



# बिलासपुर विश्वविद्यालय, बिलासपुर (छत्तीसगढ़)

पाठ्यक्रम सत्र 2017-18

एम. एससी. कम्प्यूटर साइंस (पूर्व)

## Syllabus Scheme Master of Science in Computer Science

Subject Code	Subject Name	Subject Nature	End Year Examination Maximum Marks	End Year examination Minimum Marks
MCST-101	Digital Electronics and Microprocessor	Theory	100	40
MCST-102	OOPs using JAVA	Theory	100	40
MCST-103	Advanced Computer Network	Theory	100	40
MCST-104	Data Structure	Theory	100	40
MCST-105	Advanced Operating System	Theory	100	40
MCST-106	Analysis and Design of Algorithm	Theory	100	40
MCST-107	Advanced Database Management System	Theory	100	40
MCST-108	Computer Graphics and Multimedia	Theory	100	40
MCST-109	Advanced Computer Architecture	Theory	100	40
MCST-110	.NET Technology	Theory	100	40
MCST-111	Java Programming with Data Structure Lab	Theory	100	40
MCST-112	.NET Programming Lab with SQL Server	Theory	100	40



**MCST-101**

**DIGITAL ELECTRONICS AND MICROPROCESSOR**

**UNIT-I**

**Evolution of Digital System & Logic Families-** Semiconductor Materials, Types of solids, Imperfection and Impurities in Solids, pn Junction Diodes, BJTs and other junction Device, FET and MOSFET, Digital Electronic Signals and Switches, Diode and Transistor as a switch, Logic Families - significance and Types, Types of Logic Family: RTL, DTL, Transistor Logic (TTL), Emitter Coupled Logic (ECL), CMOS Logic Family, NMOS and PMOS Logic, HMOS Logic, Electrical characteristics of logic families, Comparison of Different Logic families.

**UNIT- II**

**Boolean concept and Design of Combinational Circuits-** Fundamentals of Logic Gates: AND Gate, OR Gate, Timing Analysis, Enable and Disable Function, Inverter, NAND Gate, NOR Gate. Boolean algebra and Simplification Techniques: Introduction to Boolean algebra, Simplification Techniques: Sum-of-Products Boolean Expressions, Product-of-Sums Expressions, Karnaugh Maps for Multi-Output Functions, Quine-McClusky method of minimization of logic functions, Karnaugh Map Method, Karnaugh Map for Boolean Expressions with a Larger Number of Variables. VEM Theory, MEV and 5 and 6 variable VEM Solution.

**UNIT- III**

**Design of Combinational Circuits-** Implementing combinational Circuits using K-Map: half-adder, Full Adder, Half-Subtractor, Full Subtractor, BCD Adder, Design of code converters, comparators and various Circuits: BCD to excess-3 code and excess-3 to BCD converters, Binary to Gray Code and Gray Code to Binary Code converter, One & Two Bit Comparator, BCD to 7-segment decoder, BCD to 84-2-1 code converter and other code converter, Carry Propagation-Look-Ahead Carry Generator, Multipliers. Design of Multiplexers, De-multiplexers, Decoder and Encoder

**UNIT-IV**

**Design of Sequential Circuit-** Introduction to sequential circuits: More and Mealy machines, Multi-vibrator, Bi-stable Multi-vibrator, Schmitt Trigger, Introduction to flip-flops like SR, JK, D&T with truth tables, logic diagrams, and timing relationships, Conversion of Flip-Flops, Excitation table, State tables, and realization of state stables, Design of shift registers, Counters: Ripple (Asynchronous) Counter, Synchronous counter, UP/DOWN Counters, Design of Different Synchronous Counter using K-Map, Design of sequence generators and detectors, Introduction to Programmable Device, Architecture of PLDs.

**UNIT-V**

**Microprocessors System-** Introduction to Microprocessors, Evolution of Microprocessors and family of microprocessor, Architecture of Microprocessor, Microprocessor Instructions, Addressing Modes, Register Direct Addressing Mode, Register Indirect Addressing Mode, Indexed addressing Mode, Implicit Addressing Mode and Relative Addressing Mode, Microprocessor Selection Criteria, Eight-Bit Microprocessors: Intel 8085 Microprocessor, Motorola 6800 Microprocessor, Zilog Z80 Microprocessor, 16-Bit Microprocessors: 8086 Microprocessor, Pentium Series of Microprocessor, Salient Features of microprocessor, interrupts and pin functions.



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## MCST-102 OOPs USING JAVA

### UNIT-I

**An overview of Java-** Life Cycle of a Java Program, JDK and JRE, Java SE and EE, Object-Oriented Programming: Classes and Objects, Variables, Constants, and Data Types, Declaring Variables, Constants, Primitive Data Types, Variable Scope, Wrappers, Auto boxing, and Unboxing, Program Comments, Conditional Statement if, switch Statement, Inheritance, Method Overriding, Class Methods: Method Arguments, Method Overloading, Constructors, Keyword super, this, final, static Passing by Value or by Reference, Variable Scopes, Packages, Interfaces, and Encapsulation, Abstract Classes, Polymorphism, Graphic User Interface, Event Handling in UI, Java Applets: Writing Applets Using Swing, Error Handling, Java Exceptions.

### UNIT- II

**Network-Socket Programming and JDBC-** Introduction to Collections, & Introduction to Generics, Java Serialization, Network Programming, Socket Programming, Processing E-Mails with Java: Protocols and Servers, Creating Mailer, Required Supporting Classes, Writing the Mail Sender, Introduction to Multi-Threading, Digging Deeper into Concurrent Execution, Databases Using JDBC: JDBC Driver Types, Swing with JTable: JTable and the MVC Paradigm, Annotations and Reflection, Remote Method Invocation, Writing RMI Clients, Finding Remote Objects. Java EE 6 Overview: JCP, JSR, and Other Acronyms, Tiers of Java EE Applications, Containers versus Application Servers.

### UNIT- III

**Programming with Servlets, JavaBeans and JNDI-** Thin Client, How to Write a Servlet, How to Deploy a Servlet, Installing the GlassFish Plug-In for Eclipse, How to Create a Servlet with Eclipse, Browser-Servlet Data Flow, HTTP Get and Post Requests, Cookies, URL Rewriting, Server-Side Http Session, Filters, Event Listeners, Asynchronous Servlets. Java Server Pages: Embedding Java Code into HTML, Implicit JSP Objects, Overview of the JSP Tags, Directives, Declarations, Expressions, Script lets, JavaBeans, Using JavaBeans in JSP, JSTL. Developing Web Application with JSF: Managed Beans, Creating a JSF Website. Introducing JMS and MOM: Messaging Concepts and Terminology, Two Modes of Message Delivery, JMS API Overview, Types of Messages, Administering Objects in Open MQ. Introducing JNDI: Java Naming and Directory Interface, Administering JNDI Objects in GlassFish, Accessing the GlassFish naming Service with JNDI, Injection of JNDI Resources, Data Source and JNDI, Lightweight Directory Access Protocol.



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## UNIT-IV

**Introduction to Enterprise JavaBeans and API-** Who Needs EJB Containers?

Types of EJBs, Stateless Session Beans, Stateful Session Beans, Singleton Beans, Deploying EJB, Message-Driven Beans, Timer Service. Introduction to the Java Persistence API: Mapping Objects to Database Tables, JPQL, Entity Manager, A Brief Introduction to the Criteria API, Bean Validation. Working with RESTful web Services.

## UNIT-V

**Introduction to Spring MVC Framework and JavaFX-** Overview of Spring MVC:

Processing HTML with Spring, Understanding the Spring Web MVC Workflow, Processing HTML Forms, Introduction to Hibernate Framework: Installing and Configuring Hibernate, Adding Hibernate jars to an Eclipse Project, Testing the Database Connection, Configuring Hibernate with a DBMS, Retrieving Data with Hibernate. Bringing JavaFX to the Mix: Consuming Stock Quotes with JavaFX, Code Walkthrough, Reading JavaFX Code, HTML Client.



**MCST- 103**

**ADVANCED COMPUTER NETWORK**

**UNIT-I Basics of Data Communication-** Introduction to Computer Network: Introduction, Network Hardware, Network Software, Reference Models, Data Communication Services & Network Examples, Internet Based Applications, Data Communications: Transmission Media, Wireless Transmission, Multiplexing, Switching. Communication System, Baseband and Carrier Communication, transmission modes, Baud rate, bit rate, SNR, Channel Bandwidth and rate of communication, Introduction to analog modulation techniques (AM, FM, PM, QAM) Digital Continuous Wave Modulation techniques: Modems, ASK, FSK, PSK, BPSK, QPSK, Multiplexing techniques: TDM, FDM, WDM, CDMA, Pulse amplitude modulation techniques, sampling theorem, PCM, PCM Encoder and Decoder, DPCM, ADPCM, Delta modulation, Line Coding techniques: Bipolar, Unipolar, RZ, NRZ, Manchester, AMI, B8ZS, Block coding techniques.

**UNIT-II Basics of Computer Networks and Physical layer-** Need and Applications of Network, Protocols and Standards, OSI Model, TCP/IP Model, Network topology (Physical & logical), Transmission media: Guided transmission Media-Twister Pair, Coaxial and Fiber-Optic Cables, Wireless transmission: Electromagnetic Spectrum, Radio and Micro Waves, Infrared, Light wave, Spread Spectrum Systems, Digital hierarchy-Signaling system, DS lines, T lines, E lines, Cable modem Switching techniques: Circuit switching, Packet switching and message switching, Network Devices: Repeaters, Connectors, Transceivers and Media Converters, Bridges, routers, Gateways, Multiprotocol Routers, Routers, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.

**UNIT-III Data Link Layer-** Data link layer design issues: Services, Framing, Error and flow control, Stop-and-Wait protocol, Sliding Window protocol, HDLC, Channel allocation: Static and Dynamic allocation, Multiple Access Protocols: ALOHA, CSMA, Collision-free and limited-contention protocols, Virtual LANs, LANs & MANs: IEEE standards for LANs & MANs-IEEE Standards 802.2, 802.3, 802.4, 802.5, 802.6 High Speed LANs, SONET, Video on Demand, Bluetooth, Cellular telephony, Broadband wireless technologies, LAN standards, Ethernet, Wireless LAN, Virtual LAN, DQDB, SMDS, Frame relay, Transmission in ISDN, Broad Band ISDN, ATM Networks, DATA Link Layer in Internet.

**UNIT-IV Upper Layers-** Design Issues in Networks: Routing Algorithms, Congestion Control Algorithms, Network Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking, Internet Transport Protocols: TRANSPORT Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues, Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP Protocols, World Wide Web, Firewalls.

**UNIT-V Advanced Concepts in Computer Networks-** Over View of Cellular Networks, Adhoc Networks, Mobile Adhoc Networks, Wireless Medium Access Control, Properties of a MANET, Sensor Networks, Virtual Private Networks, Delay Tolerant Networks DTN, SDMA, FDMA, CDMA, Mobile network Layer: Mobile IP.



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**MCST-104**  
**DATA STRUCTURE**

**UNIT- I**

**Linear data structures-** Basic concepts-Data types, Abstract Data Types, Data structures, Algorithms, Performance analysis-time complexity and space complexity, Asymptotic Analysis-Big O, Omega and Theta notations. Linear Lists, sequential and Linked allocation, The list ADT, array and linked Implementations, Singly Linked Lists-Operation-Insertion, Deletion, Doubly Linked Lists-Operations-Insertion, Deletion, Stack ADT, definitions, operations, array and linked implementation, application-infix to postfix conversion, recursion implementation, Queue ADT, definitions and operations, array and linked Implementations, Algorithm for above data structures using JAVA.

**UNIT- II**

**Non Linear data structures-** Trees, Basic Terminology, Binary tree ADT, Search trees-Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees-definition and examples only, B-Trees-definition, insertion and searching operations, tree Map Classes, Tries (examples only), Comparison of Search trees. Threaded binary trees, representation and traversal of trees, operations on binary trees, types of binary trees, Java code for traversals, Disjoint Sets, Union and Find algorithms, Priority Queues-Definition, ADT, Realizing a Priority Queue using Heap, Application of trees, Algorithm for above data structures using JAVA.

**UNIT- III**

**Searching-** Linear Search, Binary Search, Hashing-Introduction, hash tables, hash functions, collision resolution methods, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

**UNIT- IV**

**Sorting-**Bubble Sort, Insertion Sort, Selection Sort, Heap Sort, Radix Sort. Algorithm Design method-Divide and conquer method-applications-Quick sort, Merge sort, Comparison of Sorting methods, Model for external sorting, Algorithm for above data structures using JAVA.

**UNIT- V**

**Graphs-** Graphs: Introduction, Basic Terminology, Graph Representations-Adjacency matrix, Adjacency Lists, Adjacency multilists, Graph traversals- DFS and BFS, Application of Graphs-Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for single Source Shortest Path Problem, 'set, Linked and matrix' representation, operations on graphs, Applications of graphs.





**MCST-105**

**ADVANCED OPERATING SYSTEM**

**UNIT-I**

**Operating System Basics-** Processor Registers, Instruction Execution, Interrupts, Interrupts and the Instruction Cycle, Interrupt Processing, Multiple Interrupts, Multiprogramming. The Memory Hierarchy, Cache Memory, I/O Communication Techniques, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, Operating System Objectives and Functions, The Evolution of Operating Systems, Serial Processing, Simple Batch Systems, Multiprogrammed Batch Systems, Time-Sharing Systems, Microsoft Windows Overview, UNIX Systems, Linux Overview

**UNIT-II**

**Processes and Process Control Strategy-** Process States, Process Description, Process Control, Execution of the Operating System, Security Issues, Unix Process Management, Processes and Threads, Multithreading, Thread Functionality, Symmetric Multiprocessing, Microkernel Architecture, Windows Thread and SMP Management, Solaris Thread and SMP Management, Linux Process and Thread Management, Principles of Concurrency, Mutual Exclusion: Hardware Support, Semaphores, Monitors, Message Passing, Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Integrated Deadlock Strategy, Dining Philosophers Problem, UNIX concurrency Mechanisms, Linux Kernel concurrency Mechanisms, Solaris Thread Synchronization Primitives, Windows Concurrency Mechanisms.

**UNIT-III**

**Memory Management & Scheduling-** Memory Partitioning, Paging, Segmentation, Security Issues. Virtual Memory, Locality and Virtual Memory, Operating System Software, UNIX and Solaris Memory Management, Linux Memory Management, Windows Memory Management, Types of Processor Scheduling. Scheduling Algorithms, Traditional UNIX Scheduling, Multiprocessor Scheduling, Real-Time Scheduling, Linux Scheduling, UNIX SVR4 Scheduling, Windows Scheduling, Process and Thread Priorities, Multiprocessor Scheduling.

**UNIT-IV**

**I/O Management and File Management-** Disk Scheduling, I/O Device, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling, Case Study of Unix SVR4 I/O, LINUX I/O, Windows I/O, File Organization and Access, File Directories, File Sharing, Record Blocking, Secondary Storage Management, File System Security, UNIX File Management, LINUX Virtual File System, Windows File System.

**UNIT-V**

**Advance Topics of Operating System-** Embedded Operating Systems, e-Cos, Tiny-OS, Computer Security Concepts, Threats, Attacks, and assets, Intruders, Malicious Software Overview, Viruses, Worms, and Bots, Rootkits, Authentication, access Control, Intrusion Detection, malware Defense, Dealing With buffer Overflow Attacks, Windows Vista Security, Distributed Process Management, Process Migration, Distributed Global States, Distributed Mutual Exclusion, Distributed Deadlock.



**MCST-106**

**ANALYSIS AND DESIGN OF ALGORITHM**

**UNIT-I**

**Algorithm Design and Performance Analysis Techniques-**Designing an Algorithm and Data Structures, Methods of Specifying an Algorithm, Proving an Algorithm's Correctness, Analyzing an algorithm, Important Problem Types: Sorting, Searching, String Processing, Graph Problems, Combinatorial Problems, Geometric Problems, Numerical Problems, Fundamental Data Structures, Linear Data Structures, Graphs, Trees, Sets and Dictionaries, Measuring an Input's Size, Units for Measuring Running Time, Orders of Growth, Worst-Case, Best-Case, and Average-Case Efficiencies, Asymptotic Notations and Basic Efficiency Classes, Informal Introduction, Brute Force and Exhaustive search, General Method for Binary Search, Finding the Maximum and Minimum, Topological Sorting, Fake-Coin Problem, Josephus Problem.

**UNIT-II**

**Divide and Conquer and Problem Reduction-**Divide and Conquer: General method, application-Binary search, Quick sort, Merge sort, Binary Tree Traversals and Related Properties, Multiplication of Large Integers and Strassen's Matrix Multiplication, Closest-Pair and Convex-Hull Problems by Divide-and-Conquer, Computing a Matrix Inverse, Computing a Determinant, Balanced Search Trees, AVL Trees, 2-3 Trees, Heaps and Heap sort, Horner's Rule and Binary Exponentiation, Problem Reduction, Computing the least Common Multiple, Counting Paths in a Graph, reduction of Optimization Problems, Space and Time Trade-offs, Sorting by Counting, Input enhancement in String Matching, Horspool's Algorithm, Huffman Trees and Codes.

**UNIT-III**

**Greedy and Dynamic Programming Methods-**Greedy Method: General Method, Knapsack Problem, Tree Vertex Splitting Dynamic Programming, Applications-Job sequencing with deadlines, Minimum cost spanning trees, Single Source shortest path problem, Dynamic Programming: General method, Examples of dynamic Programming Problem, Applications-Matrix chain multiplication, Optimal binary search trees, knapsack problem, Multistage graphs, Single Source Shortest paths, All pairs shortest path problem, Traveling salesperson problem, Flow shop scheduling, Binary Trees, Graphs, connected Components and Spanning trees, Biconnected Components, Reliability design.

**UNIT-IV Backtracking and Branch and Bound-** Backtracking, General Method, 8 Queens Problem, Graph Coloring, Branch and Bound Method, n-Queens Problem, Graph Coloring, Hamiltonian Circuit Problem, Subset-Sum Problem, Assignment Problem, 0/1 Knapsack Problem, Traveling Salesman problem, Bisection method, Method of False Position, Newton's Method, LC Branch and Bound solution, FIFO Branch and Bound solution.

**UNIT-V NP-Hard and NP-Complete problems-** Basic concepts, non-deterministic algorithms, P, NP, and NP-complete Problems, Cooke's Theorem, Clique Decision Problem, Job Shop Scheduling, String Matching, Randomized Algorithms, Approximation Algorithms for NP-Hard problems, Approximation Algorithms for the Traveling Salesman Problem, Algorithms for Solving Nonlinear Equations.





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**MCST-107**  
**ADVANCED DATABASE MANAGEMENT SYSTEM**

**UNIT-I**

**Fundamentals of Relational DBMS-** Data Models, Schemas and Instances, Data Abstraction, Data Independence, Entity-Relationship (ER) Model, Relational data model concepts, Codd's 12 rules, Overview & Architecture of commercial RDBMSs: Oracle, SQL Server, My SQL etc., Database Language: SQL, SQL Programming Techniques: DDL, DML, DCL query statements, Constraints and Triggers, Views and Indexes, SQL in Server Environment.

**UNIT-II**

**Database Design and Transaction Processing-** Data dependency, Armstrong's Axioms, Functional Dependencies and Normalization of Relation Database, First, Second, and Third Normal forms, Boyce-Codd Normal form (BCNF), ACID Properties of Transactions, concurrency control, serializability and Recoverability, Transaction support in SQL, Locking Techniques, Time Stamp ordering, Validation Techniques, Granularity of Data Items, Database Recovery Techniques-Shadow Paging, Log Based Recovery, ARIES recovery algorithm, Database Security: Access control Statistical Database Security, Deadlock: Detection, Avoidance and Recovery.

**UNIT-III**

**Object Model and Object-Oriented Databases-** User defined abstract data types and structured types, Subclasses, Super classes, Inheritance, Specialization and Generalization, Overview of Object-Oriented concepts, Database schema design for OODBMS; OQL, Persistent Programming languages; OODBMS Architecture and storage issues; Transactions and concurrency control, Example of ODBMS, Database design for an ORDBMS-Nested relations and collections; Storage and access methods, Query Processing and Optimization; An overview of SQL3, Implementation issues for extended type; Systems comparison of RDBMS, OODBMS, ORDBMS.

**UNIT-IV**

**Parallel and Distributed Databases and Client-Server Architecture-** Architectures for Parallel databases, Parallel Query evaluation; Parallelizing individual operations, Sorting, Joins; Distributed database concepts, Data fragmentation, replication, and allocation techniques for distributed database design; Query processing in distributed data based; Concurrency control and recovery in distributed databases. An overview of Client-Server architecture

**UNIT-V**

**Databases on the Web and Advanced Applications-** Web interfaces to the Web, Overview of XML; Structure of XML data, Document schema, Querying XML data; Storage of XML data, XML application; the semi structured data model, Implementation issues, Indexes for text data, Active databases, Concepts and architecture; Deductive databases and Query processing; Mobile databases, Geographic information systems.



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**MCST-108**  
**COMPUTER GRAPHICS AND MULTIMEDIA**

**UNIT-I**

**Introduction to Computer Graphics**

What is Computer Graphics, Computer Graphics application, Computer Graphics Hardware and Software, Two dimensional Graphics Primitives: Points and Lines, Line drawing algorithms: DDA, Bresenham's; Circle drawing Algorithms: Using polar coordinates, Bresenham's circle drawing, midpoint circle drawing algorithm: filled area algorithms; Scan line: Polygon filling algorithm, boundary filled area algorithms: Scanline: Polygon filling algorithm, boundary filled algorithm.

**UNIT-II**

**Two/Three Dimensional Viewing**

2-D viewing pipeline, windows, viewports, window to view port mapping; Clipping: point, clipping line (algorithms):- 4 bit code algorithm, Sutherland-cohen algorithm, parametric line clipping algorithm (Cyrus Beck), Polygon clipping algorithm: sutherland-Hodgeman polygon clipping algorithm. Two dimensional transformation: transformation, translation, scaling, rotation, reflection, composite transformation.

**UNIT-III**

**Three-dimensional Transformation and Hidden surface removal**

Three dimensional graphics concept, Matrix representation of 3-D Transformation, Composition of 3-D transformation, viewing in 3D: Projection, types of projection, the mathematics of planar geometric projection, coordinate systems, Hidden surface removal: Introduction to hidden surface removal. The Z-buffer algorithm, scanline algorithm, area sub-division algorithm.

**UNIT-IV**

**Representing Curves and Surfaces**

Parametric representation of curves: Bezier curves, B-Spline curves. Parametric representation of surfaces; Interpolation method; Illumination, shading, image Manipulation: Illumination models, shading models for polygons, shadows, transparency. What is an image? Filtering, image processing, geometric transformation of images.

**UNIT-V**

**Multimedia Technology**

Framework for multimedia systems; multimedia devices; Multimedia Presentation and Authoring; professional development tools; Multimedia servers & databases; vector graphics; Animation techniques; Shading; anti Aliasing; Morphing; Video on demand, Image Compression & standards: Making still images; editing and capturing images; scanning images; JPEG-objectives and architecture; JPEG-DCT encoding and quantization, Overview of other image file formats as GIF, TIFF, BMP, PNG etc, Introduction to MPEG, MP3, MP4 etc.



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**MCST-109**  
**ADVANCED COMPUTER ARCHITECTURE**

**UNIT-I**

**Fundamental concepts of Computer Architecture**

Role of compiler, Instruction set principles and examples, Classifying instruction set, Instruction Format, Memory addressing-type and size of operands, addressing modes: Definition, Need, Type and Implementation of Addressing Mode, Execution of Instruction, Instruction Cycle, Type of Classification of Parallel computing: Flynn's classification, Handler's classification and other classifications with example; Classification on basis of Software taxonomy: Kung's Taxonomy & SPMD; Parallelism Approaches: Data Parallelism, Control Parallelism, Paradigms of parallel computing: Synchronous-vector/array, SIMD, Systolic; Asynchronous-MIMD, reduction paradigm; Interconnection Networks: Static and Dynamic Interconnection Networks, Multiprocessors-Bus Based Interconnection Networks, Analysis and Performance Metrics for Interconnection Networks, Scalability of Parallel Architectures.

**UNIT-II**

**Computational Models and Pipelining**

Computational Models: combinational circuits, sorting Network, PRAM models, Performance of Parallel Processors & Performance Metrics: speedups, efficiency, utilization, communication overheads, single/multiple program performance, bench marks, Amdahl's law, Gustafson-Basis's law, Karf-Flatt metric, Isoefficiency metric. Pipelining: Basic and Intermediate Concepts, Type of Pipeline, Pipeline Hazards, How Is Pipelining Implemented? What Makes Pipelining Hard to Implement? Instruction-Level Parallelism Concepts and Challenges, Static and Dynamic Scheduling, Numerical Problems on dynamic Scheduling.

**UNIT-III**

**Instruction level parallelism**

Classification of ILP Processor: Pipeline Processor, Superscalar Processor and VLIW Processor, Comparisons and examples of all ILP Processor Architecture, Overcoming Data Hazards with Dynamic Scheduling, Dynamic Scheduling: Examples and the Algorithm, Reducing branch cost, High performance instruction delivery, Limitation of ILP; Hardware-Based Speculation, Advanced Techniques for Instruction Delivery and Speculation, Limitation on ILP for Realizable Processors, ILP software approach-compiler techniques-static branch protection-VLIW approach-H.W. support for more ILP at compile time-H.W. verses S.W. solution, Crosscutting Issues: hardware versus Software Speculation, Thread-Level Parallelism.



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#### **UNIT-IV**

##### **Multiprocessors Architecture**

Shared Memory architecture, Classification of Shared Memory System, Bus-Based Symmetric Multiprocessors, Basic Cache Coherency Methods, Snooping Protocols, Directory Based Protocols, Symmetric Shared-Memory Architectures, Performance of Symmetric Shared-Memory Multiprocessors, Distributed Shared Memory and Directory-Based Coherence, Shared Memory Programming, Message Passing Architecture, Introduction to Message Passing, Routing in Message Passing Networks, Switching Mechanisms in Message Passing, Message Passing Programming Models, Processor Support for Message Passing, message Passing Versus Shared Memory Architectures.

#### **UNIT-V**

##### **Multicomputer Architecture & Parallel Programming**

Client /Server Systems, Clusters and Grid Computing, PVM Environment and Application Structure, Message Passing Interface, Distributed Computing, Shared memory Programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming, Scheduling and Parallelization: Scheduling parallel programs, Loop scheduling, Parallel programming support environments.



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## MCST-110 .NET TECHNOLOGY

### UNIT-I

#### **.NET framework and C#.NET**

Introduction to .NET Technology, .NET Framework, components of .NET CLR and Class Library Importance of MSIL, CTS etc. Class Libraries, Introduction to Visual Studio .NET, IDE, Menu Bar, Toolbox, Output Windows, V&EDP, Inside a C# Program, Data Types, Statements, Arrays, Using Strings, Objects, Classes and Structs, Properties, Inheritance, Indexers, Delegates, Events, Namespaces, Generics, Collections and Data Structures, Exception Handling, Threading, Using Streams and Files, Reflection, Assemblies, versioning, Windows Forms, Controls.

### UNIT-II

#### **Programming with VB .NET**

The structure of VB .NET and Control structures, VB .NET Variables, VB.NET Operators, Control Statements, Working with forms, GUI with windows forms, Working with Menu, Loops, Validation, Sub Procedures and Function, Multiple Forms, Form Controls, File Handling, Exception Handling, Working with Databases, Advanced Database Programming using ADO.net, Classes, Generics, Collections, Inheritance, Custom controls, Packaging & deployment, using Crystal Reports.

### UNIT-III

#### **Fundamentals of ASP.NET**

How to create simple ASP.NET, Building a Web Application, Examples Using Standard Controls, Using HTML controls, Validating Form Input Controls Using Validation Controls, Understanding Application and State, Applying Styles, Themes, and Skins, Creating a Layout Using Master Pages, Working with Rich Controls-AD Rotator, Multi view, File upload etc, Working with navigation related controls-Treeview, SiteMapPath etc. Master pages and themes, Cookies and their application, Binding to Databases using Controls, Data Management with ADO.net, Creating a Site Navigation Hierarchy, Navigation Controls, Membership and Role Management, Login controls, Securing Applications, Caching for Performance, working with XML, Using Crystal Reports in Web Forms.



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## UNIT-IV

### Database handling with .NET Technology

How to consume a web service from an ASP.NET page, Web services accessing database, SQL Connect, SQL Command, Data Access with LINQ to SQL : Automatic Properties, Initializers, Understanding type inference/lamda exp/generics/anonymous types, Creating LINQ to SQL Entities, Performing standard database commands with LINQ to SQL, Creating a custom LINQ entity Base Class, Standard Data-access operation, Performing Validation; Navigation Controls: Understanding Site Maps, SiteMapPath Control, Formatting the SitMapPath Control, Menu Control, Tree View Control; Login Control: Automatically Redirecting a user to the Referring Page, Automatically Hiding the Logging control form authenticated users, Authenticated Users, Change Password control, Templates with Password Recovery Control, Caching application Pages and Data, Manipulating the Page Output profiles, Localizing Applications for multiple languages, Setting the culture in the web.config file, Forms-Based Authentication with the web.config file.

### UNIT-V Advanced Applications in .NET Framework

XML Web Services: Setting Web method Attribute, Setting Web Services Attribute, Invoking and XML Web Service with HTTP-Get, HTTP-Post & SOAP, XML Web Services Behavior, AJAX (Asynchronous Java Script and XML): Server Side & Client Side Ajax, Ajax Toolkit, Setting up and implementing Ajax, SQL server Administration: Setup Database server of a website, Converting data between MDF to DBO, DBO to XLS or in any other format, Backup and Restore of data, FTP Management, Setting up FTP server (Live), Sending Emails, Designing email panel, How to send and email to various users, Sending auto emails.





**MCSP  
JAVA PROGRAMMING WITH DATA STRUCTURE LAB**

**List of Sample Problems/Experiments:**

1. Write a JAVA program to perform the following operations:
  - a) Create a Singly linked list of integers.
  - b) Delete an integer from the above singly linked list.
2. **(i)** Write a JAVA program to implement Linked List using templates. Include function for insertion, deletion and search of a number, reverse the list and concatenate two linked lists.  
**(ii)** Write a JAVA program to perform the following operations:
  - a) Create a doubly linked list of integers.
  - b) Delete an integer from the above doubly linked list.**(iii)** Write a JAVA program to implement Doubly Linked List using templates. Include function for insertion, deletion and search of a number, reverse the list.  
**(iv)** Write a JAVA program to implement Circular Linked list Using templates. Include function for insertion deletion and search of a number, reverse the list.  
**(v)** Write a JAVA program to add to polynomials using linked list representation.  
**(vi)** Write a menu driven program to implement to the following operations in an ordered linked list: a) Insertion b) Deletion c) Merging
3. Write JAVA programs to implement the following using an array.
  - a. a) Stack ADT      b) Queue ADT
4. Write JAVA programs to implement the following using a singly linked list
  - a. a) Stack ADT      b) Queue ADT
5. **(i)** Write a JAVA program to convert a given infix expression into postfix form using stack.  
**(ii)** Write a JAVA program to add two large integers using stack  
**(iii)** Write a JAVA programs to evaluate postfix expression using stack.  
**(iv)** Write a JAVA programs to perform the following Stack operations using linked list a) Push    b) Pop      c) Clear  
**(v)** Write a JAVA programs to create and perform the following operations on Queues using linked list:      a) Enqueue    b) Dequeue  
**(vi)** Write a JAVA programs to reverse elements of a Stack using an additional Stack.
6. **(i)** Write JAVA programs to implement the deque (double ended queue) ADT using a doubly linked list and an array.  
**(ii)** Write JAVA program to perform the following Queue operations using Circular Array implementation (Use Templates): a) Enqueue b) Dequeue  
**(iii)** Write a JAVA program to reverse elements of a Stack using an additional Queue.
7. Write JAVA programs that use recursive function to traverse the given Binary tree in      a) Preorder    b) inorder    and    c) postorder
8. Write JAVA programs to implement the following operations in a Binary Search Tree.
  - a) Insert an element into a binary search tree



# बिलासपुर विश्वविद्यालय, बिलासपुर (छत्तीसगढ़)

पाठ्यक्रम सत्र 2017-18

एम. एससी. कम्प्यूटर साइंस (पूर्व)

- b) Delete an element from a binary search tree
  - c) Search for a key element in a binary search tree
  - d) Deletion by copying or by merging
  - e) display the contents in one of preorder, postorder and inorder traversals using recursion
  - f) Display the contents by level-by-level traversal
  - g) Count the leaf and non-leaf nodes of the tree.
  - h) Display the height of the tree
  - i) Create the mirror image of the tree
9. Write JAVA programs that use non-recursive functions to traverse the given binary tree in a) Preorder b) inorder and c) postorder
  10. Write JAVA programs for the implementation of BFS and DFS for a given graph.
  11. Write JAVA programs for implementing the following Searching methods:
    - a) Linear Search
    - b) Binary Search
  12. Write JAVA programs for implementing the following sorting methods:
    - a) Bubble Sort
    - b) Selection Sort
    - c) Insertion Sort
  13. Write JAVA programs for implementing the following sorting methods:
    - a) Merge sort
    - b) Quick sort
    - c) Heap sort
  14. Write a JAVA programs to perform the following operations
    - a) Insertion into a B-tree
    - b) Deletion from a B-tree
  15. Write a JAVA programs to perform the following operations
    - a) Insertion into an AVL-tree
    - b) Deletion from an AVL-tree
  16. Write JAVA programs to implement all the function of a dictionary (ADT) using hashing.
  17. Write a JAVA program for implementing Knuth-Morris-Pratt pattern matching algorithm.
  18. Write a JAVA programs for generating Minimum cost spanning tree using Kruskal's algorithm.
  19. Write a menu driven JAVA program to implement the following sparse matrices using one-dimensional array:
    - a) Diagonal Matrix
    - b) Lower Triangular Matrix
    - c) Upper Triangular Matrix
    - d) symmetric Matrix
  20. Write JAVA program to create a Hash Table that allows insertion, deletion and searching for an element.



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**List of Sample Topic on Java:**

**1. Introduction**

- a) Introduction-what is java, Importance of Java, java implementation application of java
- b) Java buzzwords (simple, secure, portable, object-oriented, robust multithreaded, architecture-natural, interpreted, high performance, distributed dynamic)
- c) object oriented programming
- d) three OOP Principals (encapsulation, inheritance, polymorphism)
- e) sample program & compilation
- f) Using block of code
- g) lexical issues (White space, identifiers, literals, comments, separators, keyword)
- h) Java Class Library

**2. Data type, operators, control structures**

- a) Variables, constants, declaration, literals, scope of variable, type casting
- b) Arithmetic operators, relational operators, logical operators, assignment operators, increment-decrement operators, conditional operators, bit wise operators, interface of operators, dot operators
- c) If-else, statement, loops (while, do-while, for break, goto, continue return switch statement, operator
- d) Array-declaration, creation, initialization, length
- e) Two-dimensional arrays
- f) string-string arrays, string methods, stringbuffer class

**3. Introduction of classes, objects and methods**

- a) What is class, object & method
- b) defining class adding variables adding methods, creating objects
- c) constructors THIS key word, garbage collection, finalize () Method
- d) accessing class members, methods overloading static members, nesting of methods
- e) vectors and wrapper classes
- f) inheritance, subclasses, subclass constructor, multiple inheritance, hierarchical inheritance overriding methods
- g) final variables and methods, final classes, finalizer methods, abstract methods and classes
- h) visibility control-public access, friendly access, protected access private protected access rules of thumb
- i) method overloading, object as parameters, argument passing, returning object recursion, access control static final
- j) Nested & inner classes
- k) string class
- l) Command-Line arguments

**4. Inheritance**

- a) inheritance, Member access, super class
- b) creating multilevel hierarchy
- c) Method over loading & overriding
- d) Abstract class, method
- e) Using final to prevent overriding & overloading
- f) The object class



## 5. Packages and Interfaces

### 6. Exception handling

- Exception types, uncaught exception, multiple catch clauses, nested try statements
- Throw, throws, finally, java's built-in exceptions
- Creating your own exception subclasses

### 7. Multithreaded programming

- Creating threads, run() method, New thread, thread class, stopping & blocking threads
- Life cycle of thread-newborn, runnable, running, blocked, dead, waiting sleeping, suspended, blocked
- Using thread methods, thread exceptions, thread priority, synchronization
- Implementing the Runnable interface

### 8. Applet

- What is an applet?
- Applet lifecycle
- Applet class
- Applet context class
- Passing parameters to applet
- Use of Java .awt graphics class and its various methods in an applet

### 9. Event handling

- Event delegation model or event class hierarchy
- All classes and interfaces of event delegation model, programmes related to event handling covering all types of events

### 10. I/O file in java

#### 11. Graphical user interface

- Layout managers (flowlayout, borderlayout, cardlayout gridbaglayout, gridlayout)
- AWT controls (labels, buttons, canvases, checkbox, checkboxgroup, choices, text fields, text areas, lists, scrollbars, panels, windows, frames, menus, menu bars)

### 12. Java Swing



**MCSP-112**

**.NET PROGRAMMING LAB with SQL**

Series of Practical Curriculum

**1. As per Unit-I to Unit-V of Theoretical Paper and**

**2. Web Architecture**

The Way the Web works  
The Asp.net difference  
Client-Side Processing  
How Asp.net Ties It Together

**3. Setting up and Installing ASP.NET**

Installing Internet Information server  
IIS Manager  
Creating Virtual/home directory  
Folder Settings  
Adding a virtual directory to your neighborhood  
Installing .Net Framework SDK

**4. Overview of the ASP.NET Framework**

**5. Using the Standard Controls**

**6. Using the Validation Controls**

**7. Using the Rich Controls**

**8. Designing Websites with master pages**

**9. Designing Websites with Themes**

**10. Microsoft SQL Server 2005 Express**

Overview of SQL Server 2005 Express  
Installation of SQL Server 2005 Express  
Features of SQL Server Express  
SQL Server 2005 Express management tools  
Server databases versus Local Databases

**11. Overview of Data Access**

Using Data Bound Controls  
Working with List Controls  
Working with tabular Data Bound controls  
Working with Hierarchical Data Bound Controls  
Working with other Controls, Using Data Source Controls  
Using ASP.NET parameters with data source controls  
Using programmatic Data Binding  
Understanding Templates and Data binding Expressions  
Using templates, Using Data Binding Expressions  
Using 2 ways Data Binding Expression

**12. Using SQL Data Source Control**

Creating database connection  
Connecting to MSSQL Server  
Connecting to ORACLE and MS Access  
Storing connection String in web configuration file  
Executing Database Commands  
Executing inline SQL Statements  
Executing stored Procedures  
Filtering database rows



- Changing the data source mode
- Handling SQL Command execution errors
- Canceling command execution
- Using ASP.NET parameters with SQL Data Source Control
- Using the ASP.NET cookie parameter object
- Using the Query String Parameter object
- Programmatically Executing SQL Data Source commands
- Adding ado.net parameters
- Executing insert, Update and Delete commands
- Executing select commands
- Caching Database Data with SQL Data Source Control

### **13. Using List Controls**

- Overview of the List Controls
- Declaring List Items
- Binding to a Data Source
- Determining the Selected List Item
- Appending data items
- Enabling automatic post backs
- Using the Items Collection
- Working with the Drop down List Control
- Working with the Radio Button List control
- Working with the List box control
- Working with the Check Box List control
- Working with the Bulleted List control

### **14. Using the Grid View Control**

### **15. Using the Details View and Form View Controls**

### **16. Using Repeater and Data list Controls**

### **17. Using the List View and Data Pager Controls**

### **18. Data Access with LINQ to SQL**

- New C# and VB.NET Language features
- Understanding Automatic Properties
- Understanding Initializes
- Understanding type inference/lamda exp/generics/anonymous types
- Creating LINQ to SQL Entities
- Performing standard database commands with LINQ to SQL
- Creating a custom LINQ entity Base Class
- Standard Data-access operation
- Performing Validation

### **19. Using Navigation Controls**

### **20. Using the Login Control**

### **21. Caching Application Pages and Data**

### **22. Localizing Applications for multiple languages**

- Setting the current culture
- Setting a culture manually
- Automatically detecting a culture
- Setting the culture in the wev.config file
- Culture and ASP.NET controls

### **23. Using Form-Based Authentication**

### **24. Creating an XML Web Services**





Precompiling an XML Web Service  
Testing an XML Web Services from browser  
Invoking an XML Web Services with HTTP-Get  
Invoking an XML Web Services with HTTP-Post  
Invoking an XML Web Services with SOAP

**25. Advanced XML Web Services**

Using the Web Service Behavior  
Examining Limitations of the Web Service Behavior  
Creating a Simple Page with a Web Service Behavior  
Using Web Service Behavior Callback Functions

**26. AJAX (Asynchronous Java Script and XML)**

About Ajax  
Server Side Ajax & Client Side Ajax  
Ajax Toolkit  
Setting up and implementing Ajax

**27. Microsoft SQL Server Administration**

Query analyzer  
Enterprise Manager Console  
Import/Export of data between Remote and Local Server (Live)  
How to setup Database Server of a website  
Converting database between MDF to DBO, DBO to XLS or in any other format  
How to generate SQL Script  
Backup and Restore of data  
Using Stored Procedure  
Uploading and downloading files from Database server

**28. FTP management**

Understanding FTP  
Setting up FTP Server (Live)  
Uploading and Downloading FTP contents

**29. Sending Emails**

Designing email panel  
How to send an email to various users  
Sending auto emails



## SQL SERVER

Following topics should cover on each part:

### PART-1

connecting to a Server, Using Management Studio with Database Engine, Data Types, Data Definition Language, Creating Database Object, Creation of A Database, Modification of a Table's Contents, Security System of Database Engine, System Environment of Database Engine, System Database, Master Database, Business Intelligence and Transact-SQL, SQL/OLAP, Microsoft Reporting services, Report Manager, Report Server, Report Catalog, SQL Server and XML, Introduction to Spatial Data.

### PART-2

1. RDBMS Basics: What Makes Up a SQL Server Database?
2. Tools of the Trade
3. The Foundation Statements of T-SQL
4. JOINS
5. Creating and Altering Tables
6. Constraints
7. Adding More to Our Queries
8. Being Normal: Normalization and Other Basic Design issues
9. SQL Server Storage and Index Structures
10. Views
11. Writing Scripts and Batches
12. Stored Procedures
13. User-Defined Functions
14. Transactions and Locks
15. Triggers
16. A Brief XML Primer
17. Reporting for Duty, Sir! A Look At Reporting Services
18. Getting Integrated with Integration Service
19. Playing Administrator