Department of CSE and IT
Jaypee University of Information Technology, Waknaghat

OUTLINE SYLLABUS

This document contains the outline syllabus for following courses offered in the Department of CSE and IT:

- B.Tech. Courses(Theory- Core Course)
- B.Tech. Courses(Theory- Elective Courses)
- B.Tech. Courses(Labs- Core Courses)
- M.Tech. Courses(Theory- Core Courses)
- M.Tech. Courses(Theory- Elective Courses)
- M.Tech. Courses(Labs- Core/Elective Courses)

B.Tech. Courses(Theory- Core Course)

1. Introduction to Computer and Programming (10B11CI111)
I Sem (All Branches) Credits-4(3-1)

Basic Computer Architecture. Programming Language hierarchy. Program translation and execution. Algorithms, Pseudo codes and flowcharts. Program design and Basic SDLC. Program as State machine. Basic Testing and Debugging. Number system. Character & Instruction Representation. Structured Programming. Selection. Control Flow. Looping control structure. Arrays and Strings. Pointers. Functions. Structures and Unions. Enumerations. Preprocessor. Iteration. Recursion. Dynamic Memory Allocation. Linked-lists. File I/O. Basic Graphics. C Libraries. User defined header files.

2. Introduction to Computers and Basic Programming(13B21CI121)
I Sem (BT) Credits-4(3-1)
Introduction to Computers, the Internet and the World Wide Web, Bits, Data Types and Operations, The von Neumann Model, Introduction to C programming, C Program Control, C Functions, C Arrays, C Pointers, C Characters and Strings, C Formatted Input/Output, C Structures, Unions, Bit Manipulations and Enumerations, C File Processing

3. Data Structure (10B11CI211)
II Sem (CSE/IT/ICT/ECE/BI) Credits-4(3-1)

Interactive Software. Problem analysis and Data design. Introduction to Complexity Analysis. Searching and Sorting Algorithms. Algorithm Visualization. Data Representation and Data Types. Abstract Data Types. Array based, Linked, Indexed, and Simulated pointer based storage. Orthogonal Lists. Sparse matrices. List of list. Doubly linked lists.

Stack. Recursion removal. Queue. Dequeue. Buffer. Discrete event simulation. Tree. Binary Tree. K-ary Tree. BST. Tree traversal. Quad Tree, Octree. Graphs and graph traversal.

4. Basic Data Structure(14B21CI211)
II Sem (BT) Credits-4(3-1)
Introduction to Data Structures, Abstract Data Type (ADT), Arrays and Strings, Structures, Recursion, Pointers, Dynamic memory allocation, Algorithm Design, Scalability, Introduction to Complexity Analysis , Big O Notation, Relationship between time complexity and hardware performance, Linked Lists:- ADT type, Linear List , Linear Linked list, doubly linked list, circular linked list, header, Linked list, various implementations and applications of Linked Lists, Stack: ADT type, specifications, array based and linked list based, recursion and its removal with stack . Queues:- ADT type, array based and linked list based,, queue as buffer, searching, Circular queues, Deque, Managing multiple queues, , various implementations and applications of Queues, Binary Trees:- Introduction to non-linear data structures, ADT type, array based and linked list based, binary tree, binary search tree, AVL tree, tree traversal, Sorting Algorithms: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, Searching:- Linear and Binary Search Hashing:- Hash table, Graphs: - ADT type, array based and linked list based, graph traversal algorithms i.e. Breadth First & Depth First, various implementations and applications of graphs.

5. Object Oriented Programming (10B11CI311)
III Sem (CSE/IT), II Sem (ICT) Credits-4(3-1)

Interactive Software. O-O paradigm. Objects, Classes, Methods, Constructors and Destructors. Complex classes. Object-oriented Analysis. File Handling. Friend Functions and Static member functions. Inheritance. Multiple Inheritance. Polymorphism and Virtual Functions. RTTI and Casting types in C++. Function and Operator overloading in C++. Namespace and Templates in C++. STL and Container classes. AWT, Swing and Applet. Concept of Packages and Class path. Interfaces in JAVA. Exception Handling in C++ and JAVA. Basic object oriented testing.

6. Database Systems (10B11CI312)
 III Sem (CSE/IT/ICT) Credits-4(3-1)

Database driven Interactive software. Database Environment. Relational Model. Relational Algebra, SQL. PL/SQL. ER & EER Modeling. Normalization. Database Connectivity. Transactions. Concurrency. Recovery & Security. Query Processing & Optimization.

7. Database Management Systems (13B22CI321)
 III Sem (ICT) Credits-4(3-1)

Overview of Database management systems, Introduction to database design, The Relational Model, Relational Algebra and Calculus, SQL: Queries, Constraints, Triggers, Normalization, Database Application Development, Internet Database Environment, Object oriented Data management, Database Administration, Database design and tuning, Storage and Indexing, Transaction Management

8. Microprocessor and Controllers (10B11CI401)
IV Sem(CSE/ICT), V Sem (ECE) Credits-4(3-1)

Introduction to 8086 based Microprocessor and Microcontrollers. Architecture. Addressing modes. Structure of machine instruction, Instruction set, Hardware specification. Programming the microprocessors and microcontroller. Memory interface. I/O interfacing. 8255 PPI, 8254 counter timer, 8259 Interrupt controller. 8237 Direct memory access and DMA controlled I/O. 16550 USART Serial data communications. Introduction to Embedded systems. 8051 microcontroller interfacing.

9. Computer Organisation (10B22CI421)
IV Sem (IT) Credits-4(3-1)

Introduction to Structured computer organization. Review of digital components. Register transfer and microoperations. Instruction codes, computer instructions, timing & control, instruction cycle, Classification of instruction set. Instruction format. Addressing modes. AsSembly Language Programming. Microprogrammed Control. Program control, CISC and RISC. Computer Arithmetic. I/O organization and Memory organization. Pipelining and Multiprocessors. Performance Analysis.

10. Fundamental of Algorithms (10B11CI411)
IV Sem (CSE/IT) VI Sem (ICT) Credits-4(3-1)

Review of Data Structure. Analyzing algorithm, designing algorithm. Growth of functions. Recurrences, divide and conquer algorithms, substitution method for solving recurrences, dynamic programming, greedy algorithm, backtracking. Decision tree, game tree. Index trees – IBST, TBST, AVL, and B Trees. Heaps. Graph algorithms - minimum spanning tree, shortest path, Hamiltonian cycle. String matching. Basic computational geometry.

11. Compilers and Assemblers
IV Sem (ICT) Credits-4(3-1)

Overview of Assemblers and Compilers, Lexical and Syntax analysis, Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing, handling ambiguous grammar, Semantic analysis and Symbol Tables, Code Generation & optimization

12. Operating Systems (10B11CI511)
V Sem(CSE/IT/ICT) Credits-4(3-1)

Introduction. Operating system structure (Monolithic systems, Layered systems, Virtual machines. Client-Server model). Process Management (IPC, RPC, Classical IPC problems). Process scheduling. Processor Allocation (Allocation Model, Design issues for processor allocation algorithms). Threads. Deadlock. Security. Memory Management. File System management. Input output management. Disk scheduling. Network OS. Distributed Operating Systems. Case Study of UNIX.

13. Software Engineering (10B11CI512)
V Sem(CSE/IT) Credits-4(3-1)

Interactive Systems. Usability. Software process models. PSP, TSP. Requirement Engineering, SRS. Formal system development techniques. Analysis and Modeling. Software Architecture and Design. UML. Software Estimation. Software Metrics. COCOMO model. Putnam Model .Coding standard and practices. Software Testing. Software Maintenance. CASE Tools.

14. Software Engineering Practices (13B22CI521)
V Sem(ICT) Credits-4(3-1)

Review of Software Engineering, Software Product, Process Improvement Framework, Software Process Models, Software Engineering Practice, Requirements Engineering, Design Engineering, Software Architecture, Component based Software, Engineering,User Interface Design, Software Construction,Case Study, Software Verification, Validation & Testing,Service Oriented Software Engineering, Software Metrics and Software, Reliability, Software Cost Estimation, Software Project Management,Web Engineering, Agile software Methodologies, Aspect Oriented Software,Development, Case Study

15. Theory of computation (10B11CI513)
V Sem(CSE) Credits-4(3-1)

Mathematical foundations for TOC, Finite Automata. Finite Automata with output. Regular languages. Pumping Lemma. Context free languages. Push down Automata. Turing Machines.Universal Turing Machines and LBAs .Halting Problem. Reducibility. Polynomial Time Algorithms and Non Deterministic Polynomial Time Algorithms.

16. Web Application Engineering (10B22CI521)
V Sem(IT), VI Sem(ICT) Credits-4(3-1)

Web enabled interactive software. Database driven websites. Online Games. Basic Web Architecture. Web Server. Application server. Markup Languages - SGML, HTML, XML and XHTML, DHTML. Cascading Style Sheets. Web Development Life Cycle. Java Script.

PHP. JDBC. Java Applets. Multi Threading. AWT. Layout Managers. Graphics in PHP, Java, and XML. XML DTD, Schema Definition Language. XSLT, XQUERY, and XPATH. DOM and SAX parsers.

17. Software Testing And Debugging(10B1WCI515)
V Sem(CSE/ IT) Credits-4(3-1)

Economics of Program Testing, Test Management & Software Development, Software Quality Assurance, ETVX Model, Testing Maturity Model, and Testing Life Cycle, Testing V-Model, Test Planning & Control, Test Completion Criteria, and Designing Test case templates, Static Software Testing & Techniques, Test Case Design, Black Box Testing, Equivalence Class Testing, Boundary Value Analysis, Decision Table Based Testing, Cause Effect Graphic Technique, Experience based techniques, State based or graph based testing, White Box testing, Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing, Fault Injection, Module Testing:, Higher Order testing, Object Oriented Testing, Web /GUI/Internet testing, Program Instrumentation, Debugging Techniques, Taxonomy of Bugs, Bug Life Cycle.

18. Fundamental of Algorithms for BI (10B11CI412)
V Sem (BI) Credits-4(3-1)

Review of Data Structure. Analyzing algorithm, designing algorithm. Growth of functions. Recurrences, divide and conquer algorithms, substitution method for solving recurrences, dynamic programming, greedy algorithm, backtracking. Decision tree, game tree. Index trees – IBST, TBST, AVL, and B Trees. Heaps. Graph algorithms - minimum spanning tree, shortest path, Hamiltonian cycle. String and sequence matching. Basic computational geometry.

19. Computer Networks (10B11CI611)
VI Sem(CSE/IT) Credits-4(3-1)

Network classification. Computer network examples. Layering concept of network. OSI network model and functions of layers. Data Link, Network, transport, session, presentation & application layers. Internet Protocols. TCP/IP suite. Local area networks. Other protocols. Basic performance issues. Network Standards.

20. Information Systems (10B22CI621)
VI Sem(IT) Credits-4(3-1)

Information System Theory & Modeling. Information system volatility & resources. Domain specific Information systems. Domain Analysis. Human Computer Interface. Decision Theory. Decision Support Systems. Information System effectiveness matrix. E-Governance. Governance enterprise architecture. Supply chain. Transaction Processing Systems. Functional Area Applications. Enterprise Resource Processing. E-Commerce. CRM. Basic GIS.

21. Data Mining (10B22CI622)
VI Sem(IT/ICT) Credits-4(3-1)

Introduction. Data Warehouse Software Engineering: Requirement Analysis, Data modeling, Design, Project Management, Building, and Testing. Hypothesis testing. Online analytical Process models. Query Access Architectures. Extraction Transformation Loading. OLAP. Data warehouse security. Metadata. Data mining Models. Statistical Data mining. Classification Techniques. Clustering Techniques. Association Rules.

22. Compiler Design (10B11CI612)
VI Sem(CSE) Credits-4(3-1)

Introduction. Lexical Analysis. Syntax Analysis. Top down and Bottom-up Parsers. Semantic Analysis. Symbol Table Management. Storage Management. Error Handling. Code Optimization. Code Generation.

23. Computer Organisation and Architecture (10B11CI613)
VI Sem(CSE),   III Sem(ICT) Credits-4(3-1)

System level design, Register level design, Processor level design. Advanced data representation. Instruction set architecture level. Data-path Design. Hardwired control unit, micro-programmed control unit, pipeline control unit. Structured Memory Design. Bus System. System control. I/O Control. Performance analysis. Processor array. Multi-computer and Multi-processor.

24. Object Oriented Systems and Programming (10B11CI614)
VI Sem (ECE) Credits-4(3-1)

Interactive database driven software. Database Environment. Relational Model. SQL. PL/SQL. ER & EER Modeling. Normalization. Database Connectivity. Transactions Processing. 3-tier Architecture. O-O paradigm. Objects, Classes, Methods, Constructors and Destructors. File Handling. Friend Functions and Static members functions. Inheritance. Polymorphism and Virtual Functions. Interfaces in JAVA. Exception Handling in C++ and JAVA. Basic principals of Software engineering. System analysis, design, testing and debugging.

25. Computer Graphics (11B1WC1611)
VI Sem(CSE), V Sem(ICT) Credits-4(3-1)

Computer representation of image, Graphics programming , User – computer interface, Components of Graphics Systems, Output primitives, Area filling, Windowing and clipping, 3D object representation, 3D Transformation & viewing, Hidden surface and Hidden line, Illumination models and shading

26. Computer and Communication Networks (13B11C1615)
VI Sem(ICT) Credits-4(3-1)

Network architectures, protocol layers, service models, Application layer protocols such as HTTP, FTP, and SMTP,o Peer-to-Peer File Sharing Protocols and Architectures,ISPs and Domain name systems, Socket API and network socket programming,Understanding reliable and unreliable transport-layer protocols, GBN and SR. TCP and UDP. Port numbers, Multiplexing and demultiplexing, Flow control and congestion control, Fairness, Delay, jitter, and loss in packet-switched networks, Bandwidth, throughput, and quality-of-service, Network layer services and protocols,Switching fabric, Routing and forwarding, Queues and buffering, Virtual-circuit and datagram networks, Internet protocol, IPv4 and IPv6, Tunneling, LS and DV algorithms,Routing in the Internet, RIP, OSPF, and BGP, Broadcast and multicast, Handling mobility, Understanding network layer services and protocols, Link-layer and its services,Ethernet, hubs, bridges, and switches, Link-layer addressing, Error-detection and error-correction, Parity, check-summing, CRC, Manchester encoding. ATM and MPLS, Local area networks and IEEE 802.11 wireless LANs, Multiple-access protocols, Random access, Efficiency of pure and slotted ALOHA. CSMA, CSMA/CD, and CSMA/CA, physical-layer services and systems and media, Coax, fiber, twisted pair, DSL, HFC, WiMax, cellular, satellite, and telephone networks, Bit transmission, Frequency division multiplexing, Time division multiplexing.

27. JAVA Programming (10B11CI614)
VI Sem (ICT) Credits-2(2-0)

Java Fundamentals: Java I/O streaming, filter and pipe streams, Byte Code interpretation, Applets, Graphics, Event Handling, Multithreading. Java Beans and Swings: Bean concepts, Events in bean box, Bean customization, Persistence, Application deployment using swing, Advanced swing techniques, JAR file handling. Network Programming in Java: Sockets, secure sockets, custom sockets, UDP datagrams, multicast sockets, URL classes, Reading Data from the server, writing data, configuring the connection, Reading the header, telnet application, Java Messaging services. Applications in Distributed Environment: Remote method Invocation, activation models, RMI custom sockets, Object Serialization – RMI – IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models, JAR file creation. Multi-Tier Application Development: Server side programming, Servlets, Java Server Pages, Applet to Applet communication, applet to Servlet communication, JDBC – Applications on databases, Multimedia streaming applications, Java Media Framework. Enterprise Applications: Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans.

28.   Data Analysis and Simulation Techniques(16B22CI6211)
VI Sem(IT) Credits-4(3-1)

Introduction: Simulation Language, Overview of Basic Approaches: Monte Carlo Simulation, Queuing Network Simulation,Quasi-continuous Simulation, Discrete-event Simulation, Applications, Data Definition and Analysis Techniques : Elements, Variables,

and Observations, Levels of Measurement, Selecting Analytical Techniques, Evaluating the Analysis, and Observations.

Statistical Hypothesis Generation and Testing: Null and Alternate Hypotheses, Statistical Significance, Rejecting the Null Hypothesis, Problems with Statistical Significance, Types of Statistical Error, Guarding Against Statistical Error. Chi Square Test: Chi-Square Test, Chi-Square Test for Goodness of Fit, Performing a Goodness of Fit Test in Excel, Cross Tabulations and the Chi-Square Test for Independence, Performing a Test for Independence with Crosstabs in Excel. Correlation: Correlation, Obtaining a Correlation Matrix with the Analysis ToolPak. Simulation Basics: Basic Concepts: System, Attribute, State, Event, Process, Activity, Time, Parallelism, Model, Basic Mechanisms: Time Advance, Scheduling, Alternative Models: Activity, Process, Others. Stages of Simulation Model Development: Problem, System Analysis, Data Collection, Fitting Distributions to Data: Parameter Estimation, Goodness-of-Fit, Iterative Prototyping, Statistical Instrumentation,Verification,Validation Emphasized, Inference. Abstract Representation Techniques: Activity-cycle Diagrams, State-Transition Diagrams, Petri Nets. Random Number Distributions: Sources of Randomness, Random Number Generation, Random Variates: From Distribution Functions, From Empirical Data Evaluation of Simulation Modeling: Ethical Issues in Simulation, Benefits of Simulation, Limitations of Simulation. Introduction to simulators:- Introduction to some popular simulator :- ns2. Matlab or omnet++, simulation projects.

B.Tech. Courses(Theory- Elective Courses)

1. Cryptography and Network Security Techniques(10B1WCI735)
VII Sem (CSE/IT/ECE/BI) Elective Credits-3(3-0)

Network security, security system model, ITU TX-800, mathematical foundations for security, Classical cipher techniques, Block ciphers: DES, AES, stream ciphers, block cipher modes of operation, RC4, confidentiality, Key management for symmetric ciphers, public key cryptosystems, RSA, Diffie Hellman key exchange algorithm, elliptic curve cryptography, message authentication,hash and mac algorithms,digital signatures and authentication protocols, Kerberos, x.509, PKI, e-mail security, IP Sec, SSL,Web security, intruders,malicious software, Intrusion detection, firewalls.

2. Biometric Recognition Techniques (12B1WCI732)
VII Sem(CSE / IT) Elective Credits-3(3-0)

Biometric Authentication Systems, Commonly used Biometrics, Biometric characteristics Biometric Recognition: Verification /Identification, System Errors, System Evaluation, System Performance, Fingerprint Recognition, Sensing, Analysis, Representation, Matching, Classification and Indexing, Synthetic Fingerprint Generation, Fingerprint Individuality, Securing Fingerprint Systems, fingerprints databases. Face Recognition, Iris Recognition, Hand Geometry Recognition and Advances in Biometrics- Multibiometric

systems, Information Fusion, Biometric standards, Social and Cultural Implications, Ocular Biometrics, Remote Biometrics, Machine Learning Techniques for Biometrics, Inverse Problems of Biometrics, Biometric Data Analysis.

3. Artificial Intelligence (10B1WCI731)
VII Sem (CSE/IT) Elective Credits-3(3-0)

Introduction to Artificial Intelligence and Systems, Intelligent Agents: The Concept of Rationality, Solving Problems by Searching-Uninformed Search and Informed Search, Beyond Classical Search - Heuristics, Logical Agents, First-Order Logic, Knowledge Representation Techniques in Artificial Agents, Planning, Learning from observation, Knowledge in Learning, Expert Systems.

4. Advanced Java Programming (12B1WCI733)
VII Sem (CSE/IT/ECE/BI) Credits-3(3-0)

Java Applests. Graphics. Event handling. Multithreading. Graphic User Interface. Remote Method Invocation. Activation. Object serialization. Distributed garbage collection. Bean concepts. Events in bean box. Bean customization. Persistence. Application. Deployment using swing. Advanced swing techniques. JAR file handling. Servlets. Java Server Pages. JDBC. Session beans. Entity beans. Programming and deploying enterprise Java Beans. Java transactions.

5. Principles of Programming Languages (10B1WCI736)
VII Sem (CSE / IT) Credits-3(3-0)

Programming language introduction, history, syntax and Semantics, compilation and interpretation, structured programming, procedure activations, object - oriented programming, functional programming, lambda calculus, map-reduce functional programming model for data-intensive processing, concurrent and parallel programming, event – driven programming, script languages, exception handling, memory management, case studies – Java, PHP, LISP, Scheme, Prolog.

6. Software Agents (11B1WCI731)
VII Sem (CSE/IT) Credits-3(3-0)

Introduction to Software Agents; Abstract architectures for agents; Multi Agent Decision-Making, Agent Oriented Software methodologies like Prometheus, Gaia, Agent UML and others, Using Prometheus Design Tool (PDT), Developing Multi Agent Systems using JACK, Standards for Agent Development like FIPA; Agent Communication Standards; Agent Support technologies

7. Graph Algorithms and Applications(10B1WCI733)
VII Sem (CSE/ IT) Credits-3(3-0)

Graph Representation, Applications to Theoretical Computer Science, Applications of: Connectivity, Traversability, Trees, Matchings, Partitionings, Coverings, Colourability, Planarity, Digraphs, Flows.

8.   Information Retrieval & Data Mining(11B1WCI832)
VII Semester (CSE) Credits-3(3-0)

Introduction to Data Mining, Data Preprocessing, Data Generalization, Data Warehousing, and On-line Analytical Processing, Association Rule Mining and Frequent Patterns, Classification and Prediction, Cluster Analysis, Introduction to Information Retrieval, Boolean Retrieval, Probabilistic Information Retrieval, Support Vector Machines, Pattern Matching Algorithm, Link Analysis.

9.   Image Processing(10B1WCI737)
VII Sem (CSE/IT/ECE) Credits-3(3-0)

Digital Image Fundamentals, Image Transforms, Image Enhancement, Image Restoration, Image Compression, Image Segmentation, Representation and Description, Recognition and Interpretation, Elements of Image Analysis, Pattern and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

10.   C# and VB.NET(12B1WCI734)
VII Sem(CSE/IT/ECE/BI) Credits-3(3-0)

Introduction to .NET framework. Features of VB.NET. Common Language Runtime. Versioning.Objects and Components.Namespaces.Data Access with Ado.Net .Windows forms.Web   Controls.Data binding.Mobile Application development.C# introduction. Objects and Types. Inheritance. String and Regular expressions.Localization , Deployment and Manipulating XML. Working with Active directory.

11.   Parallel Computing Algorithms (11B1WCI833)
VIII Sem (CSE/IT/ICT) Credits-3(3-0)

Introduction to Parallel Computing. Principles of Parallel Algorithm Design. Basic Communication Operations. Analytical Modeling of Parallel Systems. Programming Using the Message Passing Paradigm. Programming Shared Address Space Platforms. Dense Matrix Algorithms. Sorting Algorithms for Parallel Computers. Graph Algorithms. Search Algorithms for Discrete Optimization Problems. Dynamic Programming

12. Cloud Computing (12B1WCI731)
VIII Sem (CSE / IT/ICT) Credits-3(3-0)

Cloud computing – Definition, Terminologies, architecture and service models, utility computing, grid computing, cluster computing and Google cluster architecture, data – intensive computing concepts, MapReduce and graph algorithms, Apache Hadoop, Google's PageRank algorithm and its implementation with MapReduce, virtualization

technology, Xen hypervisor, server virtualization, desktop virtualization, storage virtualization, workloads and software infrastructure for a datacenter, datacenter hardware, energy and power efficiency in a datacenter, Mobile cloud computing, disaster recovery in cloud, security and privacy issues with cloud computing, case studies – Google File System (GFS), Google BigTable Data Storage system, Amazon EC2 and S3, Microsoft's Azure.

13. E-Commerce(11B2WCI851)
VIII Sem (CSE/IT) Credits-3(3-0)
Web site engineering methods and processes to support e-commerce development. Web site engineering life cycle and user-centered design, site goals, business models, value propositions, user analysis, information architecture, interface and navigation design, usability guidelines, database, testing, hosting strategies, usage metrics, and collaborative development. Technologies for e-commerce, shopping cart, digital payments, promotion strategies, and security issues. Building fully functional Web sites using database and client- and server-side technologies.

14. Parallel Processing(11B1WCI834)
VIII Sem(CSE/IT) Credits-3(3-0)

Models of Parallel Computing, Interconnection networks, Basic Computing and Communication Primitives, Performance Modeling, Dense Matrix Algorithms, Searching and Optimization: Dynamic Programming, Branch and Bound, Backtrack, Sorting, Graph Algorithms, Fast Fourier Transforms.

15. Embedded Systems and Applications(11B1WCI831)
VIII Sem (CSE/IT) Credits-3(3-0)

Introduction to Embedded systems. ARM Overview and its architecture. ARM instruction set. Processor cores. Memory Hierarchy. Architectural Support for OS. ARM CPU cores. Free Scale Microcontrollers and its Applications, Application development for embedded systems.

16. Network Management(11B1WCI836)
VIII Sem(CSE/IT/ECE/BI) Credits-3(3-0)

SNMP and OSI NM standards and technologies, SNMPv1,SNMPv2,SNMPv3, RMON, ATM networks and management, TMN network management, Broadband access network technologies and their management, NM tools and systems, Web based NM systems.

17. Storage Networks(11B1WCI835)
VIII Sem(CSE/IT) Credits-3(3-0)

Data proliferation, storage infrastructure, Information Lifecycle Management,Technologies for Storage Networks,Disk Subsystems, Architecture of Intelligent Disk, JBOD,RAID, RAID Levels, Hot Sparing, Hard Disks and Internal I/O Channels, Caching,Acceleration of

Hard Disk Access, I/O Techniques,DAS, SAN, NAS,IP SAN elements, standards (iSCSI, iFCP, mFCP, FCIP and iSNS), Migration from SCSI and Fibre Channel to IP storage, Network attached Storage: elements & connectivity, Management of Storage NetworkManagement Interfaces, Standardized and Proprietary Mechanisms, In-band & Out-band Management,Storage Virtualization,Symmetric & Asymmetric Storage virtualization, Performance of SAN virtualization, scaling storage with virtualization.

18.   Simulation Techniques(14B1WCI831)
VIII Sem(CSE/IT) Credits-3(3-0)

This course introduce some of the core tools used to analyze data and simulation techniques including model design and development, comparison to analytical models, input data preparation, random number generation, output statistical analysis, and model validation. Using these techniques, students will: model real-world systems, implement the model as a computer program, and evaluate the performance of real-world systems by analyzing the output of the model under various conditions.

19. Intelligent System Architecture and Design(15B1WCI832)
VIII Sem(CSE/IT) Credits-3(3-0)

This course will provide students with all the information they need to design and create their own Internet of Things (IoT) applications using the Arduino platform. More specifically, they will learn: 1. About the Internet of Things and Cloud Computing concepts About open platforms that allow students to store their sensor data on the Cloud (like Cosm, Nimbits and many more) 2. The basic usage of Arduino environment for creating their own embedded projects at low cost 3. How to connect their Arduino with their Android phone and send data over the Internet 4. How to connect their Arduino directly to the Internet and talk to the Cloud 5. How to reprogram their Arduino microcontroller remotely through the Cloud.

20. Service Oriented Architecture(13B1WCI831)
VIII Sem(CSE/IT) Credits-3(3-0)

SOA and Web Services represent a groundbreaking evolution in distributed computing. The concepts are not altogether new, but the application of them, and the unanimous acceptance of core standards like HTTP, XML, SOAP, WSDL, BPEL and UDDI, has paved the way for XML based web services and service-oriented architecture. Students are introduced to the core standards that enable Web Services, and are required to apply this knowledge through a series of design and programming exercises in a hands-on lab. These exercises involve SOA design, computer programming, system installation and testing. Service oriented architecture as a step towards cloud computing. Cloud computing paradigm is growing in popularity. A 'good' cloud computing solutions provides hardware-as-a-service, infrastructure-as-a-service, platform-as-a-service, software and applications as-a-service, security-as-a-service, cloudlets and cluster computing as-a-service, high-performance computing as-a-service, and so on. Students will learn how to construct and secure a private cloud computing environment based on open source VCL

solutions, and how to federate it with external clouds, such as public EC2 offering, and some other solutions. Performance, security, cost, usability and utility of cloud computing solutions will be studied both theoretically and in a hands-on lab.

21. Mobile Computing(15B1WCI731)
VII Sem (CSE/IT)
Introduction to the emerging technology • Architecture • Installation Setup • The Activity Class • The Intent Class • Permissions • Creating the UI • Storing and Retrieving Data • User Notifications • Broadcast Receivers • Networking • Location and maps • Sensors. Introduction to Windows Operating Systems • Architecture • Installation Setup • Introduction to XAML • Understanding the Navigation Model • Understanding the apps lifecycle and managing states • Building UI • Sensors • Storing and Retrieving data. Mid Sem project demo . WiFi • Physical Layer • Channel Coding • How the physical layer works • Link Layer MAC Protocols • Link Adaption Protocols • Energy Efficiency in WiFi • Cellular Systems. Mobile IP • Mobility in Network Layer • Internet protocols for Mobile Applications • Single Hop Mobility • Mobile IP and Issues.

22. Big Data Analytics(15B1WCI833)
VIII Sem (CSE/IT)
Hadoop (Implementation specific), Mining of Massive Data Sets, Hadoop Ecosystem: Advanced MapReduce Techniques, Relational View with Hive, Programming with Pig, Programming with Oozie, Programming with HBase & Zookeeper, . Cloud Deployment, . Case Studies.

B.Tech. Courses(Labs- Core Courses)

1. C Programming Lab(10B17CI171)
I Sem (All) Credits-2

Basic Programming, Programs on Control Structures, Functions, Arrays, Pointers, Strings and Characters, Structure and Unions and File I/O.

2. Basic Computer Programming Lab(10B17CI281)
I Sem (BT) Credits-2
Introduction to C programming , Structured Program Development in C , Flowchart and Algorithm , C Program Control , C Functions ,   C Arrays, C Pointers, C Characters and Strings, C Structures, Unions, Bit Manipulations and Enumerations, C File Processing.

3. Data Structures Programming Lab (10B17CI271)
II Sem (CSE/IT/ICT/ECE/BI/BT/BTDD) Credits-2

Arrays and Strings, Structures, Recursion, Pointers and Dynamic memory allocation, Operations on Linear Linked List, Doubly and Circular Linked List (Creation, insertion, deletion, sorting, traversing, reversing etc), Operations on Stacks (Creation; pushing; popping; testing underflow, overflow; prefix and postfix), Operations on Queues (Creation; enqueue; dequeue; testing underflow, overflow), Operations on Tree or BST

(Creation; Traversing like pre-order, post-order and in-order; Searching element; finding height etc.), Implementation of Insertion Sort and Selection Sort Algorithm with arrays using dynamic memory allocation, Implementation of Bubble Sort and Merge Sort Algorithm with arrays using dynamic memory allocation, Implementation of Radix Sort and Quick Sort Algorithm with arrays using dynamic memory allocation, Operation on Heaps and Heap Sort, Implementation of Linear Search Algorithm and Binary Search Algorithm using dynamic memory allocation, Operations on Graphs (Creation; entering info; printing Output and deleting; traversal of BFS and DFS algorithm etc.)

4. Basic Data Structures and Computer Programming Lab(14B27CI271)
II Sem (BT) Credits-2

Getting acquainted with Arrays and Strings, Structures, Recursion, Pointers and Dynamic memory allocation, Operations on Linear Linked List, Doubly and Circular Linked List Creation, insertion, deletion, sorting, traversing, reversing etc, Operations on Stacks Creation; pushing; popping; testing underflow, overflow; prefix and postfix) , Operations on Queues (Creation; enqueue; dequeue; testing underflow, overflow), Operations on Tree or BST (Creation; Traversing like preorder, post-order and in-order; Searching element; finding height etc.),   Implementation of Insertion Sort and Selection Sort Algorithm with arrays using dynamic memory allocation. Implementation of Bubble Sort and Merge Sort Algorithm with arrays using dynamic memory allocation. Implementation of Radix Sort and Quick Sort Algorithm with arrays using dynamic memory allocation. Operation on Heaps and Heap Sort, Implementation of Linear Search Algorithm and Binary Search Algorithm using dynamic memory allocation. Operations on Graphs (Creation; entering info; printing.

5. Object-Oriented Programming Lab (10B17CI371)
II Sem (ICT), III Sem CSE/IT, IV Sem BI Credits-1

Review of Structured programming in C, Objects, Classes, Methods, Constructors and Destructors, File Handling in C++, Friend Functions, Static members function, Complex Objects and Classes, Inheritance and its form and Multiple Inheritance in C++, Polymorphism and Virtual Functions in C++, Function and Operator overloading in C++, RTTI, Namespace, STL and Templates in C++ , Object-Oriented Concepts in Java.

6. Database Systems Lab (10B17CI372)
 III Sem(CSE/IT) Credits-1

The Databases System lab provides a basic overview about what databases are, how they should be designed and how to query them. It provides an introduction to SQL -- a language used to query and manage databases. The list of experiments includes: ER Model, Enhanced ER Model, Relational Model, Various Normal Forms, Creating a table, Deleting a table, Creating indexes on tables, Changing the schema of the table, Applying primary key and foreign key constraints on a table, Inserting data into table, Query data from the table, Updating data into the table, Deleting data from the table, Modification of

data into the table, Applying the access control methods, Aggregate functions, Sub queries, and PL/SQL.

7. Database Management Systems Lab (13B22CI381)
 III Sem(ICT) Credits-1

E-R Modelling, Relational Algebra by hand written queries, SQL Queries, Operations on Relations-I in Algebra and SQL, Operations on Relations-II in Algebra and SQL, Database application development (Java), Programming with JDBC, Functional Dependencies and Normalization, SQL views, Programming – embedded SQL

8. Multimedia Development Lab-I(10B28CI408)
III Sem (ECE/ ICT) Credits-1

Introducing the Flash Interface, Layer Folders & Properties, Creating New Layers & Moving Items between Layers, Basic Animation Techniques, Keyframes and Frames concepts for various motion objects.

9. Multimedia Development Lab-3(13B22CI382)
III Sem (ICT) Credits-2

Introducing the Flash Interface, Layer Folders & Properties, Creating New Layers & Moving Items between Layers, Basic Animation Techniques, Keyframes and Frames concepts for various motion objects. Animation and motion graphics, cutting and splitting videos, adding effects, arranging clips, graphic importation and conversion, Creating Movie Clips, import graphics from other applications, work with text, use layers and frames, use masks, import Video

10. Unix Lab (10B17CI307)
III Sem (CSE/IT/ICT), IV Sem (ECE) Credits-1

UNIX Diversion: UNIX System Kernel and Utilities, File & Directions, Single & Compound Statement Command Library and Include files. UNIX System Administration: File System Mounting & Unmounting, System Booting, Shutting Down, Handling User Account, Backup, Recovery, Security, Terminals, Printer and Modem. Different Tools & Debugger: System Development Tool, Lint, Make, SCCS (Source Code Control, system), UNIX Shell and Network Programming: Bourne Shell, Korn Shell and C shell. Shell Meta characters, Shell Variable and Scripts, Facilities and Command, Environment, Integer Arithmetic and String Manipulation. Basic Client Server Program and Network Programming

11. Algorithms Lab(10B17CI471)
IV Sem(CSE/IT), VI Sem(ICT) Credits-1

Introduction to TIME.H library. Computing time of basic exponential program for large prime number, euclids algorithm, Implementation of sorting algorithms and comparison of their time graph, Iterative Approach, Divide and Conquer Approach, Implementation of

searching algorithms and comparison of their time graph Advanced Search Trees, Adjacency matrix and list, implementation for large graph, Implementation of graph algorithms and comparison of their time graph, Implementation of real problems using dynamic programming and comparison of time graph between with and without dynamic programming. Greedy Algorithms, Implementation of NP algorithms for small inputs, Backtracking, Branch and Bound Approach, String Matching Algorithms.

12. Computer Organisation Lab(10B28CI481)
IV Sem(IT) Credits-1

8086 Assembly programming using MASM, Interrupts, String manipulations, Arithmatic operations, implement a 8086 assembler in C/C++ and Java.

13. Microprocessor and Controllers Lab (10B11CI407)
IV Sem(CSE), V Sem (EC) Credits-1

Exploring Register Architecture through Debug, 8086 AsSembly programming for MASM611, DOS I/O interrupts, Video I/O Interrupts, String manipulation, Arithmatic operations, Program Control instructions, File I/O, Menu Structures, High precision Computation, Application developement, I/O device interfacing.

14. BI Algorithms Lab(10B17CI472)
V Sem (BI) Credits-1

Introduction to TIME.H library. Implementation of sorting algorithms and comparison of their time graph, Iterative Approach, Divide and Conquer Approach, Implementation of genetic searching algorithms and comparison of their time graph Adjacency matrix and list, implementation for large graph, Implementation of graph algorithms and comparison of their time graph, Implementation of real problems in bioinformatics using dynamic programming and comparison of time graph between with and without dynamic programming. String and sequence matching algorithms, Matrix computation and microarray data handling.

15. Software Testing And Debugging Lab (10B17CI701)
V Sem (CSE/ICT) Credits-1

Revision of Java Programming, Introduction to Eclipse, Developing Black Box Testing Test cases, Boundary Value Analysis, Developing White Box Testing Test cases, Generating CFG, Computing McCabe Cyclomatic Complexity, Designing Unit Test Cases, performance testing, Fault Injection, Regression Testing, test case Prioritization, Web Testing, load Testing, GUI Testing.

16.   Web Technology Lab (10B28CI581)
V Sem (CSE & IT) Credits-1

Basic HTML Concepts- Frame, Table, Form, Image Positioning, Implementation of CSS in/with HTML, Java Script, JAVA, DHTML, XML, XHTML, Server Side Scripting Languages- PHP and JSP.

17. Software Engineering Lab(10B17CI572)
V Sem CSE& IT Credits-1

Software Project Management, Requirement Engineering, Analysis Modeling and Design, UML Tools, Software Architecture, User Interface Design, Software Metrics, Reengineering, Project.

18. Operating Systems Lab(10B17CI571)
V Sem (CSE& IT) Credits-1

Design and implementation of an operating system, basic operations, OS subsystems, process management, processes, threads, CPU scheduling, synchronization, and deadlock, memory management, segmentation, paging, swapping, file systems. The course programming assignments are in C.

19. Object-Oriented Systems and Programming Lab (10B17CI674)

VI Semester (ECE) Credits-2

Unified Modeling Language: (Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, Activity Diagrams), Objects, Classes, Methods, Constructors and destroying objects in C++ , Friend Functions, Static data and member functions, const data and functions, inline functions, Inheritance in C++ and Java, File Handling in C++ and Java, Polymorphism and Abstract classes in C++ and Java, Interfaces and Packages in JAVA, Exception Handling in C++ and Java, SQL, PL/SQ Database Connectivity

20. Data Mining Lab (10B22CI622)
VI Sem (IT) Credits-1

Pattern Search, Mean, Median, Mode and Standard Deviation Computation, Redundancy Analysis: Correlation Analysis, Normalization Techniques: Min-Max, Z-Score and Decimal Scaling Normalization, Noise Removal using Binning: Mean, Mode and Min-Max Bin, PCA (Principal Component Analysis), Single and Multiple Linear Regression, Bayes Classification, Iterative Dichotomiser 3, K-means Clustering.

21. Computer Networks Lab(10B17CI671)
VI Sem (CSE/ICT) Credits-1

Socket programming, Network Representation, Topology, MAC, Routing, TCP, UDP, Application Layer, Network security, Project.

22. Computer Graphics Lab(11B1WCI671)
VI Sem(CSE &ICT) Credits-1

Setting the VC++ environment for OpenGL, Architecture of OpenGL as a Renderer , Related APIs GLUT (Graphics Language Utility Toolkit), Display-Window Management, Initialization Functions, Setting size, position, colors, displaying mode, Writing a simple displaying function, Drawing Primitives Points, Lines, Polygons, Animation & Event Handling using Mouse and KeyBoard, Line & Circle Drawing Algorithms, Line Slope Intercept, DDA, Bresenham, Circle Drawing Algorithms, Direct equation, Midpoint Algorithm, 2D Transformation, OpenGL Transformation, 3D Shapes in OpenGL.

23. Compiler Design Lab (10B17CI672)
VI Sem (CSE) Credits-1
Implmeting programs for generating token, lex ckecking on LEX, Implementing programs for parser genrator, syntax checker on YACC, combining LEX and YACC programs to implement scienctific calculator, creating symbol table, optimizing code, implementing mini compiler.

24. System and Network Programming Lab(10B17CI673)
VI Semester(CSE) Credits-2
TCP/IP using Berkley Sockets, Client/server models, protocols, processes, threads, Semaphores programming. Designing and implementation of network applications, WIN32 programming, UNIX programming.

25. Data Analysis and Simulation Techniques Lab (16B28CI681)
VI Semester(IT) Credits-1

A laboratory course designed to provide a hands-on introduction to the development and application of simulation. Topics include an introduction to one or more discrete event simulation tools, common modelling constructs, data gathering and input data modelling, design of simulation experiments, output data analysis, and verification and validation. The design and implementation of a series of increasingly complex simulations of various discrete event systems are conducted.

26. Information Systems Lab(10B28CI681)
VI Sem(ICT) Credits-1
Introduction to advanced JAVA programming, Introduction to Netbeans IDE, designing and developing Servlets, MySQL database connectivity with servelts, JSP, JSP database connectivity, EJB 3.0, developing session beans, developing entity beans, Introduction to J2ME, Developing Android applications, developing a mini project uses above technologies.

27. Multi Media Lab-2(10B28CI683)
VI Sem(IT) Credits-1

Animation and motion graphics, cutting and splitting videos, adding effects, arranging clips, graphic importation and conversion, Creating Movie Clips, import graphics from other applications, work with text, use layers and frames, use masks, import Video.

28.   Computer and Communication Networks Lab(13B28CI684)
VI Sem(ICT) Credits-1

Network Socket Programming using C/Java, Multi-threaded Web Server, E-Mail Client, UDP Pinger, Web Proxy Server, Reliable Transport Protocol, Packet Sniffer Lab Experiments, Exploring HTTP, Exploring DNS, Exploring TCP, Exploring UDP, Exploring ICMP, Exploring Ethernet and IEEE 802.3.

29.   JAVA Programming Lab(13B28CI685)
VI Sem (ICT) Credits-2
Classes and Objects. Inheritance. Polymorphism. Packages. Interfaces. Wrapper Classes. Strings and Characters. Exception Handling, Multithreaded Programming. I/O in Java.. Applets. Event Handling. Abstract Windowing Toolkit, Swings. Network Programming.

30. Web Application Engineering Lab (13B28CI686)
VI Sem (ICT) Credits-1

Basic HTML Concepts- Frame, Table, Form, Image Positioning, Implementation of CSS in/with HTML,   Java Script, JAVA, DHTML, XML, XHTML, Server Side Scripting Languages- PHP and JSP.AJAX, JOOMLA, Cake PHP, Wordpress, Drupal, Magento.

31. High Performance Computing Lab (13B28CI771)
VII Sem (ICT) Credits-1

CUDA programming, code optimizations, performance evaluation.

32. Net Centric System Programming Lab (13B28CI871)
VIII Sem (ICT) Credits-1

Servelets, JSP,RMI, Hybernate, Struts, Netbeans, Android,EJB, Ajax, Silver Light

M.Tech. Courses(Theory- Core Courses)

1. Advanced Data Structure (10M11CI111)
I Sem (CSE) , I Sem Elective (ECE) Credits-4(3-1)

Dynamic optimality,Splay trees, Tango tree, Advance dictionary data structures Skip lists, Cuckoo hashing,   Locality sensitive hashing, Bloom filter, Multi-dimensional data structures, K-d tree, Oct-tree, R-Tree, Geometric data structures, orthogonal range

queries, range trees, interval trees, segment trees, ray shooting and partition trees, External memory/cache-oblivious models, B-trees, ordered-file maintenance, list labeling, order queries, priority queues, Distributed data structures, distributed hash table, distributed trees, distributed stack and distributed lists, Streamming data structures, synopsis, sketches, histogram, fingerprint, wavelets and sliding windows.

2. Advanced Computer Networks (10M11CI112)
 I Sem(CSE) Credits-4(3-1)

Review of computer Networks. IPv6. Security issues in IPv6. TCP/IP details. Voice over IP. Real time communication protocols. High speed local and wide area networks. Virtual networks. Network security. Broadband networks. Introduction to intelligent networking. Performance analysis of networks.

3. Advanced Database Systems(10M11CI113)
 I Sem (CSE) Credits-4(3-1)

Review of Database systems. Web-enabled database systems. Storage and file structures. Indexing and Hashing. Query Processing. Query Optimization. Object oriented DBMS. Extended relational model. Distributed Databases. Active Databases. Temporal Databases, Spatial Databases. Multimedia databases. Deductive Databases. Emerging databases technologies.

4. High Performance Computer Architecture (10M11CI114)
I Sem(CSE), III Sem Elective (ECE) Credits-4(3-1)

Performance analysis and scalability. Modeling performance. Pipelined Systems. Interconnection networks. Processor array. Multicomputers. Multiprocessors. Systolic Array. Vector processor. Structured memory design for parallel systems – symmetric shared, distributed shared and synchronization. Parallel Programming Concepts and Design Patterns Theoretical Analysis of Parallel Algorithms , Amdahl's law, Memory Hierarchy Models, Communication Models, CUDA Hardware, CUDA Programming, CUDA Threading Model, CUDA Communication and Memory Model, CUDA Performance Monitoring and Optimizations.

5. Fundamentals of Algorithms and Statistical Analysis(11M12CS111)
I Sem (CB) Credits-4(3-1)

Review of Data Structure. Analyzing algorithm, designing algorithm. Growth of functions. Recurrences, divide and conquer algorithms, substitution method for solving recurrences, dynamic programming, greedy algorithm, backtracking. Decision tree, game tree. Index trees – IBST, TBST, AVL, and B Trees. Heaps. Graph algorithms - minimum spanning tree, shortest path, Hamiltonian cycle. String and sequence matching. Basic computational geometry.

6. Advanced Algorithms (10M11CI211)
II Sem (CSE), IV Sem Elective (ECE) Credits-4(3-1)

Review of Algorithms. Algorithm correctness and efficiency. Growth of functions. Algorithm analysis methods, recurrences, divide and conquer, backtracking, dynamic programming. Sorting. Search pruning. Heuristic methods. NP – completeness. Matrix operations. String matching. Computational geometry. Approximation algorithm. Linear programming.

7. Advanced OS (10M11CI212)
II Sem (CSE), II Sem Elective (ECE) Credits-4(3-1)

Review of OS principles. Synchronization mechanisms. Process deadlocks. Resource models. Theoretical foundations. Inherent limitations of distributed operating systems. Event ordering. Timestamps. Distributed mutual exclusion. Token and non-token based algorithms. Comparative performance analysis. Concurrency control. Agreement protocols for handling processor failures. Coordination of processes and related algorithms. Failure handling and recovery mechanisms. Multiprocessor operating systems and related thread handlings.

8. Advance Software Engineering (10M11CI213)
II Sem (CSE) Credits-4(3-1)

Review of software Engineering. PSP.TSP. Usability. Agile Methods. Agile Development. Iterative Scrum. Extreme Programming. Unified Process. Evolution. Requirements engineering.Meta Modeling.Software Architecture and Design Patterns Software Metrics and Software Reliability. Testing Strategies. Planning and Automated Testing. Aspect Oriented Programming (AOP).

9. Multimedia Systems(10M11CI214)
II Sem (CSE/ECE) Credits-4(3-1)

Introduction. Multimedia Data Encoding (Audio, Image, Video, and Animation). Quality of Service. Multimedia Operating Systems: Process Management. Inter-process Communication
and Synchronization. Memory Management. Device Management. Media Server Architecture and Storage Management. Networks Services, Protocols, Layers, and Synchronization.

M.Tech. Courses(Theory- Elective Courses)

1. System and Network Security Techniques(09M11CI421)
I Sem CSE Credits-3(3-0)
Introduction to System security, network security,security system model, ITU TX-800, mathematical foundations for security, classical cipher techniques, Block ciphers: DES,

AES, stream ciphers, block cipher modes of operation, RC4, confidentiality, Key management for symmetric ciphers, public key cryptosystems, RSA, Diffie Hellman key exchange algorithm, elliptic curve cryptography, message authentication,hash and mac algorithms,digital signatures and authentication protocols, Kerberos, x.509, PKI, e-mail security,IP Sec, SSL,web security, intruders,malicious software,firewalls.

## 2.	Data and Communication Network Management(11M1WCI231)
II Sem CSE Credits-3(3-0)
Review of Data and communication networks, Network management concept and models, ASN.1, SNMPv1, SNMPv2, SNMPv3, RMON, ATM network management, TMN, Aceess network management, Network management tools and applications, Web based network management.

## 3.	Advanced Image Processing Techniques(09M31CI422)
III Sem M.Tech CSE Credits-3(3-0)

Digital Image Representation, Steps in Image Processing, Sampling and quantization, neighbors, connectivity, Distance measures, Imaging Geometry. Image Transforms, Image Enhancement, Image Restoration, Image Compression, Image Segmentation, Representation and Description, Applications , JPEG 2000

## 4.	Advanced Storage Networks(09M31CI423)
III Sem CSE Credits-3(3-0)

Storage I/O Techniques, DAS, SAN, NAS, RAID, RAID levels, Derived RAID levels, RAID controller, Data Protection and Restoration, Consistency, Data management, B2D, VTL, Snapshots, Data Deduplication, CDP, Backup replication, Storage Virtualization, Symmetric & Asymmetric Storage virtualization, Performance of SAN virtualization, scaling storage with virtualization, Data Center design, Architecture, Structure, Energy use, characteristics, heat removal, Green Data centers, Data center transformation, File Systems, Clustering, Snapshots & Clones, File tiering, SSDs and file systems,Distributed Storage Networks, Architecture, Protocols, Business Continuity & Disaster recovery, Risk assessment and analysis, Vulnerability,

5. Performance Evaluation of Networks(11M1WCI432)
IV Sem CSE Credits-3(3-0)
Mathematical foundations for performance evaluation, Random variables, probability distributions, expected value, Important distributions, Queuing Systems, High performance networks, multistage ATM switches, Performance Evaluation Parameters, QOS, Availability, Reliability, Packet Drop/Data Loss, Latency, Jitter, Throughput, Software overheads, Performance Measures of Different Protocols, Numerical solution of Markov chains, Markov and reliability models for Network system, Performance Enhancement techniques, parallelism, self-routing, modularity, constant delay, in-order

delivery, VLSI implementation, Generation of representative Web workloads for network and server performance evaluation, Capacity planning of servers, proxies and networks.

6. Advanced Web Mining(11M1WCI431)
IV Sem CSE Credits-3(3-0)

Basic Search Engines and information retrieval, Architecture of a Search Engine. Crawling the Web, Directory Crawling, Storing the Documents, Processing Text, From Words to Terms, Text Statistics, Vocabulary Growth, Document Parsing, Tokenizing, Stopping, Stemming, Phrases and N-grams, Inverted indexes, Documents, Counts, Positions, Fields and Extents, Scores, Ordering, Compression. Ranking with Indexes, Abstract Model of Ranking, Link Analysis, Anchor Text, PageRank, Link Quality, Information Extraction, Internationalization, Document Categorization, Naive Bayes, Support Vector Machines and K Nearest Neighbor classifiers, Hierarchical and K-Means Clustering, Evaluation, Evaluation,Semantic web, XML, XML schema, RDF, RDF schema, OWL, Social Search, Social network mining, Web graph mining, opinion mining and sentiment analysis, Searching With Communities, Filtering and, Recommending.

7. Machine Learning(13M1WCI331)
IV Sem CSE Credits-3(3-0)
Introduction, Inductive Classification, The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypotheses. Decision Tree Learning, Experimental Evaluation of Learning Algorithms, Comparing learning algorithms, Rule Learning: Propositional and First-Order: Translating decision trees into rules. Artificial Neural Networks, Perceptrons, Multilayer networks and back propagation. Overfitting, learning network structure, recurrent networks. Bayesian Learning: Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logistic regression. Bayes nets and Markov nets for representing dependencies. Instance-Based Learning: Case-based learning Clustering and Unsupervised Learning Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabeled data.

8. Distributed Algorithms(13M1WCI332)
IV Sem CSE Credits-3(3-0)

Causality; Ordering of events, Logical Clocks (timestamps), Causal communication; Distributed snapshots; Detecting stable properties; Diffusing computation;Modeling a distributed computation; Expressing correctness properties of a distributed algorithm; Failures in a distributed system; Synchronization; Distributed agreement; Replicated data management; Check-pointing and recovery.

9. Advanced Computational Techniques in Engineering(15M1WCI432)
IV Sem CSE Credits-3(3-0)

Data Distributions, Data Transforms, Fourier, Wavelet and Anamorhpic transforms, Gaussian Elimination and Its Variants, Sensitivity of Linear Systems ,Vector and Matrix Norms , A Posteriori Error Analysis Using the Residual, Roundoff Errors; Backward

Stability, Propagation of Roundoff Errors , Backward Error Analysis of Gaussian Elimination , The Least Squares Problem, The Discrete Least Squares Problem, Orthogonal Matrices, Rotators, and Reflectors, Solution of the Least Squares Problem, The Gram-Schmidt Process, Geometric Approach, Updating the QR Decomposition, The Singular Value Decomposition, Eigenvalues and Eigenvectors, Systems of Differential Equations, The Power Method and Some Simple Extensions, Similarity Transforms, Reduction to Hessenberg and Tridiagonal Forms, The QR Algorithm, Implementation of the QR algorithm, Use of the QR Algorithm to Calculate Eigenvectors, Eigenspaces and Invariant Subspaces, Subspace Iteration, Simultaneous Iteration, Methods for the Symmetric Eigenvalue Problem, The Generalized Eigenvalue Problem; Iterative Methods for Linear Systems, A Model Problem , The Classical Iterative Methods, Convergence of Iterative Methods , Descent Methods; Steepest Descent, Preconditioners, The Conjugate-Gradient Method, Derivation of the CG Algorithm, Convergence of the CG Algorithm, Indefinite and Nonsymmetric Problems,

M.Tech. Courses(Labs- Core Courses)

1. Software Systems Lab – I(10M17CI171)
I Sem (CSE) Credits-2

UNIX Commands, Shell Programming, Working with files, Working with Makefile and Debugging, Process model, Process environment, Process creation and termination, Process synchronization,Threads, Inter-process communication, pipe and FIFO, Working with Semaphores and shared memory, Socket Programming, Compiler design

2. Objected Oriented Programming Lang Lab(11M12CS173)
I Sem (CB) Credits-2

Objects, Classes, Methods, Constructors and Destructors, File Handling in C++, Friend Functions, Static members function, Complex Objects and Classes, Inheritance and its form and Multiple Inheritance in C++, Polymorphism and Virtual Functions in C++, Function and Operator overloading in C++, RTTI, Namespace, STL and Templates in C++ , Object-Oriented Concepts in Java.

3. Algorithms and Data Analysis Lab(11M12CS172)
I Sem (CB) Credits-2

Algorithms for Computational Biology, TIME.H library. Implementation of sorting algorithms and comparison of their time graph, Iterative Approach, Divide and Conquer Approach, Implementation of genetic searching algorithms and comparison of their time graph Adjacency matrix and list, implementation for large graph, Implementation of graph algorithms and comparison of their time graph, Implementation of real problems in computational biology using dynamic programming and comparison of time graph

between with and without dynamic programming. String and sequence matching algorithms, Matrix computation and microarray data handling.

4. Software Systems Lab – II(10M17CI271)
II Sem (CSE) Credits-2

Windows socket programming, Network Programming, Mini lab project-1 to implement the concept of Socket and Network programming, XML, XML parsing, designing of compiler, Introduction to distributed computing, EJB3.0, Mini lab project-2 to implement the concept of distributed computing.

5.   Research software systems Lab(16M17CI172)
PG/Research Scholars
MATLAB Programming, CUDA Programming, Parallel and Concurrent Computing, IOT