B.TECH. 4 YEAR PROGRAMME

COMPUTER SCIENCE & ENGINEERING

SYLLABUS 2020-21
(1st, 2nd,3rd, 4th, 5th, 6^{th,} 7th & 8th Semester)

Detailed Syllabus for B.Tech. CSE

B.Tech. –CSE (First Semester)

MTH 101 Engineering Mathematics I

Calculus of Functions of One Variable: Linear and Quadratic approximations, Error estimates, Taylor's Theorem, Infinite series, Tests of convergence, Absolute and Conditional convergence, Taylor and Maclaurin series.

Calculus of Functions of Several Variables: Partial derivatives, Chain rules, Implicit differentiation, Gradient, Directional derivatives, Total differential, Tangent planes and Normal's, Maxima, Minima and Saddle points, Constrained maxima and minima, Curve sketching, Geometric applications of Integrals, Double Integrals, Applications to areas and volumes, Change of variables.

Ordinary Differential Equation: Differential Equation of First Order and Higher Degree, Linear Differential Equation. with Constant Coefficient of Higher Order, Cauchy's Differential Equation, Method of Variation of Parameter, Simultaneous Differential Equation.

Graph Theory: Introduction, terminology, representation, isomorphism, connectivity, Wars hall's algorithm, Euler and Hamilton path, and shortest path tree.

REFERENCES:

1. Higher Engineering Mathematics : -   B.S. Grewal
2. Advanced Engineering Mathematics : -   H.K. Das
3. Differential calculus :-   Schaum's series
4. Graph Theory with Applications :-   Narsingh Dev
5. Higher Engineering Mathematics : -   B. V. Ramana

PHY 101 Engineering Physics-I

Part A:

Electrostatic: Coulomb's Law, Electric field & electrostatic potential, Work and Energy in electrostatic field, Gauss law & its applications, Curl of E, Laplace's and Poisson's equations, Dipoles & multipoles, Force and torque on dipoles, Polarization, Bound charges & electric displacement.

Magnetostatics: Electric Current, Magnetic field & Current density, Ampere's law & its applications, Biot-Savart law, Curl and divergence of **B,** Magnetic dipoles, Magnetization, Magnetic susceptibility, Ferro-, para- and dia- magnetism, Faraday's law, Energy in magnetic field.

Electrodynamics: Lorentz force, Maxwell's equations. Poynting theorem, Electromagnetic potentials, Electromagnetic (EM) waves & their propagation in different media.

Part B:

Introduction to quantum mechanics, Planck"s theory, Thermal radiation (Black bodies, Stefen Boltzmann etc), Photoelectric effect, Compton effect, Dual nature of EM radiation,

matter waves, de Broglie waves, wave-particle duality, Uncertainty principle, Heisenberg microscope, Properties of matter (phase and group velocity). Schrodinger equation, probabilistic interpretation of wave function, admissibility conditions for wave function. One dimensional problems: particle in a box, potential well, potential barrier and quantum tunneling. Periodic potential in one dimension.

REFERENCES:

1. INTRODUCTION TO ELECTRODYNAMICS: D.J. GRIFFITHS
2. APPLIED ELECTRODYNAMICS THEORY:
   ANALYSIS, PROBLEMS AND APPLICATIONS: NAIR AND DEEPA
3. QUANTUM PHYSICS: EISBERG & RESNICK
4. CONCEPT OF MODERN PHYSICS: BEISER

CS 101 Fundamentals of Computer Programming

Concept of Programming Languages, A quick overview of OS-Windows/Linux, Writing, compiling and running the program on Linux/Windows, The Compiler, Program Builder, Debugging: types of errors and debugging techniques, Problem solving aspects, Introduction to Algorithms and flow charts, C programming Data structures , Variables, Variables names, I/O, The standard Input/output file, Formatted inputs/Output, Expressions and Operators, connectors, control statements, Functions: Scope of Function variable, Modifying function arguments, Pointers, Array, String, Structures and Unions, file handling, File redirection, file pointers, advantages of using multi files, Organization of data in each file, compiling multi-file programs, The Preprocessor, Library Functions and Low level programming.

Textbooks:

1. Balgurusamy,Programming in ANSI C,Mc Graw Hi11,2015
2. Rajaraman V.,COMPUTER PROGRAMMING IN C,Printice Hall of India, 2004.
3. The C Programming language, Kernigham & Ritchie
4. Herbert Schildt,C: The Complete Reference,Mc Graw Hill, 2004

EE 101 Fundamentals of Electrical & Electronics

D.C. Circuits and AC Fundamentals:
Ohm's law, Kirchoff's laws, Nodal Analysis, Mesh Analysis, Superposition Theorem, Source Transformations, Thevnin"s and Norton's Theorems, star/delta transformation, maximum power transfer theorem, transients.

A.C. Fundamentals: Single phase EMF generation, average and effective values of sinusoids, Solution of series and Parallel Circuits, power and power factor, Resonance in series and parallel circuits, steady state analysis for sinusoidal excitation: Sinusoids, Three phase connections: star and delta.

Magnetic Circuit:
Mmf, Magnetising force, Magnetic flux and flux density, permeability, Reluctance and permeance, B-H curve, Simple magnetic circuits, Hysteresis and eddy current loss.

Transformer:
Single-phase transformer Construction, principle of operation, EMF equation, phasor diagram on no-load and full-load, losses and efficiency, open and short circuit test, auto transformer.

D. C. Machines:
D. C. Generator: Construction, EMF equation, various types and characteristics
D. C. Motor: Principle, torque and speed formula, types and their characteristics, Speed control

Semiconductor Diode and BJT
Semiconductor Diode and its V-1 characteristics, Rectifier circuit, Various types of diodes, Zener diode, PIN Diode, Light emitting diode, gun diode ,Working principle, Transistors in CC, CE, and CB configurations, transistor biasing, V-I characteristics and load line concept with Quiescent point, Transistor H-parameter.

Textbooks:

1. Toro, Del V., Electrical Engineering Fundamentals, Printice Hall of India, 1994.
2. Millman, Jacob and Halkias, Christos C., Integrated Electronics: Analog and Digital Circuits and Systems, Mc Graw Hill, 2004
3. Boylestad, Robert L., and Nashelsky, Louis, Electronics Device and Circuit Theory, Ninth Edition, Printice Hall of India, 2005

HUM 101 Effective Communication and soft skills

Concept of communication, communication cycle, barriers of communication, verbal v/s non-verbal communication, 7 Cs of Communication, Concept of word formation, introduction to colloquial language, Common Errors in Writing**,** Writing Practices: Reading and comprehension, Summary Writing, Business Letter Writing (Inquiry, Complaint)**,** Critical thinking and analysis, Technical writing (definition and description), Listening Comprehension: Pronunciation Intonation Stress and Rhythm, Public speaking; Non-verbal aspects of speaking: Accent, Pronunciation, Intonation etc, Preparation of Curriculum Vitae/Resume; Interviews; Essentials of Group Discussions /Presentation.

IT 101 Engineering Workshop

E1: Study of Cathode Ray Oscilloscope (CRO) – Measuring Voltage and Current
E2: Study of Function Generator – Configure Output for Varying Signals
E3: Study of Digital Multi-Meter – AC/DC Voltage, Current, Resistance, Parameters of Diode & Transistor
E4: Study of Programmable DC Power Supply – Ripple and Noise, Setting Resolution and Accuracy
E5: Introduction and identification of basic electronic components.
E6: Calculation and verification of equivalent resistance using bread board and multi-meter.
E7: Calculation and verification of equivalent capacitance using bread board and multi-meter.
E8: Testing of pn junction diode and LED using multimeter.
E9: Testing of pnp and npn transistor using multimeter.
E10: Design and construction of half wave and full wave rectifiers.

Detailed Syllabus for B.Tech. CSE

B.Tech. –CSE (Second Semester)

MTH 102 Engineering Mathematics II

Linear Algebra: Review of Matrices Algebra, Solution of Matrices Equation, Row reduced Echelon form,Vector spaces, subspaces, basis, Orthogonal basis, Gram-Schmidt, orthogonalization, Linear Operators, Matrix representation, Rank, Solution of Linear equations using matrices (invertibility, null space etc.), Eigenvalues, eigenvectors.

Complex Analysis: Functions of a Complex Variable, Analytical functions, Cauchy-Reimann equations, Elementary functions, Contour integrals, Cauchy's Theorem, Residue Theorem, Power series, Taylor and Laurent series, zeros, poles, essential singularities, evaluation of integrals.

Vector Calculus: Vector fields, Divergence and Curl, Line Integrals, Green's Theorem, Surface Integrals, Divergence Theorem, Stoke's Theorem and applications.

Partial Differential Equation: Linear & Non-Linear P.D.E of First Order, Homogeneous & Non-Homogeneous Linear P.D.E with constant coefficient of Higher Order, Separation of Variables.

REFERENCES:

1. Higher Engineering Mathematics : -   B.S. Grewal
2. Advanced Engineering Mathematics : -   H.K. Das
3. Linear Algebra :-   Schaum's series
4. Complex Analysis :-   Schaum's series
5. Higher Engineering Mathematics : -   B. V. Ramana

PHY 102 Engineering Physics II

Laser and Fiber Optics:
Laser: Stimulated and Spontaneous processes, Einstein's A & B Coefficients, Transition probabilities, Characteristics of laser, Optical Resonators, Principles and Working of Ruby and He-Ne laser with energy level diagram and applications.

Fiber Optics: Fundamental idea about optical fiber, Types of fibers, Acceptance angle & cone, Numerical Aperture, V-number, Propagation of Light through step index fiber, Pulse dispersion, Attenuation, Loses and applications.

Solid State and Semi Conductor Physics:

Semi Conductor Physics: Effective mass**,** Energy bands in solids, Electron and hole mobility, Fermi level for intrinsic and extrinsic semiconductors, Zenor diode, PN junction transistor, Transistor parameters, Photo diode, solar cell and Hall effect.
Superconductivity: Meissner effect, Type I and Type II superconductors, Dielectric polarization and Dielectric losses.

Wave Optics:
Interference: Interference in Thin Films (due to reflected and transmitted light), Newton's ring and Michelson's Interferometer.
Diffraction: Diffraction at single, double and n-slit

Applied Nuclear Physics: Properties of Nucleus, Nuclear Forces, Fission & Fusion, Particle accelerators (Cyclotron and Betatron), Geiger- Muller (GM) Counter.

Theory of Relativity: Frame of reference, Postulates of Special Theory of Relativity, Lorentz Transformation, Length Contraction, Time Dilation, Einstein's Mass Energy Relation.

REFERENCES:

1**.** OPTICS: GHATAK

2. PRINCIPLES OF OPTICS: BRIJLAL SUBRAMANYAM

3. CONCEPT OF MODERN PHYSICS: BEISER

4. ENGINEERING PHYSICS: M.N. AVADHANULU and P.G. KSHIRSAGAR

5. MODERN PHYSICS: MANI & MEHTA

EG 101 Engineering Graphics

Lines, Lettering, Sketching, Principle of Dimensioning, Orthographic Projection: Projection of Points, Lines, Planes, Auxiliary Views, Projection of Solids, Sections of Solids, Intersections of solids and development of lateral surfaces of simple solids, Isometric Projections, Oblique and Perspective Projection.

CS 102 Data Structures and Algorithms

Notion of Algorithm, Space and Time Complexity, Analyzing algorithms Static & Dynamic Memory Management, Arrays, Stacks, Queues, Linked Lists Trees, Binary Trees, Tree Traversals, Applications of Binary Trees Graphs and their representations, Graph Traversal Algorithms, Minimum Spanning Tree, Shortest Paths

Searching Algorithms: Sequential Search, Binary Search

Sorting Algorithms: Quick sort, Merge sort, insertion sort, Selection sort, Heap & Heap sort Binary Search Tree, Balanced Tree, AVL Tree Files

Indexing: Hashing,

Tree Indexing: B-tree

Basic Algorithm Design Paradigms: Divide & Conquer, Greedy method, Dynamic Programming, Back tracking, Branch and Bound [Discussion with the help of some example which are already discussed].

Text/ References Book:

1. Horowitz, Sahni, Fundamentals of Data Structures, Computer Science Press-2013.
2. Cormen et al., Introduction to Algorithms, Second Edition, Printice Hall of India 2014.
3. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sartaj Sahni, Rajasekaran-Universities Press-2008.
4. Data Structures Using C And C++, 2 Edition, Augenstein Moshe j., Tenenbaum Aaron M., Langsam Yedidyah, Publisher: Prentice-Hall India-2009

HUM 102 Culture & Human Values

The syllabus comprises of excerpts from the writings of great masters like Swami Vivekananda, Mahatma Gandhi, Chanakya, Rabindranath Tagore, Dr. S. Radhakrishnan, H.E. Dr. APJ Kalam, Carl Sagan, Gurunanak Dev, Wordsworth, 0. Henry, Maupassant and many others. The wisdom of the philosophical texts would be brought to them through the Reading Material prepared specifically for the students. It is expected that their English communication and general awareness would improve through this discursive and interactive method.

IT 102 Programming Lab

AutoCAD:

Introduction to 3D Wireframe/Solid Modeling, Modeling of Primitive 3D Solids, Modeling of unique 3D Solids by Extrusion, Revolution, Sweeping and Lofting, 3D Operations and Solid Editing

Matlab:

Basics: Mathematics, Data Analysis, Programming, Graphics, Creating GUI
Toolboxes - Curve Fitting: Data fitting, Preprocessing data, post processing data, Using library functions for Data fitting, Symbolic Math: Calculus, Linear Algebra, Simplifications, Solutions of Equations, Matlab Compiler: Programs involving control statements, data structure etc., User defined functions, Simulink: building a model, run.

Detailed Syllabus for B.Tech. CSE

B.Tech. –CSE (Third Semester)

Course Name: Mathematics-III   Code: MTH 211

Numerical Methods: Solution of algebraic and transcendental equations, Solution of linear Simultaneous Equations. Finite Differences, Interpolation formula for equal and unequal intervals, Central Difference formula, Inverse Interpolation,

Numerical Differentiation. Numerical Integration, Numerical solution of Ordinary & Partial Differential Equations.

Statistics: Curve fitting, Correlation and Regression Analysis Probability Statistics: Curve fitting, Correlation and Regression Analysis.

Discrete and Continuous Random Variables, Probability Density Functions. Theoretical Distributions, Binomial, Poisson Normal Distributions etc.

Hypothesis Testing: Testing of Statistical Hypothesis and its Significance (Chi-Square, t, z and F Tests).

Text/ Reference Books:

1. Numerical Analysis	S S Sastry
2. Numerical Analysis	B S Garewal
3. Numerical Analysis	Jain Ayenger Jain
4. Mathematical Statistics	M. Ray
5. Head first Statistics	Gujarati

Course Name: Discrete Structures   Code: CSE 212

Sets, relations, and functions: Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. Arbitrary union, intersection and product. Propositional Logic: Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory -- set theory, axiom of choice. Size of a set: Finite and infinite sets, countable and uncountables, Cantor's diagonal argument and power set theorem, non-computability of all number theoretic functions.

Partially ordered sets: Complete partial ordering, chain, lattice. Complete, distributive, modular, and complemented lattices. Boolean and pseudo-Boolean lattices. Different sublattices, monotone map and morphisms, quotient structures, filters. Tarski's fixed points theorem. Algebraic Structures: Algebraic structures with one binary operation -- semigroup, monoid and group. Congruence relation and quotient structures. Morphisms. Free and cyclic monoids and groups. Permutation group. Substructures, normal subgroup. Error correcting

code. Algebric structures with two binary operations- ring, integral domain and field. Boolean algebra and Boolean ring.

Introduction to Counting: Basic counting techniques -- inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating function. Introduction to Graph: Graphs and their basic properties -- degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, graph colouring, planar graph, trees.

Text/ Reference Books:

1. Element of Discrete Mathematics By C. L. Liu.
2. Discrete Mathematics by Rosen

Course Name: Digital Logic and Design   Code: CSE 213

Number system & Boolean algebra, number systems: Binary, Arithmetic, octal, Hexadecimal & radix conversion. Binary codes: BCD, excess three, gray display ASCII, EBDCIC, Parity check codes, code conversion, Boolean algebra: theorems, Introduction to logic gates, NAND,NOR realization, Boolean laws & theorems. Simplification of Boolean expression, sum of product & product of sum forms, concept of min terms & max terms, minimization techniques, karnaugh's MAP method, Tabulation method.

Combinational circuits & flip flops half adder, full adder, substractor, BCD adder, multiplexer & demultiplexer, encoder & decoder ckts. FLIP-FLOPS: RS, clocked RS, T, D. JK, master slave JK. Sequential ckts, elements of sequential switching ckts, synchronous & asynchronous systems, binary ripple, counter, BCD counter, up-down counter, Shift Registers, series parallel shift registers shift left & shift right operation, Johnson & ring counter.

Design of sequential ckts. State diagram, state table, state assignment, characterizing equation & definition of synchronous sequential machines, Mealy & More model machines, state table & transition diagram, Introduction to logic families, RTL, DTL, TTL, ECL, NMOS, NCMOS, logic, etc.

Text/ Reference Books:

1. Digital logic and computer design by Moris Mano
2. Digital principles & application A.Paul Malvino & Donald. P. Leach

Digital Electronics - Lab Experiments
1. Experiment to study and implement all the logic gates and to verify their outputs.
2. Experiment to study and implement NAND gate as universal gate.
3. Experiment to study and implement NOR gate as universal gate.
4. Experiment to study and implement XOR gate.
5. Experiment to study and implement binary code conversion to grey code conversion.
6. Experiment to study and implement grey code to binary code conversion.

7. Experiment to study and implement HALF-ADDER circuit.
8. Experiment to study and implement FULL-ADDER circuit.
9. Experiment to study and implement HALF –subtractor circuit.
10. Experiment to study and implement JK-Flip Flop.
11. Experiment to study about the working of multiplexer and its operation as a logic level generator.
12. Study of logic gates using ICs and discrete components.
13. Verify 8:1 MUX and 1:8 DEMUX
14. Study of RAM using IC 7489
15. Study of CMOS Inverter
16. Interface CMOS to TTL and vice versa
17. Study of FFs – RS, D, T and JK
18. Study of decade counter IC 7490
19. Study of 4-bit ripple counter IC 7493
20. Study of shift register IC 74194/195
21. Study of 4-bit comparator IC – 7485
22. Working project made by the student at the end of Lab.

Course Name: Principles of Programming Languages   Code: CSE 214

The Role of Programming Languages: Why Study Programming Languages, Towards Higher-Level languages, Programming paradigms, Programming environments Language Description: Syntactic structure, language Translation Issues: Programming language Syntax, Stages in translation, Formal translation Models. Encapsulation ,classes, hierarchies of classes, inheritance, polymorphism, abstract classes. Identifying objects and classes, representation of objects, Object oriented programming languages, class declarations, object declaration.

Inherited methods, redefined methods, the protected interface, abstract base classes. Public and protected properties, private operations disinheritance, multiple inheritance. Overview of C++ as object oriented programming language, loops, decision, structures and functions, arrays and pointers, virtual function. Statements, Types, Procedure Activations Object-Oriented Programming: Grouping of Data and Operations, object oriented programming Functional Programming: Elements, Programming in a typed language, Programming with lists.

Text books:
1. "Programming Languages: Design and Implementations", Terrance W. Pratt, Marvin V. Zelkowitz, T.V.Gopal,Fourth ed.,Prentice Hall.
2. "Programming languages: Concepts and Constucts", Ravi Sethi, Second Ed.,Pearson.
3. "Types and programming Languages", Benjamin C. Pierce. The MIT Press Cambridge, Massachusetts London, England
4. Object Oriented Programming in C++ by Robert Lafore

Course Name: Design and Analysis of Algorithms   Code: CSE 215

Concepts of algorithm, asymptotic complexity, examples of analysis use of recurrence relation in analysis of algorithms, master method, removal of recursion, heap and heap sort. Divide and conquer technique, analysis and design of algorithms base on this technique for binary search, Sorting techniques: merge sort, quick sort, selection problem etc., Matrix multiplication.

Study of greedy strategy, solutions based on greedy strategy for knapsack problem, scheduling problem, minimum spanning trees, shortest paths optimal merge patterns. Concept of dynamic programming and problems based on this approach such as 01 knapsack problem, multi-stage graphs, shortest paths, Traveling sales-person problem, reliability design problem.

Graph traversal: depth first search, breadth first search, bi-connected components. Backtracking concept and its examples likes 8 queen's problem, Hamiltonian cycle problem, introduction to branch & bound and its examples like 8 piece puzzle problem traveling sales-person problem.

Binary search trees, height balanced trees, AVL trees, 2-3 trees, B-trees hashing. Introduction to lower-bound theory introduction to NP-Complete, and NP Hard problems, examples of NP complete problem like Hamiltonian path and circuits, eulerian paths and circuits etc.

Text/ Reference Books:
1. Computer Algorithms: Horowitz by Sartaj Shani & Sanguthevar Rajasekaran
2. Design and Analysis of Computer Algorithms by V. Aho, J. E. Hopcroft, and J. D. Ullman .
3. Introduction to Algorithms by Cormen, Leiserson & Rivest

Course Name: Computer Workshop   Code: CSE 216

JAVA
Introduction to Java programming, Object-oriented programming with Java Classes and Objects Fields and Methods, Constructors, Inheritance , Exception handling, The Object class, Working with types: Wrapper classes Enumeration interface, Packages , Applets, Basics of AWT and Swing Layout Managers, Threads Synchronization, The I/O, Basic concepts of networking Working with URLs, Concepts of URLs, Sockets, Database connectivity with JDBC

Python
Introduction, Conditional Statements, Looping, Control Statements, String Manipulation Lists , Tuple, Dictionaries, Functions, Modules, Input-Output, Exception Handling, OOPs concept, Regular expressions, CGI, Database, Networking (Socket, Socket Module, Methods, Client and server Internet modules), Multithreading, GUI Programming, Sending email.

Text/ Reference Books:

1.   Core Python Programming by R. Nageswara Rao
2.   How to program Java by Details and Details
3.   Java the Complete Reference by Herbert Schildt

Detailed Syllabus for B.Tech. CSE

B.Tech. –CSE (Fourth Semester)

Course Name: Analog & Digital Communication   Code: CSE 221

Basic blocks in a communication system: transmitter, channel and receiver; baseband and passband signals and their representations; concept of modulation and demodulation. Continuous wave (CW) modulation: AM, DSB/SC, SSB, VSB, methods of generation; Demodulation techniques of CW modulation: coherent and non-coherent; Nonlinear modulation techniques: FM and PM, narrowband FM, wideband FM, methods of generation; FM spectrum; Demodulation techniques for FM; Frequency Division Multiplexing (FDM); Radio transmitters and receivers. Performance of analog modulation schemes in AWGN : CNR, post-demodulation SNR and figure of merit for AM, DSB/SC, SSB, FM, threshold effect in FM, pre-emphasis and de-emphasis in FM, FMFB. Noise in receivers; Noise figures; Radio link design.

Signal analysis and analog modulation: Analog signal, digital, convolution correlation, autocorrelation, of analog modulation, amplitude and angle modulation, spectral analysis and relation, noise source, band pass noise, noise performance of AM and FM signal. Pulse Modulation: Natural sampling, flat top sampling, sampling theorem, PAM, bandwidth, pulse time modulation method of generation and detection of PAM, and PPM, time division multiplexing, Noise in pulse modulation system.

Pulse code modulation: Quantization of signal, quantization errors, PCM, PCM system, comp multiplexing PCM system, differential PCM, delta modulation, adaptive delta modulation, noise in PCM system. Information theory and Coding: Unit of information, entropy, Joint and conditional entropy, information rate mutual nformation, channel capacity of BSC, BEC and binary channel theorem Shannon Harte'y theorem, bandwidth S/N trade off, average length of code control coding, Hamming distance block code, convolution code.

Digital Communication: Differential phase shift keying (DPSK), quadrature phase shift k (QPSK), M- ray PSK, Binary frequency shift keying (BESK), comparison of DPSK QPSK, M-ray FSK, duo   binary encoding, base band signal reception, probability of optimum filter, matched filter.

Text/ Reference Books:
1. Modern Digital and Analog Communication Systems   B.P.Lathi
2. Communication Systems   Simon Haykins
3. Communication Systems   A. B. Carlson
4. Analog & Digital Communication   R.P. Singh & Sapre
5. Communication Engineering   Rao

Analog Communication Lab Experiments

1) Double side band AM Generation.
2) Double side band AM Reception.

3) Single side band AM Generation.
4) Receiver Characteristics (Selectivity, Sensitivity, Fadelity).
5) Frequency Modulation using Reactance Modulator.
6) Frequency Modulation using Varactor Modulator.
7) Quadrature Detector.
8) Operation of Phased locked loop Detector.
9) Operation of Foster – Seeley loop Detector.
10) Operation of Ratio Detector.

Course Name: Computer Organization and Architecture   Code:CSE 222

Introduction to computer organizations and architecture, computer system components, bus organized computer, memory address register, data register, program counter, accumulator, instruction register. Instructions fetch. Decoding and execution. Instruction formats and addressing modes, instruction set design issues, micro operations. Register transfer language. Control unit organization. Instruction sequencing, instruction interpretation. Hardwired control and micro programmed control organization, control memory, address sequencing, microinstruction formats, micro program sequencer, microprogramming, microinstruction encoding, horizontal and vertical micro instructing.

Arithmetic and logic unit design. Addition and subtraction algorithm. Multiplication algorithm. Division algorithm. Floating point arithmetic. Processor. Configuration, instruction pipelining, branch handling, CISC and RISC architecture features, superscalar architecture. Input- output organization, programmed I.O. I/O addressing , I/O instruction. Synchronizations. I/O interfacing, standard I/O interfaces interrupt mechanism, DMA I/O processors and data communication.

Memory organization and multiprocessing basic concepts and terminology. Memory hierarchy, semiconductor memories (RAM ROM) virtual memory. Cache memory, Associative memory, memory allocation and management policies, structure of multiprocessor.

Text/ Reference Books:

1. Computer Organization and Architecture Design and Performance by Willam Stalling
2. Computer Architecture and Organization by John P. Hayes
3. Computer Architecture and Organization by M. Morris Mano

Course Name: Software Engineering   Code: CSE 223

The Software Product and Software Process Software Product and Process Characteristics, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes. Software Process customization and improvement, CMM, Product and Process Metrics. Requirement Elicitation, Analysis, and Specification Functional and Non-functional requirements, Requirement Sources and Elicitation Techniques, Analysis

Modeling for Function-oriented and Object-oriented software development, Use case Modeling, System and Software Requirement Specifications, Requirement Validation, Traceability.

Software Design: Software Design Process, Design Concepts and Principles, Software Modeling and UML, Architectural Design, Architectural Views and Styles, User Interface Design, Function-oriented Design, SA/SD Component Based Design, Design Metrics. Software Analysis and Testing Software Static and Dynamic analysis, Code inspections, Software Testing, Fundamentals, Software Test Process, Testing Levels, Test Criteria, Test Case Design, Test Oracles, Test Techniques, Black-Box Testing, White-Box Unit Testing and Unit, Testing Frameworks, Integration Testing, System Testing and other Specialized, Testing, Test Plan, Test Metrics, Testing Tools. , Introduction to Object-oriented analysis, design and comparison with structured Software Engineering.

Software Maintenance & Software Project Measurement Need and Types of Maintenance, Software Configuration Management (SCM), Software Change Management, Version Control, Change control and Reporting, Program Comprehension Techniques, Re-engineering, Reverse Engineering, Tool Support. Project Management Concepts, Feasibility Analysis, Project and Process Planning, Resources Allocations, Software efforts, Schedule, and Cost estimations, Project Scheduling and Tracking, Risk Assessment and Mitigation, Software Quality Assurance (SQA). Project Plan, Project Metrics.

Text/ Reference Books:
1. Software Engineering by Roger S Pressman
2. Software Engineering by Lan Sommerville

Course Name: Database Management System   Code: CSE 224

Introduction to DBMS concepts and architecture: file organization techniques, database approach v/s traditional file accessing approach, advantages of database systems, data models, schemas and instances, database languages and interface, initial conceptual design of database, DBMS Architecture database system utilities, data independence, functions of DBA and designer.

Entities attributes, entity types, value sets, key attributes, relationships, defining the E-R design of database. Relational data models: Domains, tuples, attributes, relations, characteristics of relations, key attributes of relations, relational database, schemas, integrity constraints, update operations on relations. Hierarchical data model: Hierarchical database structures, Integrity constraints, data definition and manipulation in hierarchical model. Network data model: Records, record types and data items, set types and set instances, constraint on set membership, representation of set instances, special types of sets, DBTG proposal and implementation.

Relational algebra and relational calculus: Relational algebra operations like select, project, join, division, outer join, outer union etc., insertion, deletion and modification anomalies. Data definition in SQL, queries, update statements and views in SQL. QUEL and QBE, data and storage definition, data retrival queries and update statements etc.

Introduction to normalization, normal forms, functional dependency, decomposition, dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies, inclusion and template dependencies. Distributed databases, protection, security and integrity constraints, concurrent operations on databases, recovery, transaction processing, database machines. Comparison of various database models, comparison of some existing DBMS.

Text/ Reference Books :
1. Fundamentals of Database System by Navathe
2. Fundamentals of Database System by Korth
3. Database Management System by Raghu Ramakrishnan

Course Name: Formal Language and Automata Theory   Code: CSE 225

Introduction to theory of Computation and Finite Automata: Mathematical Preliminaries & Notation : Sets, functions and relations, Graphs and Trees, Proof Techniques, Basic concepts, Languages, Grammars, automata, deterministic finite accepters, Deterministic accepters and Transition Graphs, Languages, Non deterministic finite accepters, definition of a NDFA, Equivalence of DFA and NDFA, Reduction of the Number of states in finite automata. Grammars and Languages: Regular expression, Regular Grammar, Regular languages, closure properties of Regular languages, Context free grammars, Simplification of Context free grammars and Normal forms, Properties of context free languages.

Push – Down Automata: Non deterministic push down automata: Definition of a push down automata, The language accepted by a push down automata, Push down automata and context free languages, Push down automata for context free languages, CFG's for PDA, Deterministic Push down automata and Deterministic Context free languages, Grammars and Deterministic context free languages. Turing Machines**:** The Standard Turing Machine: Definition of a Turing Machine, Turing Machines as language accepters, and Turing Machines as Transducers. Combining Turing Machines for complicated tasks, Turing thesis, other models of Turing Machines.

Limits of algorithmic computation, Computability and Decidability, the Turing Machine Halting Problem, Reducing one Undecidable Problem to another, Undecidable Problems for Recursively Enumerable languages, The post correspondence problem: Indecidable problems for context free languages, Recursive function, Primitives recursive functions, Ackermanris functions, recursive functions, Post Systems : Rewriting systems : Matrix grammars, Markov Algorithms.

Text/ Reference Books:
1. Introduction to languages & the theory of Computation by John C. Martin.
2. An Introduction to Formal Languages and Automata by Peter Linz.
3. Introduction Automata Theory Languages and Computation by J.E. Hopcroft & J.D. Ullman.

Course Name: Entrepreneurship Development   Code: CSE 226

Entrepreneurship Development – Concept and Importance, function of Enterpriser, Goal determination – Problems Challenges and solutions.

Project Proposal- Need and Objects; Nature of organization, Production Management; Financial Management; Marketing Management; Consumer Management.

Role of Regulatory Institutions; Role of Development Organizations; Self Employment Oriented Schemes; Various grant schemes.
a. Production management; b. Marketing management – Sales and the art of selling, understanding the market and market policy; Consumer management, time management.

Role of regulatory institutions-district industry centre, pollution control board, special study of electricity development and municipal corporation; Role of development organization, khadi & villages commission/Board; Self-employment-oriented schemes, Prime minister's employment schemes.

References:
- Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill, 2013.
- Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis" 2nd Edition Dream tech, 2005.
- Rajeev Roy, 'Entrepreneurship' 2nd Edition, Oxford University Press, 2011.

Detailed Syllabus for B.Tech. CSE

B.Tech. –CSE (Fifth Semester)

Course Name: Computer Networks   Code: CSE-311

Introduction to networks and layered architecture: OSI, TCP/IP; Telecommunications and cellular networks overview; Examples of networks: Arpanet, Internet, Network Topologies WAN, LAN, MAN.

Physical Layer: Basics of communication; Physical media types and their important bandwidth and bit-error-rate characteristics; Wired and wireless media including copper cables, optical fibre and wireless and topology; Multiplexing-circuit switching and packet switching.

Data Link Layer: Framing;Error detection and correction techniques; Topologies; Wired LANs: Ethernet, Wireless LANs, Wireless WANs, Connecting LANs;Virtual-circuit networks, Performance analysis of networks.

Network layer: Network layer and addressing, IP version 4 and 6;Packet delivery, forwarding and routing protocols including distance-vector and link-state approaches; Interior and exterior gateway protocol concepts; Example protocols: OSPF, RIP, BGP.
Transmission layer:Reliable end-to-end transmission protocols-TCP and UDP.
ApplicationLayer: Protocols such as DNS, SMTP, FTP, HTTP, POP, IMAP etc.

Text/ Reference Books:
1. W. Stallings, Data and Computer Communications, 6th edition, Prentice Hall, 2000.
2. A. S. Tannenbaum, Computer Networks, 4th edition, Prentice Hall, 2003.
3. F. Halsall, Data Communications, Computer Networks and Open Systems, 4th edition, Addison-Wesley, 1996.
4. Walrand and Varaiya, High Performance Communication Networks, Morgan Kaufman, 1996.
5. D. E. Comer, Internet working with TCP/IP: Principles, Protocols, Architecture, 3rd edition, Prentice Hall, 2000. 6. W. R. Stevens, TCP/IP Illustrated Vol. I, Addison Wesley, 1994.

Course Name: Digital Image Processing   Code: CSE 312

Introduction to Image Processing Systems, Digital Image Fundamentals:- Image model, Relationship between Pixels, Imaging geometry, Camera model, Image Sensing and Acquisition, Sampling and quantization, Image Enhancement and in spatial Domain: Point processing, Neighborhood Processing, High pass filtering, High boost filtering, zooming. Image Enhancement based on Histogram modeling, Image Enhancement in frequency domain: 1D& 2D Fourier transform, Low pass frequency domain filter, High pass frequency domain filters, Homomorphic filtering, Image Segmentation, Detection of discontinuation by point detection, line detection, edge detection, Edge linking and boundary detection Local analysis, global by graph, theoretic techniques, Thresh-holding, Morphology, Representation

and description, Discrete image transform, Image Compression, Wavelet transformation, Image geometry, Image restoration.

Text/ Reference Books:

1. Digital Image Processing Gonzalez & Wood
2. Digital Image Processing A.K. Jain .Image Processing Dhananjay K.

Course Name: Micro-Processors and Micro-Controllers   Code: CSE 313

Microprocessors (8085) - internal architecture, Instruction set and assembly language programming. Introduction to 8086 microprocessor, internal architecture, pin description, memory segmentation, addressing modes, instruction set and assembly language programming.
Basic Interfacing devices: Memory interfacing, 8255, 8253, 8259, 8257, 8251, Interfacing A/D and D/A converters, Case studies of microprocessor based systems. Salient features of advanced microprocessors: 80286,386,486, Pentium.
Introduction to 8051 microcontrollers, its architecture, pin description, I/O configuration, interrupts, addressing modes, an overview of 8051 instruction set, Microcontroller applications.

Text/ Reference Books:
1. 8085 Microprocessor   Ramesh Goenkar, Prentice Hall
2. Microprocessor and Interfacing   D. V. Hall
3. The 8051 Microcontroller   Kenneth J Aya
4. THE INTEL MICROPROCESSORS   BARRY B. BREY, Pearson Prentice Hall

Micro Processor & Micro Controller-Lab
1. Write C program to interface stepper motor.
2. Write C program to interface DC motor.
3. Write C program to interface traffic light controller.
4. Write C program to interface Elevator.
5. Write C program to interface ADC-DAC controller.
6. Write C program to interface temperature controller.
7. Write C program to interface DAC controller.
8. Write a program to add two 8-bit BCD numbers.
9. Write a program to add 'n' 8-bit BCD numbers.
10. Write a program to add two 'n' byte BCD numbers.
11. Write a program to perform 8-bit binary subtraction.
12. Write a program to perform 8-bit binary subtraction by 1's compliment method.
13. Write a program to perform 8-bit binary subtraction by 2's compliment method.
14. Write a program to perform 8-bit binary subtraction by 9's compliment method.
15. Write a program to perform 8-bit binary subtraction by 10's compliment method.
16. Write a program to perform two 'n' byte binary subtractions.

Course Name: Compiler Design   **Code: CSE-314**

Introduction to language translators and overview of the compilation process.

Lexical analysis (scanner): specification of tokens, token recognition, conflict resolution, regular expression, scanner generator (lex, flex).

Syntax Analysis (parser): Context-free language and grammar, push-down automata, LL(1) grammar and top-down parsing, operator grammar, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc,bison).

Semantic Analysis: Attribute grammar, syntax directed definition, evaluation and flow of attribute in a syntax tree.

Symbol Table: Its structure, symbol attributes and management.

Intermediate Code Generation: Translation of different language features, different types of intermediate forms.

Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc. Architecture dependent code improvement: loop optimization etc.

Text/ Reference Books:
1. Compilers: Principles, Techniques, and Tools, Alfred Aho, Monica Lam, Ravi Sethi, Jeffrey D. Ullman, Addison-Wesley, 2007
    2. Modern compiler implementation in Java, Second Edition, Andrew W. Appel, Jens Palsberg, Cambridge University Press, 2002.
    3. Computer Organization and Design: The Hardware/Software Interface, David Patterson and John Hennessy, Morgan Kaufmann, 1998

Course Name: Operating System   **Code: CSE-315**

The Evolution of operating Systems (OS); Fundamental goals of operating systems overview of important features of OS operation. Overview of OS: multiprogramming, Batch, interactive, time sharing, distributed operating systems and real time systems; Concurrency and parallelism.

Process management and scheduling: Concept of process and process synchronization, process states, process state transitions, the process control block, operations on processes, suspend and resume, interrupt processing, mutual exclusion, the producer/consumer problem, the critical section problem, semaphores, classical problems in concurrency, inter process communication; Issues in user service and system performance.

Synchronization primitives and problems, deadlocks (essential topics: peterson's algorithm, monitors), detection and prevention of deadlocks, dynamic resource allocation.

Memory Management: Memory fragmentation and techniques for memory reuse paging, virtual memory management using paging, Segmentation, Distributed and Multiprocessor Systems.

File Management: File systems, implementation of file Operations. Protection of files.

Text/ Reference Books:

1. Modern Operating Systems, Andrew S Tanenbaum and Herbert Bos, Fourth Edition, Pearson Education, 2014.
2. Operating Systems Concepts, Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Wiley, 2012.
3. Dhamdhere, D. M., Operating Systems---A concept-based approach, Second edition, McGraw-Hill Education India, New Delhi, 2006.
4. Stallings, W., Operating Systems---Internals and Design Principles,Fifth edition, Pearson Education, New York, 2005.

Detailed Syllabus for B.Tech. CSE

B.Tech. –CSE (Sixth Semester)

Course Name: Cryptography and Information Security Code: CSE 321

Overview of Information Security: confidentiality, integrity, and availability, User authentication, Information Security for Server Systems, Information Security for Client devices

Understanding the Threats: Malicious software (Viruses, trojans, rootkits, worms, botnets), Memory exploits (buffer overflow, heap overflow, integer overflow, format string).

Information Security and Cryptography, Mathematics of Cryptography, Ciphers: Substitution and Transposition, Symmetric Encryption and Message Confidentiality, Integrity of Data, Hash Function, Digital Signature.

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Stream Cipher and Block Cipher, Random Number Generator, One-time Pad.

Groups, Rings, Fields, Modular Arithmetic, Euclid's Algorithm, Finite Fields Of Form GF (p) And GF (2n). Polynomial Arithmetic, Prime Numbers, Fermat's And Euler's Theorem, Testing For Primality, The Chinese Remainder Theorem, Discrete Logarithms.

Block Cipher Principles, Data Encryption Standard (DES), Multiple Encryption, Triple DES, Advanced Encryption Standard (AES), Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

Text/ Reference Books:

1. William Stallings and Lawrie Brown. 2014. Computer Security: Principles and Practice (3rd ed.). Prentice Hall Press, Upper Saddle River, NJ, USA.
2. Behrouz A. Forouzan. 2007. Cryptography &Amp; Network Security (1 ed.). McGraw-Hill, Inc., New York, NY, USA.
3. M. Stamp, ―Information Security: Principles and Practice,‖ 2st Edition, Wiley, ISBN: 0470626399, 2011.
4. M. E. Whitman and H. J. Mattord, ―Principles of Information Security,‖ 4st Edition, Course Technology, ISBN: 1111138214, 2011.
5. "Designing Security Architecture Solutions", Jay Ramachandran,Wiley.
6. "Web Application Security, A Beginner's Guide" Bryan Sullivan, Vincent Liu, McGraw Hill.

Course Name: Data Warehouse & Data Mining Code: CSE 322

Data Mining Concepts, Input, Instances, Attributes and Output, Knowledge Representation & Review of Graph Theory, Statistics, Supervised Learning Framework, concepts & hypothesis, Training & Learning, Boolean functions and formulae, Monomials, a learning

algorithm for monomials. Data Cleaning, Data Integration & Transformation, Data Reduction.

Associations, Maximal Frequent & Closed Frequent item sets, Covering Algorithms & Association Rules, Linear Models & Instance-Based Learning, Mining Association Rules from Transactional databases, Mining Association Rules from Relational databases & Warehouses, Correlation analysis & Constraint-based Association Mining.

Issues regarding Classification & Prediction, Classification by Decision Tree induction, Bayesian classification, Classification by Back Propagation, k-Nearest Neighbor Classifiers, Genetic algorithms, Rough Set & Fuzzy Set approaches. Types of data in Clustering Analysis, Categorization of Major Clustering methods, Hierarchical methods, Density-based methods, Grid-based methods, Model-based Clustering methods

Multidimensional analysis & Descriptive mining of Complex data objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Timeseries& Sequence data, Mining Text databases, Mining WWW

Data warehousing Components, Building Data warehouse, Mapping Data Warehouse to Multiprocessor Architecture, DBMS Schemas for Decision Support, Data Extraction, Transformation Tools, Metadata

Text/Reference Book:
1. Jiawei Han and MichelineKamber, ―Data Mining: Concepts and Techniques‖, Morgan Kaufmann Publishers.
2. Ian H. Witten and Eibe Frank, ―Data Mining: Practical Machine Learning Tools and Techniques with Java implementations, Morgan Kaufmann Publishers.
3. D. Pyle, ―Data Preparation for Data Mining‖, Morgan Kaufmann.
4. Korth, Silbertz, Sudarshan, ―Database Concepts, McGraw Hill
5. Elmasri, Navathe, ―Fundamentals of Database Systems‖, Addision Wesley

Course Name: Distributed Systems   Code: CSE 323

Basic Concepts of Distributed Systems: Computer architecture: CICS, RISC, Multi-core Computer networking: ISO/OSI Model Evolution of operating systems Introduction to distributed computing systems (DCS).

Distributed Coordination: Temporal ordering of events Lamport's logical clocks Vector clocks; Ordering of messages Physical clocks Global state detection, Distributed mutual exclusion algorithms Performance matrix.

Inter-process communication: Message passing communication Remote procedure call Transaction communication Group communication; Broadcast atomic protocols. Deadlocks in distributed systems, Load scheduling and balancing techniques.

Text/Reference Book:

1. Distributed Systems Concepts and Design, G. Coulouris, J. Dollimore, Addison Wesley

2. Distributed Operating Systems and Algorithms, Randy Chow, T. Johnson, Addison Wesley
3. Distributed Operating Systems, A.S. Tanenbaum, Prentice Hall

Course Name: Artificial Intelligence   Code: CSE 324

Meaning and definition of artificial intelligence, Production systems: types, characteristics, study and comparison search techniques: BSF, DSF, hill climbing, best first search, A* algorithm, AO* algorithm etc, types of control strategies.

Knowledge representation: Problems faced, propositional and predicate logic, resolution and refutation, deduction, theorem proving. Reasoning: introduction, reasoning methods, Baye's theorem, Bayesian network, fuzzy logic.

Slot and filler structures: semantic networks, frames, conceptual dependency, scripts etc. Game playing and its techniques, planning techniques, study of blocks world problem in robotics, understanding, natural language processing and common sense.

Learning and its techniques, neural networks and its applications, expert systems.

Text/Reference Book:

1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 2nd Ed, Prentice Hall, 2003;
2. Elaine Rich and Kevin Knight. Artificial Intelligence, Tata McGraw Hill

List of Electives Level -1 (Any One Subject for VI Semester)

Data Engineering & Computing Stream		Computer System Architecture Stream		Network Security & Algorithms Stream		Language, Theory & Communication Stream	
CSE501	Advances in Database Management System	CSE502	Computer Graphics & Multimedia	CSE503	Computer & Network Security	CSE504	Mobile & Wireless Communications

SYLLABUS OF ELECTIVES LEVEL-1

Course Name: Advances in Database Management System

Code: CSE 501

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation-Based Protocols – Multiple Granularity.

Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of non-volatile storage-Advance Recovery systems- Remote Backup systems.

Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Text/Reference Book:
1.Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, 5thedition.

Course Name: Computer Graphics & Multimedia   Code: CSE 502

Introduction to raster & amp; random graphics fundamentals, Display devices & amp; comparison Point plotting, line drawing & amp; circle drawing & amp; their algorithm like DDA & amp; Bressenhams, Video Basics- Graphics input/ output devices techniques, Mouse, tablets, stylus, light pen, valuators, digitizers, and plotter Devices independent graphics systems, positioning constraints, rubber band technique, dragging, inking& amp; Painting,
Data Structure of Computer Graphics, 2-D Transformation, Clipping, Windowing, View port, 3-D transformation, clipping, viewing transformations, projection, curve generation methods. Graphics packages, segmented files, Geometric models, Picture Structure. Raster graphics, Character Displaying, Natural images Solid Area. Scan Conversion, Raster display hardware, Filling areas, aliasing & amp; anti-aliasing Hidden surface elimination, Shading,

Application to Simple Engineering Problem. Multimedia : Characteristics of a multimedia presentation , Uses of Multimedia, Text –Types, Unicode Standard ,text Compression, Text file formats, Audio- Components of an audio system, Digital Audio, Digital Audio processing, Sound cards, Audio file formats ,Audio Processing software ,Video-Video color spaces, Digital Video, Digital Video processing, Video file formats.

Text/Reference Book
1. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
2. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub.
3. Parekh "Principles of Multimedia" Tata McGraw Hill
4. Pakhira,"Computer Graphics, Multimedia & Animation",PHI learning
5. Andleigh, Thakral , "Multimedia System Design " PHI Learning

Course Name: Computer & Network Security   Code: CSE-503

Overview of Information Security: confidentiality, integrity, and availability, User authentication, Information Security for Server Systems, Information Security for Client devices.
Understanding the Threats: Malicious software (Viruses, trojans, rootkits, worms, botnets), Memory exploits (buffer overflow, heap overflow, integer overflow, format string)

Introduction to Network Security: Network security needs. Threats to network security, kind of computer security, security policies, security mechanisms, attacks, security tools and basic cryptography, transposition/substitution, block cipher principles.

Introduction to Symmetric crypto primitives, Asymmetric crypto primitives, Data Encryption Standard (DES), Message Digests, Message Authentication and Hash Functions, Hash and Mac Algorithms, Principles of Public key cryptosystems, RSA, Selection of public and private keys.

Key distribution centers and certificate authorities, digital signature standard (DSS), kerberos, Real-time communication security, IPsec, Electronic mail security, Firewalls and web security, Intruders and viruses, trusted system, password management, zero knowledge protocols, malware – privacy, honey pot, defense programming, web application vulnerability, DHS, attack, semantic attack, DoS, DDoS, wireless attack, Intrusion detection system.

Text/Reference Book:

1. William Stallings and Lawrie Brown. 2014. Computer Security: Principles and Practice (3rded.). Prentice Hall Press, Upper Saddle River, NJ, USA
2. Behrouz A. Forouzan. 2007. Cryptography &Amp; Network Security (1 ed.). McGraw-Hill, Inc., New York, NY, USA.
3. Cryptography and Network Security, William Stallings
4. Introduction to Network Security, Krawetz, Cengage

Course Name: Mobile & Wireless Communications   **Code: CSE 504**

Introduction to wireless communication systems, different generations of wireless networks. Cellular system design fundamentals, frequency reuse, handoff strategies, Interference and system capacity, Trunking and grade of service.

Mobile radio propagation: free space propagation model, Ground reflection propagation model, Long term fading, Small scale multipath propagation, Time dispersion parameters, Coherence bandwidth, Doppler spread and coherence time, types of small scale fading, Clarke's model for flat fading, level crossing and fading statistics.

Capacity in cellular systems, cell splitting and sectoring, cell-site antennas and mobile antenna, cochannel interference reduction, Frequency management and channel assignment.

Frequency division and time division multiple access. Global System for Mobile: System Architecture. GSM Radio subsystem. GSM: GSM Traffic Channel and Control Channel, Frame Structure.

Spread spectrum multiple access (Frequency Hopped Multiple Access and. Code Division Multiple Access). Different spreading codes.CDMA Digital Cellular system: different standards with detailed description of forward and reverse channels. Capacity of cellular systems.

Overview of Bluetooth and Android APIs

Text/Reference Book:

1. Mobile cellular telecommunication- W. C. Lee, McGraw-Hill
2. Wireless communication -T. S. Rappaport, Prentice Hall
3. Wireless communication – Simon Haykins, Pearson
4. Wireless Communications and Networking William Stallings

Course Name: Soft Computing   Code: CSE 411

Introduction to neural networks, Working of an artificial neuron, Perceptron, Back propagation algorithm, Adalines and Madalines. Supervised and unsupervised learning, Counter-propagation networks, Adaptive Resonance Theory, Kohonen's Self Organizing Maps, Neocognitron, Associative memory, Bidirectional Associative Memory. Introduction to fuzzy logic and fuzzy sets, fuzzy relations, fuzzy graphs, fuzzy arithmetic and fuzzy if-then rules, Process control using fuzzy logic, Decision-making fuzzy systems, Applications of fuzzy logic, Hybrid systems like neuro-fuzzy systems. Evolutionary Computation: Population-based Search: genetic algorithms and evolutionary computation, Swarm optimization, Ant colony optimization. Search techniques like Simulated Annealing, Tabu search etc.

Text/Reference Books:

1. Soft Computing and Intelligent Systems Design by F.O.Karray and C.De Silva,Pearson Publication
2. Neural Networks, Fuzzy Logic and Genetic Algorithms by Rajsekaran and Pai, PHI Publication.

Course Name: Environmental science   Code: CSE 701

Environmental Management, Resources and Legislation Environmental disturbances, quantification of environmental issues, soil resources and their classification, equitable use of resources, natural resource management, food chain and trophic levels, environmental impacts of energy development, legislation.

Global Atmospheric Change The atmosphere of earth, global temperature, greenhouse effect, radioactive forcing of climate change, global warming potential, carbon cycle, carbon emissions from fossil fuels, regional impacts of temperature change, global initiatives

Physical, Chemical and Biological Processes Particle dispersion, methods of expressing particle concentrations, stoichiometry, chemical equilibria, solubility of gases in water, carbonate system, organic chemistry, nuclear chemistry, nuclear fission and fusion, basic atmospheric properties, fundamentals of microbiology.

Population and Economic Growth The nature of human population growth, population parameters, industrialization, urbanization, sustainable development, sustainable consumption, resettlement and rehabilitation issues, health and the environmental impacts.

Solid and Hazardous Waste Management Integrated solid waste management, hazardous waste management, biomedical waste treatment technologies and disposal options, e-waste management, waste minimization for sustainability, waste management – Indian scenario.

Pollution and Monitoring Water resources, characteristics of water, water pollutants, oxygen demanding wastes, surface water quality, groundwater quality, water and wastewater treatment systems. Air quality standards, emission standards, criteria pollutants, air pollution and meteorology, atmospheric dispersion, emission controls.Effect of noise on people, rating systems, community noise sources and criteria, traffic noise prediction, noisecontrol.

Text/Reference Books:

1) Mackenzie L. Davis and David A. Cornwell.2010. Introduction to Environmental Engineering, 4e. Tata McGraw-Hill Education Private Limited NewDelhi.
2) Gilbert M. Masters.2007. Introduction to Environmental Engineering and Science Pearson Education. Dorling Kindersley (India) Pvt. Ltd.Delhi.
3) J. Glynn Henry and Gary W. Heinke.2004. Environmental Science and Engineering, Pearson Education (Singapore) Pte.Ltd.

Course Name: Technical Communication   Code: CSE 702

Unit-1 Fundamentals of Technical Communication: Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition, types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication

Unit-II Forms of Technical Communication: Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Key-Note Speech: Introduction & Summarization; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration.

Unit-III Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear: Confident speaking; Audience Analysis & retention of audience interest; Methods of   Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Unit-IV Technical Communication Skills: Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition

narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

Unit-V Kinesics & Voice Dynamics: Kinesics: Definitions; importance; Features of Body Language; Voice Modulation: Quality, Pitch; Rhythm; intonation; Pronunciation; Articulation; stress & accent; Linguistic features of voice control: Vowel & Consonant Sounds.

Text/Reference Books:

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
3. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.
4. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.
5. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.
6. Skills for Effective Business Communication by Michael Murphy, Harward University, U.S.
7. Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi.

Course Name: System Biology   Code: CSE 703

Introduction to Computational Biology & Systems Biology, Biology in time and space. Models and Modeling: purpose, adequateness, advantage of computational modeling, basic notion for computational models, model scope, statements, system state, variables parameters constants, behavior, classificatiom, steady states. Fundamentals of Nucleic acid and protein sequence analysis. Analysis of complex biological systems Sequencing (DNA & amino acid) and Micro array. Protein structure analysis. Genome assembly Tools and Databases Computational gene hunting (gene predication -HMM) Alignment of biomolecular sequences (Local, Global, DP, Blast, multiple) their principles and methods. Motif finding. structural modeling and structure prediction Network modeling. Genomic regulation Protein folding Genetic variation RNA world Systems Biology (gene, protein and membrane machine)--Human and Pathogens--Cancer genomics (Tumor complexity)--Gene regulatory network Codon optimization Algorithmic Drug designs. Current and emerging areas in the field of computational and systems biology.

Text/Reference Books:

1. Systems Biology: A Textbook by Edda Klipp, Wolfram Liebermeister, Wiley BlackWell.
2. Pavel A. Pevzner, Computational Molecular Biology, An Algorithmic Approach, The MIT
3. press, 2001.
4. Neil C. Jones and Pavel A. Pevzner, An Introduction to Bioinformatics Algorithms, Indian
5. reprint by Ane Books, 2005.
6. Nello Cristianini and Matthew W. Hahn, Introduction to Computational Genomics: A
7. Case Studies Approach, 2007, Cambridge University Press.

Course Name: Intellectual Property Right   Code: CSE 704

Introduction, Basic concept of Intellectual Property, Characteristics and Nature of Intellectual Property right. Justifications for protection of IP. IPR and Economic Development. Major International Instruments relating to the protection of IP i. Berne Convention ii. Paris Convention iii. TRIPS.

Copyright Meaning, Subject matter, Original literary, dramatic, musical, artistic works, Cinematograph films, Sound recordings. Ownership of copyright, Term of copyright, Rights of owner i. Economic Rights ii. Moral Rights. Assignment and license (including basic concept of statutory and compulsory license) of rights, Performers rights and Broadcasters rights, Infringement of copyright, Fail use and Fair Dealing concepts, Relevant Sections.

Patents Meaning, Criteria for obtaining patents, Procedure for registration , Term of patent , Rights of patentee. Basic concept of Compulsory license and Government use of patent. Infringement of patents and remedies in case of infringement, Relevant Sections.

Trade Marks: Meaning of mark, trademark, Categories of Trademark: Certification Mark, Collective Mark and Well known Mark and Non-conventional Marks, Concept of distinctiveness, Absolute and relative grounds of refusal, Doctrine of honest concurrent user, Procedure for registration and Term of protection, Assignment and licensing of marks, Infringement and Passing Off Relevant sections: 2, 9, 11, 12, 18 to 29, 38, 39, 122, 134, 135.

Text/Reference Books:

1. Lionel Bently & Brad Sherman, Intellectual Property Law, Oxford.
2. P. Narayanan, Intellectual Property Law, Eastern Law House.

Course Name: Mobile Computing   **Code: CSE 601**

Introduction to Mobile Communications and Computing, novel applications, GSM: Mobile services, System architecture, and new data services. (Wireless) Medium Access Control: Motivation for a specialized MAC, DMA, FDMA, TDMA, CDMA. Mobile Network Layer: Mobile IP, IP packet delivery, Dynamic Host Configuration Protocol (DHCP). Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP. Database Issues: client server computing with adaptation, transactional models, and quality of service issues. Mobile Ad hoc Networks (MANETs): Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs. Protocols and Tools: Wireless Application Protocol-WAP. Bluetooth and J2ME.

Text/Reference Books:

1. Mobile Communications Jochen Schiller.
2. Handbook of Wireless Networks and Mobile Computing Stojmenovic and Cacute.
3. Fundamentals of Mobile and Pervasive Computing Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren

Course Name: Parallel Algorithms   **Code: CSE 602**

Introduction to parallel algorithm, data parallel and control parallel approach, models of parallel computation, dense matrix algorithm , sorting searching, selection and graph algorithms. Introduction to distributed algorithms, synchronous algorithms network model, leader election algorithm, minimum spanning tree, shortest path, distributed consensus k agreement problem, two phase commit, three phase commit, mutual exclusion algorithms, and applications of distributed algorithm.

Text/Reference Books:

1. Parallel algorithms Michael. J.Quinn.
2. Distributed algorithm NancyLynch.
3. Implicit Parallel Programming in Ph, Rishiyur S. Nikhil, 1947-Arvind.

Course Name: Natural Language processing   Code: CSE 603

Regular Expressions and Automata, N-grams, Part-of-Speech Tagging, Hidden Markov and Maximum Entropy Models, Formal Grammars of English, Syntactic Parsing, Statistical Parsing, Features and Unification, Language and Complexity, The Representation of Meaning, Computational Semantics, Computational Lexical Semantics, Information Extraction, Question Answering and Summarization, Machine Translation.

Text/Reference Books:

1. "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", C. D. Jurafsky and J. Martin.
2. "Foundations of Statistical Natural Language Processing", Manning and H. Schutze.
3. "Computational Approaches to Morphology and Syntax (Oxford Surveys in Syntax & Morphology)" 1st Edition, Roark & Sproat.

Course Name: Software Testing and Quality   Code: CSE 604

Software Testing Principles, Quality, Testing flow process. Defect Classification: Origin of Defects, Classes, Repository and Design, Developer/Tester Support for Developing a Defect Repository. Test Case Design Strategies: Black Box Approach, Random Testing, Equivalence Class Partitioning, Boundary Value Analysis, COTS, White Box approach, Test Adequacy Criteria, Coverage and Control Flow Graphs, Covering Code Logic, Additional White Box Test Design Approaches, Evaluating Test Adequacy Criteria. Unit testing, Integration tests, System testing, Regression testing and Acceptance testing, Test Plan Writing. Testing Tools. Criteria for Test Completion. Types of system testing-Acceptance testing: performance testing, Regression Testing internationalization testing, ad-hoc testing, Alpha – Beta Tests, testing OO systems, usability and accessibility testing. Testing services: Test Planning, Test Plan Components, Test Plan Attachments, Locating Test Items ,test management , test process ,Reporting Test Results. Software test automation: Skills needed for automation, scope of automation, design and architecture for automation, requirements for a test tool, and challenges in automation, Test metrics and measurements –project, progress and productivity metrics.

Text/Reference Books:

1. " Software Testing – Principles and Practices", Pearson education, 2006, Srinivasan Desikan and Gopala swamy Ramesh.
2. "Foundations of Software Testing", Pearson Education, 2008, Aditya P.Mathur.

Course Name: Machine Learning   Code: CSE 605

Supervised Learning-Feature Selection, Cross Validation, Bootstrapping, Normalization Classification: Naïve Bayes, Bayesian Network, C4.5, ID3, Support Vector Machine, Extreme Learning Machine, Neural Network, VC Dimension, Regularization, Regression: Linear, Polynomial, Multiple Linear Regression, Support Vector Regression. Committee Machines/ Ensemble Learning: Bagging, Boosting. Unsupervised Learning- Clustering: KNearest Neighbour, K-Means, Fuzzy K-Means, Hierarchical Clustering, Single Linkage, Complete Linkage, Average Linkage, Non Spherical Clustering Algorithms. Statistical Testing Methods, Probabilistic Inference, Neural Network, Deep Learning Neural Network, Evolutionary Algorithms. Machine Learning Applications: Text Classification, Disease Diagnosis, Biometric Systems, Real Valued Classification.

Text/Reference Books:

1. Pattern Recognition and Machine Learning, Bishop, C. M. (2006),Springer, ISBN 0-387-31073-8.
2. (2012) Foundations of Machine Learning, MehryarMohri, Afshin Rostamizadeh, Ameet Talwalkar , MIT Press ISBN 978-0-262-01825-8.
3. Machine Learning, Mitchell, T. (1997). McGraw Hill. ISBN 0-07-042807-7,P. Narayanan, Intellectual Property Law, Eastern Law House.

Course Name: Cyber Crime and Information Warfare   Code: CSE 606

Introduction of cyber crime, challenges of cyber crime, categorizing cyber crime, cyber terrorism, virtual crimes, perception of cyber criminals: hackers, insurgents and extremist group, interception of data, surveillance and protection, criminal copy right infringement, cyber stalking, hiding crimes in cyber space and methods of concealment. Anonymity and markets, privacy and security at risk in the global information society, privacy in cyber space, war fare concept, information as an intelligence weapon, attack and retaliation attack and defense. An I-WAR risk analysis model, implication of I –WAR for information managers, perceptual intelligence and I-WAR, handling cyber terrorism and information warfare, Jurisdiction.

Text/Reference Books:

1. Principle of cyber-crime JonathanClough
2. Information warfare: Corporate attack and defence in digital world William Hutchinson, MathewWarren

Course Name: High Performance Computing   **Code: CSE 607**

Basic computer architecture, Multi core architecture, Multi core programming, Introduction of High Performance Computing and Heterogeneous computing, Types of Heterogeneous computing. CPU-GPU based Heterogeneous computing with CUDA: From Graphics Processing to General-Purpose Parallel Computing, CUDA: General-Purpose Parallel Computing Architecture, CUDA Programming Model, CUDA Programming Interface, Hardware Implementation, CUDA Performance Guidelines, CUDA Built-in functions.FGPA based Heterogeneous computing : FPGA, FPGA Applications; introduction to Xilinx (ise 9.2), cell architecture of an FPGA, rent's rule, slice, Introduction to VHDL, entity, architecture, component, port map, VHDL module, VHDL test bench, synchronous and asynchronous circuits, Bernstein's conditions, control flow and data flow language.

Text/Reference Books:

1. CUDA : Programming Massively Parallel Processor: A hands-on Approach. Authors: David Kirk, Wen-meihwu ELSEVIER Inc.
2. The VHDL Handbook by David R. Coelho.
3. CUDA by Example: An Introduction to General Purpose GPU Programming by Jason Sanders and Edward Kandrot .
4. 100 Power Tips For FPGA Designers by Evgeni Stavinov.

Course Name: Optimization Method   **Code: CSE 608**

Unconstrained Optimization, Convex Optimization, Optimization Using Calculus Graphical Optimization, Linear Programming Quadratic Programming. Optimization Problem Formulation of machine learning algorithms like SVM and its variants, ELM and its variant etc. Study of evolutionary optimization techniques like GA, PSO, Artificial Bee Colony Algorithm, Genetic Algorithm, Ant Colony Optimization, Simulated Annealing, Neadler Mead Algorithm etc. Integer Programming Dynamic Programming 8 Error Functions and their minimization techniques.

Text/Reference Books:

1. Operations Research : An Introduction by Hamdy A Taha, Pearson
   URLs:
2. https://nptel.ac.in/courses/105/108/105108127/
3. https://nptel.ac.in/courses/112/105/112105235/
4. https://nptel.ac.in/courses/111/105/111105100/

Course Name: Information Retrieval and Extraction   Code: CSE 609

Introduction: Goals and history of IR. The impact of the web on IR. The role of artificial intelligence (AI) in IR. Basic IR Models: Boolean and vector-space retrieval models; ranked retrieval; text-similarity metrics; TF-IDF (term frequency/inverse document frequency) weighting; cosine similarity. Basic Tokenizing Indexing. Simple tokenizing, stop-word removal, and stemming; inverted indices; efficient processing with sparse vectors. Query Operations and Languages: Relevance feedback; Query expansion; Query languages. Text Representation: Word statistics; Zipf's law; Porter stemmer; morphology; index term selection. Metadata and markup languages (SGML, HTML, XML). Text Categorization and Clustering: Categorization algorithms: naive Bayes; decision trees; and nearest neighbor. Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM). Applications to information filtering; organization; and relevance feedback. Information Extraction and Integration: Extracting data from text; XML; semantic web; collecting and integrating specialized information on the web.

Text/ Reference Books:

1. Introduction to Information Retrieval. Manning, C.; Raghavan, P.; Schütze, H. Cambridge University Press (2008).

Course Name: Digital Forensic and Cyber Law   Code: CSE 610

Introduction to computer crimes, evidence, legal issues, digital forensics, Computer forensics, mobile device forensics, network forensics, and forensics data analysis. Digital Devices with rudimentary computing power. Sources of Digital Evidence. Stages of Forensic: acquisition or imaging of exhibits, extraction, preservation, analysis and reporting standards. Legal Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008. Overview of hardware operating systems: structure of storage media/devices; windows/Macintosh/ Linux -- registry, boot process, file systems, file metadata. Study of File Systems: FAT, NTFS, EXT 2/3/4, ReFS file Systems, etc. File systems parsing. Event Analysis: $MFT, registry hives, prefetch, superfetch, shortcuts, jumplists, etc. Storage drive forensics: Big data challenge of digital forensics. Acquisition and analysis of volatile and non-volatile memory. Recovery of deleted files. Digital Forensic tools: Encase, FTK, Autopsy, Sleuth kit, WinHex, Linux dd, dd_rescue, dcfldd, scalpel, foremost, and other open source tools. Database forensics: forensic study of databases and their metadata. Investigative use of database contents and system log files to build a time-line or recover relevant information; Network forensics: Collecting and analyzing network-based evidence, email activity, intrusion detection, tracking offenders, etc. Introduction to IoT Forensics. Mobile device forensics: recovery of digital evidence or data from a mobile device. Introduction to Social Network Analysis, Reverse Engineering, and Malware Analysis.

Text/ Reference Books:

1. Brain Carrier, "File System Forensics Analysis", Addison-Wesley Professional, 1st Edition, 2005.

2. Kanellis, Panagiotis, "Digital Crime and Forensic Science in Cyberspace", IGI Publishing, ISBN 1591408733.
3. Computer Forensics and Cyber Crime: An Introduction (3rd Edition) by Marjie T. Britz, 2013.
4. Digital Forensics with Open Source Tools. Cory Altheide and Harlan Carvey, ISBN: 978-1-59749-586-8, Elsevier publication, April 2011.
5. Network Forensics: Tracking Hackers Through Cyberspace, Sherri Davidoff, Jonathan Ham Prentice Hall, 2012.
6. Guide to Computer Forensics and Investigations (4th edition). By B. Nelson, A. Phillips, F. Enfinger, C. Steuart. ISBN 0-619-21706-5, Thomson, 2009.
7. Computer Forensics: Hard Disk and Operating Systems, EC Council, September 17, 2009
8. Computer Forensics Investigation Procedures and response, EC-Council Press, 2010
9. EnCase Computer Forensics., 2014.
10. NIST Computer Forensic Tool Testing Program (www.cftt.nist.gov/)
11. Computer Forensics: Investigating Data and Image Files (Ec-Council Press Series: Computer Forensics) by EC-Council (Paperback - Sep 16, 2009) .
12. Digital Evidence and Computer Crime, Third Edition: Forensic Science, Computers, and the Internet by Eoghan Casey, 2011.
13. The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and Mac Memory. Michael.

Course Name: Real Time Systems   Code: CSE 611

Introduction, Real - Time System Characteristics, Few Basic Issues, Modelling Timing Constraints, Basics of Real - Time Task Scheduling, Cyclic Scheduler, Event - Driven Scheduling, Rate Monotonic Scheduler, RMA Scheduling : Further Issues, Deadline Monotonic Scheduling and Other Issues, Resource Sharing Among Real-Time Tasks, Real-Time Task Scheduling on Multiprocessors and Distributed Systems, Clock Synchronization in Distributed Real-Time Systems, A Few Basic Issues in Real-Time Operating Systems,

Text/Reference Books:

1. A Few Basic Issues in Real-Time Operating Systems P. Narayanan, Intellectual Property Law, Eastern Law House.

Course Name: Graph theory   Code: CSE 612

Definition of a graph and directed graph, simple graph. Degree of a vertex, regular graph, bipartite graphs, sub graphs, complete graph, complement of a graph, operations of graphs, isomorphism and homomorphism between two graphs, directed graphs and relations. Walks, paths and circuits, connectedness of a graph, Disconnected graphs and their components, Konigsberg 7-bridge problem, around the world problem, Euler graphs, Hamiltonian paths and circuits, Existence theorem for Eulerian and Hamiltonian graphs.

Trees and their properties, distance and centre in a tree and in a graph, rooted and binary trees, spanning trees and forest, fundamental circuits, cut sets, connectivity and separability,1- isomorphism, 2-isomorphism, breadth first and depth first search. Incidence matrix and its sub matrices, Reduced incidence matrix, circuit matrix, fundamental circuit matrix, cut set matrix, fundamental cut set matrix, path matrix, adjacency matrix of a graph and of digraph. Planar graphs, Euler's formula, Kuratowski's graphs, detections of planarity, geometric dual, combinatorial dual. Chromatic number, independent set of vertices, maximal independent set, chromatic partitioning, dominating set, minimal dominating set, chromatic polynomial, colouring and four colour problem, coverings, matching in a graph. Network flows, Ford-Fulkerson algorithm for maximum flow, Dijkstra algorithm for shortest path between two vertices, Kruskal and Prim's algorithms for minimum spanning tree.

Text/Reference Books:

1. Graph Theory with Applications to engineering and computer science Deo Narsingh.
2. A first Look at Graph Theory Clark John and Holton D.A.,

Detailed Syllabus for B.Tech. ECE

B.Tech.- CSE (Eighth Semester)

Course Name: Data Science and Analytics   **Code: CSE 613**

Introduction to data science, exploratory data analysis, Introduction to machine learning, Linear regression and regularization, Model selection and evaluation, Classification: KNN, decision trees, Classification: SVM, Ensemble methods: random forests, Introduction to probability Models, Naive Bayes, logistic regression, Feature engineering and selection, Clustering: K-means, hierarchical clustering, Dimensionality reduction: PCA and SVD, Text mining and information retrieval, Network analysis, Recommender systems, Relational databases, SQL, Big data storage and retrieval: noSQL, GraphDB, Big data distributed computing: map reduce, spark RDD, Hive, Hbase, Pig, Advanced neural networks and deep learning.

Text/Reference Books:

1. James, G., Witten, D., Hastie, T., Tibshirani, R. An introduction to statistical learning with applications in Springer, 2013.
2. Han, J., Kamber, M., Pei, J. Data mining concepts and techniques. Morgan Kaufmann, 2011.
3. Hastie, T., Tibshirani, R., Friedman, J. The elements of statistical learning 2nd edition
4. Springer.
5. Murphy, K. Machine learning: A probabilistic perspective, MIT Press.

Course Name: Pattern Recognition   **Code: CSE 614**

Introduction to Pattern Recognition, Regular Pattern, Irregular Pattern, Approaches to Pattern Recognition, Parametric, Non-Parametric Approaches. Parzen window method for density estimation, Feature selection, Search methods, Pattern Recognition Applications., Discriminant functions, Decision surfaces, Classification algorithms: Naive Bayes, Random Tree, Random Forest, Classification using SVM. Classifier Ensembles, , Linear Regression, Types of Clustering, K-Mean Clustering, Iso-data Clustering, Clustering Metrics, Clustering applications, Fuzzy K-Mean, Clustering tendency, Semi Supervised learning. Fuzzy variants of classification and clustering algorithms, Neural networks fundamentals, Genetic Algorithms, Neural and Genetic based approaches for Pattern recognition, Self organizing maps, Advantages/Disadvantages of Neural based approaches for Pattern Recognition.

Text/Reference Books:

1. Pattern recognition and image processing Earl Gose
2. Pattern classification Duda, Hart, stork.

Course Name: Big Data Analytics   Code: CSE 615

Overview of Big Data: Introduction, history, elements, related knowledge, big Data in Businesses, and types of big data analytics. Technologies for Handling Big Data: Understanding Hadoop Ecosystem, Big Data Architecture, Hadoop& its Features, Hadoop 2.x Core Components Preview, Hadoop Storage: HDFS (Hadoop Distributed File System), Hadoop Processing: MapReduce Framework, Different Hadoop Distributions, HDFS, Map Reduce YARN, HBase, HBase architecture, Hive, Hive architecture, different modes of hive, Pig, Pig architecture, different modes of Pig, difference between hive and pig, Sqoop, Sqoop architecture, different modes of Sqoop, etc. Understanding of Apache Spark: RDD, Spark Core, Spark Architecture. HadoopVs Apache Spark, Big Data Privacy, Privacy in big data life cycle: Data Generation, Data Storage and Data Processing.

Text/ Reference Books:

1. Hadoop: The Defiantive Guide, By Tom White O'Rielly Publications 4th edition 2015.
2. High Performance Spark, By Holden Karau, Rachel Warren O'Rielly Publications 2014.
3. Getting Started with Storm, By Jonathan Leibiusky, Gabriel Eisbruch, DarioSimonassiO'Rielly Publications 2014.
4. Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph By David Loshin.
5. Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data: Analytics for Enterprise Class Hadoop and Streaming Data By Paul Zikopoulos, Chris Eaton.
6. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, By Michael Minelli, Michele Chambers, Ambiga Dhira.

Course Name: Randomized Algorithm   Code: CSE 616

Introduction to randomized algorithms. Game Theoretic Techniques. Probabilistic Method, MarkovChains and Random Walks. Randomized Data Structures: Treaps, skip lists, Hash tables. Geometric algorithms and linear programming, Graph algorithms, Approximate Counting, Online Algorithms.

Text/Reference Books:

1. Randomized Algorithm Motwani and Raghavan.

Course Name: Cloud Computing   **Code: CSE 617**

Cloud Computing: Introduction, Working of cloud computing, benefits; Understanding Cloud Computing: Developing cloud computing services, Discovering cloud services; Cloud Computing for Everyone: Centralizing email communications, Cloud computing for community; Cloud Computing for the Corporation: Managing Schedules, Managing Projects; Using Cloud Services: Collaborating on Calendars, Schedules, and Task Management, Collaborating on Project Management Outside the Cloud: Other Ways to Collaborate Online: Collaborating via Web-Based Communication Tools, Collaborating via Social Networks and Groupware. Case Study: Different cloud models- Private cloud, Public cloud. Creation of private/public cloud using different hypervisors

Text/Reference Books:

1. Cloud Computing Michael Miller,
2. Implementing and Developing Cloud Computing Applications David E.,Y. Sarna.

Course Name: Ethical Hacking   **Code: CSE 618**

Ethical hacking Overview, TCP/IP Concepts Review, network and computer Attacks, Network enumeration and Foot printing- DNS query, Whois query, OS finger printing, Banner grabbing Programming for security professionals- Web application vulnerabilities, Buffer overflow attack, Session hijacking, Code injection attacks- Cross Site Scripting attack, SQL injection attack, Password hacking, windows hacking, network hacking, anonymity and email hacking. Web servers hacking, session hijacking, Surveillance, desktop and server OS Vulnerabilities, Database attacks, hacking wireless networks, cryptography, network protection systems, Trojan and backdoor applications, legal resources, virtualization and Ethical Hacking.

Text/Reference Books:

1. Ethical Hacking and Network Defense. Michael T. Simpson, Kent Backman, James Corley.
2. Hacking Exposed—Network Security Secrets & Solutions, Stuart McClure.

Course Name: Computer Vision   Code: CSE 619

Introduction to computer vision, computer imaging system, Image formation and sensing CVIP tools, Image representation. Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization. Image Enhancement in the Spatial Domain, Image Enhancement in the Frequency Domain, Homomorphic Filtering. Image Restoration, Colour Image Processing, Segmentation, Thresholding, The Use of Motion in Segmentation, Image Compression, Error-Free Compression, Lossy Compression, Image Compression, Standards, Wavelets and Multi resolution Processing, Multi resolution Expansions, Wavelet Transforms. Chain code, Tracking and Motion model, Reflectance map, Photometric stereo.

Text/Reference Books:

1. Computer vision Dana H. Ballard James Corley.
2. Computer Vision Young, Tzay Y.

Course Name: Introduction to Robotics   Code: CSE 620

Robot kinematics: position analysis, differential motions and velocities. Trajectory planning. Actuators, sensors and simple sensor processing algorithms. Visual servoing. Robot programming and control architectures. Selected topics from mobile robotics (localization, mapping, navigation and motion planning).

Text/Reference Book:

1. Robotics modeling, planning and control by B. Siciliano, L. Sciavicco, L. Villani, G. Oriolo.

Course Name: Neural Network   Code: CSE 621

Introduction to neural networks, working of a biological and an artificial neuron, neural network architectures, types of neural networks: single and multi-layer, perceptron, linear separability, perceptron training algorithm, back propagation algorithm. Adalines, Madalines, adaptive multi-layer networks, prediction networks, radial basis functions. Supervised and unsupervised learning, winner takes all networks, Counter-propagation networks, Adaptive resonance theory, Neocognitron. Associative Memory, Hopfield networks, Bi-directional associative memory, Bolzmann's training. Various types of optimization methods like gradient descent, simulated annealing etc. Introduction to fuzzy logic, neuro-fuzzy systems, Applications of neural networks.

Text/Reference Book:

1. Elements of artificial neural networks by Kishan Mehrotra, Chilukuri K. Mohan and Sanjay Ranka.
2. Neural networks and fuzzy systems by Bart Kosko, Prentice Hall of India.
3. Fundamentals of artificial neural networks by Mohammad H. Hassoun, Prentice Hall of India.

Course Name: Web Search & Mining   Code: CSE 622

Introduction to World Wide Web, Basic Concepts of Information Retrieval, Information Retrieval Models, Boolean Model, Vector Space Model, Statistical Language Model. Text and Web Page Pre-Processing, Stopword Removal, stemming, index compression, Web Spamming, Social network Analysis and its parameters: Centrality and Prestige.

Text/Reference Books:

1. Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data, 2nd Edition, Springer July 2011, Bing Liu. http://www.cs.uic.edu/~liub/WebMiningBook.html.
2. Mining the Web: Discovering Knowledge from Hypertext Data by Soumen Chakrabarti.
3. Introduction to Information Retrieval, Cambridge University Press, 2008. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schutze.

   http://nlp.stanford.edu/IR-book/

Course Name: Biometrics   Code: CSE 623

Introduction and definitions of biometric. Traditional authenticated methods and technologies. Biometric technologies: Fingerprint, Face, Iris, Hand Geometry, Gait Recognition,Ear,Voice,Palmprint,On-LineSignatureVerification,   3D   FaceRecognition, Dental Identification and DNA. The Law and the use of Multibiometrics systems. Statistical measurement of biometric. Biometrics in Government Sector and Commercial Sector. Case Studies of biometric system., Biometric Transaction. Biometric System Vulnerabilities.

Text/ Reference Books:

1. Biometrics for network security, Paul Reid, hand book of Pearson.
2. Handbook of Fingerprint Recognition, D. Maltoni, D. Maio, A. K. Jain, and S. Prabhakar, SpringerVerlag.
3. BIOMETRICS: Personal Identification in Networked,A. K. Jain, R. Bolle, S. Pankanti (Eds.), Society, Kluwer Academic Publishers,1999.
4. Biometric Systems: Technology, Design and Performance Evaluation, J. Wayman, A.K. Jain, D. Maltoni, and D. Maio (Eds.), Springer.

Course Name: Quantum Computing   Code: CSE 624

Inroduction to Quantum Computation: Quantum bits, Bloch sphere representation of a qubit, multiple qubits. Church Turing thesis.

Circuit model of computation, Quantum physics and Computation, State of a quantum system, Hilber space, Probabilities and measurements, entanglement, density operators and correlation, basics of quantum mechanics, Quantum Circuits: single qubit gates, multiple qubit gates, design of quantum circuits. States and general quantum operations, Quantum gates, Universal sets of quantum gates.

Quantum Algorithms: Superdense coding, quantum teleportation, probabilistic versus quantum algorithms, phase kick-bac, the Deutsch algorithm, Quantum phase estimation and Quantum Fourier Transform , Shor's algorithm for order finding, Quantum search algorithm.

Quantum computational complexity and error: Computational complexity, Black-box model, Lower bounds for searching, General black-box lower bounds, Classical error correction , Fault-tolerant computation, Quantum error correction.

Text/Reference Books:

1. Quantum Computing, V. Sahni, McGraw Hill Education 2007.
2. Quantum Computing for computer scientists, Noson S. Yanofsky, Mirco A. Mannucci, Cambridge University Press 2008.
3. An Introduction to Quantum Computing Algorithms, Pittenger A. O., Birkhäuser Basel 2000.

Course Name: Principle of Management   Code: CSE 705

Module I Explain what is meant by the term management Classify the three levels of managers and identify the primary responsibility of each group. Describe the difference between managers and operative employees. Explain the skills and roles manager. Describe the value of studying management. Identify the relevance of popular humanities and social science courses to management practices.

Module II Define planning. Explain the potential benefits of planning. Distinguish between strategic and tactical plans. Define management by objectives and identify its common elements. Outline the steps in the strategic management process. Explain SWOT analysis. Describe the steps in the decision making process. Identify the assumptions of the rational decision-making model. Define certainty, risk, and uncertainty as they relate to decision making. Identify the two types of decision problems and the two types of decisions that are used to solve them. Describe the advantages and disadvantages of group decisions.

Module III Identify and define the six elements of organization structure. Contrast mechanistic and organic organizations. Summarize the effect of strategy, size, technology, and environment on organization structures. Contrast the divisional and functional structures.

Module IV Define leader and explain the difference between managers and leaders. Describe the skills that visionary leader exhibit. Explain the styles and theories of leadership. Define Motivation at work, Techniques of Motivation. Theories of motivation. Explain what is meant by the term learning organization.

Module V Define control. Describe three approaches to control. Explain why control is important. Describe the control process. Distinguish among the three types of control. Describe the qualities of an effective control system. Explain how controls can become dysfunctional.

Text/Reference Books:

1. Management: International Edition, by Hitt, Black & Porter.
2. Fundamentals of Management: International Edition by Robbins & De Cenzo.
3. Management: Concepts & Practices by Hannagan.

Course Name: Engineering Economics   Code: CSE 706

Introduction to Engineering Economy, Time value of money, Cash flow diagrams, Interest and Interest rate, Discrete compounding and payment. Interest formulae for discrete compounding and discrete payments- Gradient series factors, Nominal & Effective interest. Economic equivalence, Methods of comparison of alternatives. Replacement analysis,Economic life of the asset. Depreciation and Depletion. Elements of cost,Break even analysis,Economic order quantity. Cost estimation, Decision under risk and uncertainty. Effect of taxation on economic studies, Income tax analysis.

Text/Reference Books:

1. Engineering Economy, (DeGarmo,Sullivan & Canada), Collier Macmillan.
2. Engineering Economy, (Thuesen & Fabrycky),Pearson.
3. Engineering Economics, (Panneerselvam),PHI.
4. Engineering Economic Analysis, (Newnan,Eschenbach & Lavelle), Oxford University Press.
5. Engineering Economy,(Blank & Tarquin), McGraw-Hill.

Course Name: Organizational Behavior   Code: CSE 707

Module I: Introduction what is organizational behavior? OB as an interdisciplinary subject.
Module II: The Individual Diversity in the organizations, attitudes and job satisfaction, emotions and moods, personality and values, perception and individual decision making, motivation concepts, motivation: from concepts to applications .
Module III: The Group Foundations of group behaviour, understanding work teams, communication, leadership, power and politics, conflict and negotiations, foundations of organization structure.
Module IV: The Organization system Organizational culture, human resource policies and practices, organizational change and stress management.

Text/ Reference Books:

1. Robbins, S. P., Judge, T. A. & Vohra, N., Organizational Behaviour, 18th ed., Pearson Education.
2. Rao, V. S. P., OrganisationalBehaviour, Excel books.
3. Singh, K., Organizational behaviour: Text and cases, 3rd ed., Vikas Publishing house
   4. Khanka, S. S., Organisational Behaviour: Text and cases, S. Chand Publication.

Course Name: Project Management   Code: CSE 708

Project management theory, terms and concepts are introduced in this course. Students will discover the project life cycle and learn how to build a successful project from pre-implementation to completion. The course, by focusing on various stages of planning, designing and managing projects, would prepare the students to adapt themselves to the constantly emerging demands of the industry. A major strength of the course lies in the takeaways including appropriate skills, knowledge, tools and techniques that later help candidates in mastering the projects with a clear focus on time, budget, and quality.

Module.1 Course Introduction and Project Life Cycle Overview
Module.2 Project Goals and Scope
Module.3 Getting to Know Stakeholders and Resources
Module.4 Resource Leveling and Allocation in Projects
Module.5 Project Management Tools, Network Techniques and Timelines
Module.6 Crashing of Projects: Time vs. Cost Trade-Off
Module.7 Assessing and Managing Costs and Gains
Module.8 Earned Value Method
Module.9 Probabilistic Aspects of Projects
Module.10 Project Risk Management
Module.11 Critical Chain Project Management

Text/Reference Books:

1. Chandra, P. (2009) 7th edition. Projects Planning, Analysis, Selection, Financing, Implementation and Review. New Delhi: Tata McGraw-Hill.
2. Gray F.Clifford, L. W. (2011) 5th edition. Project Management Th e Managerial Process. McGraw Hill.
3. Desai, V.(2013), Project Management.