

Subject Name: Data structure & File Organization Using C
Language

Subject Code: TMC 201

10 Details of the Course:

Unit No.	CONTENT	
1	Introduction: Basic Terminology, Pointer and dynamic memory allocation, Elementary Data Organization, Algorithm Complexity and Time-Space trade-off. Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, Sparse Matrices. Recursion: Definition, Tail recursion.	
2	Stack: Array Representation of stack, Linked Representation of Stack, Infix, Prefix and Postfix Expressions. Queues: Array and linked representation and of queues, Circular queue, D-queue, and Priority Queue. Linked list: Representation of Singly Linked Lists, Two-way Header List, Doubly linked list, Generalized linked list.	
3	Trees: Binary Trees, Binary Search tree, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Threaded Binary trees, AVL Tree, Huffman algorithm & Huffman tree. Searching and Hashing: Sequential search, binary search, Hash Table, Hash Functions, Collision Resolution Strategies.	
4	Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort. Graphs- BFS, DFS. Spanning tree: Minimum Spanning tree, Kruskal's Algorithm, Prim's Algorithm, Applications of graph.	
5	File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.	

11 Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	R. Kruse, "Data Structures and Program Design in C" Pearson Education	2003
2	Horowitz and Sahani, "Fundamentals of data Structures", Galgotia	2002
3	A M Tenenbaum, "Data Structures using C & C++", PHI	2005
4	Lipschutz, "Data Structure", TMH	2003
5	K Loudon, "Mastering Algorithms With C", Shroff Publisher & Distributors	2004

Unit No.	CONTENT	
1	<p>Beginning with OOP: Introduction of object oriented programming (OOP) and comparison with structured programming. OOP's concepts, polymorphism, inheritance, encapsulation, abstraction, application and benefits of OOPs.</p> <p>Introduction and Evolution of Java: Evolution of Java, Byte Code, JDK, JVM, JRE. Creation of user defined classes</p> <p>Using concepts of polymorphism, inheritance. Overloading ,Overriding,Command line arguments</p> <p>Fundamental Classes: Object class, Wrapper classes, String class, immutability, StringBuffer and StringBuilder.Array Manipulations.</p>	
2	<p>Abstract class and Interface: Defining abstract classes and Interfaces, abstract methods declarations, implementing interfaces, extended interfaces, interface references and constants in interfaces</p> <p>Exception handling: Exception Types, Exception class, RuntimeException Class,Checked and unchecked Exceptions, Defining new exceptions; Handling: try, catch and finally; throw statement, throws clause.</p> <p>I/O: The File class, FilenameFilter, Byte Streams: Input and Output streams, Character streams: readers and writers; object serialization.</p>	
3	<p>Thread: Overview of threads, thread Creation; implementing the runnable interfaces, extending the thread class, Thread States, methods: Running, Yielding, sleeping, joining, waiting and notifying. Thread synchronization.</p> <p>Object Lifetime: Garbage Collection, Reachable Objects, Object Finalization.</p> <p>Nested and Inner Classes/O: The File class, FilenameFilter, Byte Streams: Input and Output streams, Character streams: readers and writers; object serialization</p> <p>Applet: Applet basics, Applet Architecture, Applet Life cycle; Event Handling: Event handling mechanisms, the Delegation Event Model, Event classes, sources of events, Event Listener Interfaces, Adapter classes</p>	
4	<p>Networking: Networking Basics, Java and the Net, TCP/IP Client sockets, URL, URLConnection, TCP/IP Server sockets, Datagram</p> <p>Introduction to Generic Classes and Collection (List, Set, Map) Vector, ArrayList etc.</p> <p>JDBC: Concept of JDBC, JDBC Driver Types, JDBC Packages, Database Connection, Associating the JDBC/ODBC Bridge with the Database, JDBC URL, Statement Objects, ResultSet, Transaction Processing, commit, savepoint, rollback, ResultSetMetadata,</p>	

	DatabaseMetadata, Data Types, SQLException, Prepared Statement, CallableStatement, Batch updates. Storing and Retrieving images via JDBC.	
5	<p>Servlets: Advantages of Servlets over CGI, Installing Servlets, The Servlet's Life Cycle, Servlet API, Handling HTTP GET and POST Request, ServletConfig, ServletContext, Requests and Responses, GenericServlet, HttpServlet, HttpServletRequest, HttpServletResponse, Deployment Descriptor, Request Dispatcher</p> <p>Session: Cookies, Session Tracking, Filter API, Multi-tier Applications Using Database. Connectivity.</p> <p>Java Server Pages (JSP) Problems with Servlets and Advantages of JSP, JSP Scripting Elements- (Directives, Declaratives, Scriptlets, Expressions, Implicit Variables), Page Directives, JSTL, Standard Action, Custom Tags.</p> <p>Hibernate: Object Relational Mapping, Advantages over JDBC, Mapping from Java classes to database tables (and from Java data types to SQL data types), Data query, retrieval and manipulation.</p>	

11 Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	Naughton, Schildt, "The Complete Reference JAVA2", TMH, 7 th edition	2007
2	Khalid A. Mughal: A Programmer's Guide To JAVA, Addison Wesley, 3 rd edition.	2008

Subject Name: Computer Networks

Subject Code: TMC 203

Unit No.	CONTENT	
1	Introduction: Data Communication Basics, History of Computer Networking and the Internet. Internet, Protocol, Services. Computer Network: Hardware, Media and topology. Protocol layering: The OSI Reference Model and the TCP/IP protocol stack. Internet Access Networks. Circuit and Packet Switching, Delays: Processing, Queuing, Transmission and Propagation delays.	
2	Application Layer: Principles and Architectures of Network Applications. Application Layer Protocols- The Web and http: Persistent and Non-persistent connections, http message format, cookies, proxy server, conditional GET, File Transfer Protocol. Email: SMTP, mail message formats, mail access protocols: POP3, IMAP, MIME. DNS: Services, how it works, Root, Top-Level and Authoritative DNS servers, Resource Records, DNS messages. A simple Introduction to p2p files distribution: Bit Torrent	
3	Transport Layer: Introduction and Services, Transport layer in internet, Difference between Connection Oriented and Connectionless services. UDP: Segment structure, checksum in UDP. TCP: the principles behind connection-oriented data transfer, stop-and-wait, Go Back N, Selective Repeat. Connection Establishment, TCP header, Round Trip Time, designing a reliable data transfer protocol.	
4	Network Layer: Network Layer Design Issues, Packet Forwarding and Routing, Difference between Virtual Circuits and Datagram networks, The Internet Protocol (IP), Datagram format, IP fragmentation, IPv4 addressing, subnets, CIDR, classful addressing, DHCP, Network Address Translation (NAT). IPv6 Header, Moving from IPv4 to IPv6: tunneling, dual stack and header translation. Routing Algorithms: Link state (LS), Distance Vector (DV). Routing in the Internet: RIP, OSPF & BGP.	
5	Link Layer and Local Area Network: Introduction and Services: Service provided by the LL, Implemented. Error-Detection and Correction Techniques: Parity checks, Check-summing methods, Cyclic Redundancy Check (CRC). Multiple Access protocols: Channel partitioning, Random access. Ethernet: Frame structure, CSMA/CD, Ethernet technologies. Signals- analog and digital signals, periodic and a periodic signal, Digital Data Conversion: unipolar, polar, bipolar. Analog data conversion: - PAM, PCM, sampling. Modulation techniques: - ASK, FSK, PSK, AM, FM, PM.	

Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLIC ATION
1	"Computer Networking – A Top Down Approach", James F. Kurose and Keith W. Ross, Pearson Fifth Edition.	2014
2	"Computer Networks" 4 th Edition, Andrew S. Tanenbaum, Pearson.	2006
3	"Computer Networking – A Top Down Approach" Behrouz A Forouzan and F Mosharraf, Fifth Edition, McGraw Hill.	2014
4	"Computer Networks & Internets", Douglas E. Comer, MS Narayanan, 4 th Edition.	2004
5	"TCP/IP Protocol Suite", 4 th Edition, Behrouz A Forouzan, TMH.	2010

Subject Name: Database Management System**Subject Code:** TMC 204

Unit No.	CONTENT	
1	Introduction to DBMS: An overview of database management system, Database System Vs File System, Database system concepts, data models. Advantages of DBMS, Schema and instances, Three schema architecture, data independence. Data base languages and interfaces, Disadvantages of DBMS.	
2	Data Modeling and Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree, ER Case Studies. Relational Data Base Model (RDBMS): Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra: operations and queries.	
3	Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, DDL,DML,DCL, and DQL statements, SQL operators and their use, Tables, views and indexes, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus. Overview of PL/SQL, Triggers and cursors.	
4	High Level Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs.	
5	Transaction Processing Concepts: Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling. Concurrency Control: Concurrency control mechanism, locking Techniques for concurrency control.	

Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	Elmasri and Navathe: Fundamentals of Database Systems, 5 th Edition, Pearson Education.	2007
2	Silberschatz, Korth and Sudharshan: Data base System Concepts, 5 th Edition, McGrawHill.	2006
3	C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems, 8th Edition, Pearson education.	1996
4	Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 3 rd Edition, McGraw-Hill.	2003

Subject Name: Virtualization and Cloud Computing

Subject Code: TMC 205(2)

Unit No.	CONTENT	
1	Introduction: Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Cloud computing Fundamentals – Brief history of cloud computing, CloudStorage, Pros and Cons of cloud computing, Benefits from cloudcomputing.Essential characteristics of cloud computing model.	
2	Cloud Platform Architecture: Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Cloud Deployment models and their comparative study, Service Oriented Architecture. Software environments for clouds, Performance, Security and Energy Efficiency, Main players in the field, Introduction to AWS, Key Amazon offerings, Google App Engine.	
3	Storage Architectures: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Prevalent Storage technologies like DAS, RAID, NAS and SAN architectures, Data centers for Cloud Computing, Amazon's Elastic Block Storage (EBS).	
4	Virtual Machines and Virtualization: Introduction, brief history of virtualization, Need for virtualization, Concept of hypervisor and its types, Virtualization architecture, pros and cons of virtualization, Types of Virtualization, Hardware Virtualization, Software Virtualization, Memory Virtualization, Storage Virtualization, Data Virtualization, Network Virtualization, Cloud Security Recommendations, Virtualization Security Recommendations.	
5	Cloud Programming, Resource Management and Scheduling: Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine: Policies and Mechanisms for Resource Management, Cloud Scheduling Applications of Control Theory to Task Scheduling on a Cloud. Elastic load balancing and auto scaling.	

Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier	2013
2	Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier	2010
3	Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH.	2010
4	G. Reese, "Cloud Application Architectures", O.Reilly	2009
5	D.S. Linthicum "Cloud Computing and SOA Convergence in Your Enterprise: A Step-by-Step Guide", Addison Wesley	2009

Subject Name: Software Engineering and Project Management

Subject Code: TMC 206

Unit No.	CONTENT	
1	<p>Introduction: Introduction to Software, Software Crisis, Software Processes & Characteristics, Introduction to Software engineering, Software life cycle models, Process Models. Software quality.</p> <p>Software Quality and Reliability: Introduction, Importance of Software Reliability, Failure and Faults, Reliability Models, Software Quality Models, compression of CMM and ISO 9001, Six-Sigma, just in time, total quality management etc.</p>	
2	<p>Software Project Management: Software Project Management life cycle, Software Project PlanningProject Estimation: Size Estimation: Lines of Code & Function Count, Cost Estimation Models, Risk Estimation and Management, Effort estimation, Project monitoring and control.</p> <p>Software Requirements Analysis & specifications: Requirement Engineering, Elicitation techniques, Requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Characteristics & organization of SRS, IEEE Standard for SRS.</p>	
3	<p>Software Development: Agile method Methodology; Extreme programming; Rapid application development; Clean Room Software Development; Component Based Software Development.</p> <p>Software Design: Design Concepts, Cohesion & Coupling, Function Oriented Design, Object Oriented Design, Software coding techniques and guidelines.</p>	
4	<p>Software Testing: Objectives, lifecycle, Testing process, Design of test cases, Levels of Testing, Debugging, testing techniques, Blackbox testing techniques, Whitebox testing techniques, Introduction to functional testing & Structural testing, Object oriented testing and web-based software testing.</p>	
5	<p>Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Software Configuration Management. Software Configuration Management vs Software maintenance.</p> <p>Project Scheduling: Basic Concepts, Project Scheduling- Basic Principles, Relationship between People and Effort, Task Network, Scheduling, Gantt and PERT charts, Staffing.</p>	

Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	R. S. Pressman, "Software Engineering – A Practitioner's Approach", McGraw Hill Int. , 7 th Ed.	2010
2	Stephen R. Schach, "Classical & Object Oriented Software Engineering", 7 th Ed., TMH	2007
3	Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa, 3 rd Ed.	2005
4	K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International, 4 th Ed.	2009
5	Carlo Ghizzi , Mehdi Jazayeri and Dino Mandrioli, "Fundamental of Software Engineering", PHI, 3 rd Ed.	2009