414 Data Warehousing and Mining Lab

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Based on course work corresponding SE-411

SE-415 Elective –II Lab

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Based on course work corresponding SE-412

SE-416 Major Project II

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SE-417 Self Study / Seminar - III

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