B.TECH. 4 YEAR PROGRAMME

COMPUTER SCIENCE & ENGINEERING

SCHEME
(3rd & 4th Semester)

Third Semester (B.Tech. - CSE)

Course No.	Subject	Scheme of Studies Periods per Week			Credits
		L	T	P	
MTH 211	Mathematics III	3	1	-	4
CSE-212	Discrete Structure	3	1	-	4
CSE-213	Digital Logic and Design	2	1	2	4
CSE-214	Object Oriented Programming	2	1	2	4
CSE-215	Design and Analysis of Algorithms	2	1	2	4
CSE-216	CS Workshop 1 (Java and Python)	1	-	2	2
Total L=13, T=5, P =8				Total Credit	22

Fourth Semester (B.Tech. - CSE)

Course No.	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
CSE-221	Analog and Digital Communication	3	1	-	4
CSE-222	Computer organization and Architecture	2	1	2	4
CSE-223	Software Engineering	2	1	2	4
CSE-224	Database Management Systems	2	1	2	4
CSE-225	Formal Language and Automata Theory	3	1	-	4
CSE-226	CS Workshop 2 (Web Technologies)	1	-	2	2
CSE-227	Community Services	-	-	-	-
Total L=13, T=5, P =8				Total Credit	22

Community Services*: 15 days (100 Hrs) community services such as Swach bharat Abhiyan.

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SYLLABUS III - 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, simplification of Boolean expressions, minimization techniques, Karnaugh map, Quine Mc–clusky method, combinational circuits design, Flip flops, sequential circuits design, Registers, Introduction of Logic families

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 viceversa
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: Object Oriented Programming **Code: CSE 214**

Objects, objects as software modules, objects interaction, classes, method lookup, hierarchies of classes, inheritance, polymorphism, abstract classes. Identifying objects and classes, representation of objects, association with objects, aggregate components of objects. Object oriented programming languages class declarations object declaration, mandatory profiles message sending association recursive association, many to many association .argument passing.

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, files and stream.

Text/ Reference Books:

1. Object Oriented Programming in C++ by Robert Lafore
2. How to program C++ by Details and Details.
3. Object oriented design with C++ by Ken Barclay

Couse 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, removal of recursion, heap and heap sort, disjoint set structure. Divide and conquer technique, analysis and design of algorithms base on this technique for binary search, merge sort, quick sort, selection problem, matrix multiplication.

Study of greedy strategy, solutions based on greedy strategy for knapsack problem, minimum spanning trees, scheduling problem, shortest paths optimal merge patterns. Concept of dynamic programming and problems based on this approach such as 011 knapsack problem, multi-stage graphs, shortest paths, 7raveling sales person problem, reliability design problem. 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

Couse Name: CS Workshop-I **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

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SYLLABUS IV – SEMESTER

Course Name: Analog & Digital Communications **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 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, Feasilibility 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 Systems **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: CS Workshop-II **Code: CSE 226**

Introduction to PHP, Handling Html Form With Php, Decisions and loop, Function, String Array, Working with file and Directories, State management, String matching with regular expression, Generating Images with PHP, Database Connectivity with MySql, HTML, CSS, Java Script, JQuery, AJAX.

Introduction to OOPS, Exception Handling, Introduction to CakePHP, Models: Creating up model for a database table, Controller: Creating controller, Views: Creating Views, Cake session, WordPress Introduction, Basics of the WordPress User Interface, Finding and Using WordPress Plugins, Working with WordPress Themes, WordPress Content Management, Creating and Managing Content, Framework, CMS.

Text/ Reference Books:

1. PHP: The Complete Reference by Steven Holzne
2. PHP and MySQL Web Development by Luke Welling and Laura Thomson