Guru Nanak Dev Engineering College, Ludhiana
Department of Computer Science & Engineering
Syllabus of 1st Mid-Semester Tests

B.Tech. (CSE)

B.Tech: 3rd Sem

Object Oriented Programming (PCCS-101)
Object-Oriented Programming Concepts: Introduction, Comparison between procedural programming paradigm and object-oriented programming paradigm, Features of object-oriented programming: Encapsulation, Class, Object, Abstraction, Data hiding, polymorphism, and Inheritance. Introduction of object oriented design. Data Types, Operators, and Control Structures: Basic data types, Derived data types, Keywords, Identifiers, Constants and variables, Type casting, Operators, and Operator precedence. Control Structures: if statement, switch-case, for, while and do-while loops, break and continue statement. Classes and Objects: Implementation of a class, Creating class objects, Operations on objects, Relationship among objects, Accessing class members, Access specifiers, Constructor and destructor, Types of constructor, Static members, Empty classes, Nested classes, Local classes, Abstract classes, Container classes. Functions, Arrays, and String Handling: Function components, Default arguments, Passing parameters, Function prototyping, Call by value, Call by reference, Return by reference, Inline functions, Friend functions, Static functions, Recursion, Array declaration, Types of arrays, Array of objects, String handling.
Computer Networks (PCCS-102)
Data Communication Components: Representation of data and data flow, Various Network Topologies, Protocols and Standards, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing- Frequency division, Time division and Wave division, Concepts on spread spectrum, OSI model, TCP/IP reference model and their comparison. Physical Layer: Concept of analog and digital systems, Transmission Media, Transmission impairments and Data rate limits- Nyquist formula, Shannon formula, Switching- Circuit, Message and Packet switching. Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction, Fundamentals, Block coding, Hamming Distance, CRC.
Digital Electronics (ESCS-101)
Number Systems: Binary, Octal, Decimal, Hexadecimal. Number base conversions, 1's, 2's, rth's complements, signed Binary numbers. Binary Arithmetic, Binary codes: Weighted

BCD, Gray code, Excess 3 code, ASCII–conversion from one code to another.

Boolean Algebra: Boolean postulates and laws–De-Morgan's Theorem, Principle of Duality, Boolean expression–Boolean function, Minimization of Boolean expressions–Sum of Products (SOP), Product of Sums (POS), Minterm, Maxterm, Canonical forms, Conversion between canonical forms, Karnaugh map Minimization.

Logic GATES: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR. Implementations of Logic Functions using gates, NAND-NOR implementations.

Combinational Circuits: Design procedure–Adders.

Human Values & Professional Ethics (HSMCS-101)

Ethics and values: Importance of Ethics and values, Difference between moral, ethics and values, Nature of Values, The Structure of Value Relations , Integrity, Work ethics, Service learning, Virtues, Respect for others, Living peacefully, caring , Sharing , Honesty, Courage, Valuing time, Cooperation, Commitment, Empathy, Self confidence, Challenges in the work place, spirituality.

Value education: Need for value education, Basic guidelines, Self Exploration, Values in family and Harmony in existence, Values across cultures.

Personality and behavior development: God and scientific attitude, positive thinking, Integrity and discipline, punctuality, Aware of self destructive habits, Association and cooperation, Doing best, motivation Theories and Case study, Johari Window, Leadership Styles and Theories, Win-Win policy, SWOT Analysis

Mathematics-III(BSCS-101)

Linear Systems: Gauss's elimination method and Gauss's Jordan method.

Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines and second degree parabolas.

Differential calculus of complex variables: Separation of elementary functions of complex variables, Cauchy-Riemann equations, analytic functions, elementary analytic functions (exponential, trigonometric, logarithm) and their properties, harmonic functions, finding harmonic conjugate.

Guru Nanak Dev Engineering College, Ludhiana
Department of Computer Science & Engineering
Syllabus of 1st Mid-Semester Tests

B.Tech: 5th Sem

Relational Database Management System (CS-14501)
Introduction to Database System: Database systems versus file systems, Characteristics of the Database approach, Database users and administrators, Advantages and disadvantages of using DBMS approach, Data models, Data independence, Database languages, Classification of DBMS, Client-Server architecture. Entity Relationship Model:Entity types, Entity sets, Attributes and keys, Relationship types, Relationship sets, Roles and structural constraints, Weak entity types, Design choices for ER conceptual design, UML class diagrams. Relational Model: Relational model concepts, Constraints, Update operations, Transaction and dealing with constraint violations. Relational Algebra –Unary relational operations, Operations from Set theory, Binary relational operations, DIVISION operation and additional relational operations.
Computer Graphics (CS-14502)
Introduction: Overview of computer graphics, Computer graphics applications, Different I/O devices with specialized graphics features, Display technologies- Storage tube graphic displays, Raster scan systems, Random scan systems, LCD and LED displays, Cathode ray tube, Color CRT, Video basics – Video controller, Random-scan display processor. 2D Primitives: Scan conversion basics, Algorithm for scan converting a point, Scan converting a line – Digital differential analyser algorithm, Bresenham's line algorithm, Scan converting circle – Bresenham's circle drawing algorithm, Midpoint circle drawing algorithm, Scan converting ellipse. 2D Viewing: Window to viewport transformations, 2D transformations– Scaling, Translation, Rotation, Reflection, Shear, Matrix representations and homogeneous coordinates, Composite transformations.
Design and Analysis of Algorithms(CS-14503)
Introduction: Algorithm and its importance, Mathematical foundations- Growth functions, Complexity analysis of algorithms. Divide and Conquer: Basic technique and its application on Binary Search, Finding Maximum and Minimum and on sorting techniques such as Merge Sort, Quick Sort. Greedy Algorithms: General method, Using greedy algorithm to solve Knapsack problem, Minimum-Cost spanning trees problem, Single source shortest path problem and Travelling salesperson problem.

Guru Nanak Dev Engineering College, Ludhiana
Department of Computer Science & Engineering
Syllabus of 1st Mid-Semester Tests

Dynamic Programming: Introduction to dynamic programming and application of the algorithm to solve multistage graphs.

Web Technologies (CS-14504)

Introduction to Internet and Web: History and evolution of Internet Protocols, Internet Addressing, Internet service provider (ISP), Introduction to WWW, DNS, URLS, HTTP, HTTPS, SSL, Web browsers, Cookies, Web servers, Proxy servers, Web applications.

HTML and DHTML: Introduction to HTML and DHTML, Basic structure of an HTML document, Working with - Text, Lists, Tables, Frames, Hyperlinks, Images and multimedia, Forms and controls, Audio and video, Creating Style Sheet, Style definitions, CSS font properties, Text formatting, Types of CSS - Inline, Internal and External CSS style sheets.

Java Script: Introduction, JavaScript's history and versions, Basic Syntax, variables, Data types, Statements, Operators, Functions.

Cryptography and Network Security (CS-14506)

Introduction to Network Security: Essentials of network security, Architecture, Security - Attacks and various types of attacks, Services and mechanism, Crypt analysis, Steganography, Applications of network security.

Classical Encryption Techniques: Symmetric cipher model, Substitution techniques, Transposition techniques, Block cipher- DES, Triple DES, AES. Stream ciphers – RC4.

Public Key Cryptography and RSA: Principles of public key cryptosystems, RSA algorithm, Key management, Diffie Hellman key exchange.

Wireless Networks (CS-14507)

Introduction: History and evolution, Types of wireless networks, IEEE Standards for wireless, benefits, Applications, Problems and challenges.

Wireless Principles: Electromagnetic spectrum, Attenuation and multipath fading, Antenna and propagation models, Signal encoding, Spread spectrum, Coding and multiple access techniques.

Cellular Concept and Networks: Design and principles of cellular operation, Cellular telephony operations, Frequency re-use, Channel assignment, Hand-off, Interference, Improving quality. Networks example–1G (AMPS, NMT), 2G (D-AMPS, GSM, CT),3G, 4G and 5G networks. Introduction to cellular technology and its protocols and applications–GSM, Adhoc and Sensor Networks.

Guru Nanak Dev Engineering College, Ludhiana
Department of Computer Science & Engineering
Syllabus of 1st Mid-Semester Tests

B.Tech: 7th Sem

Advanced Computer Networks (CS-14701)
Internetworking: Half and full duplex ethernet, Ethernet at the data link layer, Ethernet at the physical link layer, Ethernet cabling–Straight-through, Crossover and rolled Cable, Data encapsulation, Three-layer hierarchical network model. TCP Protocols: Internet layer protocols–IP,ICMP, ARP, RARP; Host to host layer protocols: TCP, UDP; Application layer protocols–Telnet, FTP, TFTP, NFS, SMTP, LPD, X Window, SNMP, DNS, and DHCP.
Compiler Design (CS-14702)
Introduction to Compiler: Compilers, Analysis of the source program, Cousins of the compiler, Analysis – Synthesis model of compilation, Phases of compilation, Grouping of phases, Phases of translation. Lexical Analysis: Role of lexical analyser – Issues in lexical analysis, Tokens, Patterns, Lexemes. Input buffering – Buffer pairs, Sentinels. Specification of tokens, Token recognition, Transition diagrams, Introduction to lexical analysis tool – LEX. Syntax Analysis: Role of the parser, Top down parsing –Backtracking, LL(1), Recursive descent parsing, Predictive parsing, Bottom-up parsing –LR parsers.
Cyber Laws & Intellectual Property Rights (CS-14703)
Cyber World and Security: Introduction to Cyberspace and Cyber law, Different components of cyber laws, Cyber law and Netizens. Attacks and Malware – The Zero-Day Attack and Mutation in delivery, Crimeware Toolkits and Trojans, Sophisticated Malware. Defensive measures for Cybersecurity – The Firewall, The Intrusion Detection System (IDS) and The Intrusion Prevention System (IPS), Virtual Private Networks (VPN) and Access control, integrated defense for an enterprise network. E-commerce: Introduction to e-commerce, Different e-commerce models, E-commerce trends and prospects, E-commerce and taxation, Legal aspects of e-commerce.
Cloud Computing(DECS-14706)
Cloud Computing Fundamentals: Evolution of cloud computing, Overview of computing paradigms – Distributed computing, Cluster computing, Grid computing, Utility computing, Autonomic computing, and Cloud computing. NIST model of cloud computing, Benefits and challenges of cloud computing, Big Data, Internet of things (IOT). Cloud Concepts and Technologies: Virtualization – Definition, Characteristics and benefits of virtualization, Virtualization and cloud computing, Types of virtualization, Load balancing. Hypervisors, Multitenancy, Scalability and elasticity, Billing and metering of services, Application programming interfaces (APIs), and Service level agreement (SLA).

Guru Nanak Dev Engineering College, Ludhiana
Department of Computer Science & Engineering
Syllabus of 1st Mid-Semester Tests

Cloud Architecture and Services: Cloud computing reference model architecture, Common cloud management platform, Cloud service models – Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

Big Data Analytics (DECS-14707)

Introduction to Big Data:Big data overview, V's of big data, Data structures, State of the practice in analytics, Current analytical architecture, Drivers of big data, Big data ecosystem and a New Approach to Analytics, Key roles for the new big data ecosystem, Data at rest v/s data at motion, Examples of big data analytics tools.

Apache Hadoop: Understanding distributed system and Hadoop, Comparing SQL databases and Hadoop, MapReduce building blocks of Hadoop –Namenode, Datanode, Secondary namenode, Job-Tracker, Task-Tracker, Introducing and configuring Hadoop cluster – Local, Pseudodistributed mode, Fully distributed mode, Handling web-based Cluster, and Configuring XML files.

Working with Hadoop: Interacting with HDFS, Steps to read and write into HDFS. Anatomy of MapReduce Program

Natural Language Processing (DECS-14709)

Introduction: Introduction to natural language and speech processing, Steps for processing natural languages, Issues and challenges for processing of natural languages, Elements of information theory, Brief history of natural language processing.

Morphological Analysis: Inflectional and Derivational morphology, Morphological parsing, Lexicon and Morphotactics, Finite state transducers, N-gram language models, N-gram smoothing, Entropy.

Soft Computing (DECS-14713)

Introduction: Introduction to soft computing– Definition and importance, Evolution of soft computing, Usefulness and applications.

Neural Networks: Model of an artificial neuron, Comparison of artificial neural network and Biological neural network. Neural network architectures. Learning methods–Hebbian, competitive, Boltzmann. Neural network models– Perceptron, Adaline and medaline networks, Single layer, Back propagation, Radial basis function network and multi-layer networks.

Fuzzy Logic: Crisp and fuzzy sets, Fuzzy sets– Membership functions.

Guru Nanak Dev Engineering College, Ludhiana
Department of Computer Science & Engineering
Syllabus of 1st Mid-Semester Tests

M.Tech: 1st sem

Mathematical Foundations of Computer Science (MCS-101)
Unit 1 Probability mass, density, and cumulative distribution functions, Parametric families of distributions (Binomial and Multinomial, Poisson and Normal distribution), Expected value, variance, conditional expectation, Markov and Chebyshev Inequalities ,Central Limit Theorem, Markov chains. Unit 5 Computer science and engineering applications: Data mining, Network protocols: Resource Allocation and Congestion Control, analysis of Web traffic, Bioinformatics, Machine learning.
Constitution Of India (MAC-105)
History of Making of the Indian Constitution: History , Drafting Committee, (Composition & Working). Philosophy of the Indian Constitution: Preamble ,Salient Feature. Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.
Research Methodology & Intellectual Property Rights (MRM-101)
Unit 1: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations Unit 2: Effective literature studies approaches, analysis Plagiarism, Research ethics Unit 3: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal
Advanced Data Structures (MCS-102)
Unit 1 Hashing and Skip Lists Hashing :- Introduction, Static Hashing – Hash table, Hash Function ,overflow Handling, Dynamic Hashing Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update

Guru Nanak Dev Engineering College, Ludhiana
Department of Computer Science & Engineering
Syllabus of 1st Mid-Semester Tests

Operations on Skip Lists, Probabilistic Analysis of Skip Lists
Unit 2
Trees: Binary Search Trees, AVL Trees, Red Black Trees, B- Trees, B^+-Trees, Splay Trees, Digital Search Trees.

Machine Learning (MCS-111)

Introduction: Well defined learning problems, Defining a learning System, Perspectives and issues in machine learning

Supervised learning, Linear regression, Logistic regression, Naïve Bayes algorithm, Decision trees, Issues in decision trees learning, K-Nearest Neighbor algorithm, Support Vector Machines.

Data Warehouse & Data Mining (MCS-121)

Introduction to Data Warehousing and Data Mining:
Data Warehouse Defined, Features of a Data Warehouse, Data Granularity, The Information Flow Mechanism, Metadata, Two Classes of Data, The Lifecycle of Data, Data Flow from Warehouse to Operational Systems, Failures of Past Decision-Support Systems, Operational Versus Decision-Support Systems, Data Warehouse v/s Data Mining, Data Mining Process, Data Mining Functionalities, Data Pre-processing – Descriptive Data Summarization, Data Cleaning, Integration and Transformation, Reduction
The Building Blocks of a Data Warehouse and Data Warehouse Schema:
Data Warehouse Architecture Goals, Data Warehouse Architecture, Data Warehouse and Data Mart, Issues in Building Data Marts, Building Data Marts, Other Data Mart Issues, Overview of the Components, Data Warehouse Schema: The Star Schema, The Snowflake Schema, Aggregate Tables, Fact Constellation Schema or Families of Star, Keys in the Data Warehouse Schema
Data Warehouse Modeling and Online Analytical Processing:
Building the Fact Tables and Dimension Tables, Characteristics of a Dimension Table, Characteristics of a Fact Table, The Factless Fact Table, Updates To Dimension Tables, Cyclicity of Data - Wrinkle of Time, Dimensional Modeling, Strengths of Dimensional Modeling, Data Warehouse and the Data Model, Enhancing the Data Warehouse Performance.

Guru Nanak Dev Engineering College, Ludhiana
Department of Computer Science & Engineering
Syllabus of 1st Mid-Semester Tests

M.Tech: 3rd Sem

Network Security (MTCS-601)
Introduction: Overview of computer networks (OSI reference model, TCP/IP protocol suite), MAC protocols for high speed LANs, MANs and Wireless LANs (FDDI,DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet), Fast access technologies. Basics of Network Security: Introduction to security in networks, Characteristics of networks intrusion, Kinds of security breaches, Plan of attack, Points of vulnerability, Methods of defence, Control measures, Effectiveness of controls