Subject Name: Data structure & File Organization Using C Language   **Subject Code:** TMC 201

Course Name: Master of Computer Applications (MCA)

1 Contact Hours: 45   **L** 3   **T** 0   **P** 0

2 Examination Duration (Hrs):   **Theory** 0 3   **Practical** 0 0

3 Relative Weightage: **CWE:** 25   **MTE:** 25   **ETE:** 50

4 Credits : 0 3

5 Semester: ☐   ☒ *   ☐
     Autumn   **Spring**   **Both**

6 Pre-Requisite: Knowledge of 'C' language.

7 Subject Area: Computer Science

8 Objective: To familiarize students with the different Data Structures and their applications.

9 Course Outcome:
A student who successfully fulfills the course requirements will be able to:
CO 1 Describe and analyze the concept of Data Structures and assess how the choice of data structures impacts the performance of programs
CO 2 Compare and contrast merits and demerits of various data structures in terms of time and memory complexity.
CO 3 Identify and propose appropriate data structure for providing the solution to the real-world problems.
CO 4 Implement operations like searching, insertion, deletion, traversing mechanism etc. on various data structures
CO 5 Apply hashing schemes for searching and sorting algorithms.
CO 6 To augment merits of particular data structures on other data structure to develop innovation in subject of study.

10 Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
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.	7

	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.	10
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.	10
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.	10
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.	8
	TOTAL	**45**

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

Subject Name: Object oriented Analysis and JAVA Programming   **Subject Code:**   TMC 202

Course Name: Master of Computer Applications (MCA)

1   Contact Hours: 45   **L** 3   **T** 0   **P**   0

2   Examination Duration (Hrs):   **Theory**   0   3   **Practical**   0   0

3   Relative Weightage: **CWE:** 25   **MTE:** 25   **ETE:**   50

4   Credits: 0   3

5   Semester: ☐   *   ☐
        Autumn   Spring   Both

6   Pre-Requisite: Knowledge of programming

7   Subject Area: Computer Science

8   Objective: To familiarize students with object-oriented concepts and the power of Java language , enrich them with robust tools of Java language**.**

9   Course Outcome:

CO 1   Apply and characterize the Java programming features to develop programs for demonstrate the same.

CO 2   Make use of object oriented concepts to develop applications
CO 3   Classify exceptions and demonstrate applications for file handling and multithreading.
CO 4   Evaluate and select the most reliable approaches for developing applications using proper exception handling techniques using several networking classes.
CO 5   Compare and utilize collection framework to create programming applications by describing and developing applications for GUI.
CO 6   Design and describe   applications by deploying for event handling and accessing databases using Java features.

10   Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
1	**Introduction to Java :**Importance and features of Java, Concepts of Java Virtual machine (JVM) Keywords, Constants, Variables and data types, operators and expressions, Control statements, Conditional statements, loops and iterations. **Concept of class:** Class definition, adding variables and methods, creating objects, constructors, defining methods, calling methods, Arrays,String Handling in java(String, StringBuffer classes), Wrapper classes. **Scanner Class**: Scanner class methods (next(),nextLine() etc.	9
2	**Object Oriented Programming concepts:** Inheritance, super classes, multilevel hierarchy, abstract and final classes, overloading and overriding	8

	Packages and interfaces: Packages, Defining Packages, Using Packages, import and static import, Access protection. **Interface:** Defining Interfaces, abstract methods declarations, implementing interfaces, extended interfaces, interface references.	
3	**Exception handling:** Exception Types, Exception class, RuntimeException Class, Error Class, Checked and uncheced Exceptions, Defining new exceptions; Handling: try, catch and finally; throw statement, throws clause. **Multithreaded programming:** Java thread model, Thread synchronization, messaging, thread class, Runnable interface, inter thread communication, Producer/ consumer problems, Wait () and notify (). **Object Lifetime:** Garbage Collection, Reachable Objects.	10
4	**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 **AWT & Swing:** Introduction to AWT and Swings, Swings advantages over AWT, Swing applications, Swing Controls : JButton ,JLabel , JCheckBox , JRadioButton , JList , JComboBox, JTextFiled, JTextArea , JScrollBar, JTable, Graphics in swing **Event Handling:**Event delegation model, classes, Event Listener Interfaces, Adapter classes. **Networking:** Networking Basics, Java and the Net, TCP/IP Client sockets, URL, URLConnection, TCP/IP Server sockets, Datagram	8
5	**Collection and Generic Framework:** Introduction to Collection and Generic Framework: Interfaces Iterator, List, Set, ArrayList, LinkedList HashSet .Jar Utilities. **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, DatabaseMetadata, Data Types, SQLException, Prepared Statement, CallableStatement, Batch updates. Storing and Retrieving images via JDBC.	10
	.	45

11   Suggested Books:

1. Patrick Naughton and Herbert Schildt, "Java 2 The Complete Reference", 9th edition, McGraw Hill Education, 2017.
2. Bruce Eckel, "Thinking in Java", 4th edition,Pearson Education India, 2008
3. E. Balaguruswamy, "Programming with Java a Primer", 4thedition, Tata McGraw Hill, 2009.
4. Cay S Horstmann and Gary Cornell, "Core Java Volume –I and II", Standard edition, Sun Microsystems, 2001
5. Harvey Deitel and Paul Deitel, "Java How to Program" , 4thedition, PHI Learning, 2004

Course Name: Computer Networks **Subject Code:** TMC 203

Program Name: Master of Computer Applications (MCA)

1 Contact Hours: 55   **L** 3 **T** 1 **P** 0

2 Examination Duration (Hrs):   **Theory** 0 3 **Practical** 0 0

3 Relative Weightage: **CWE:** 25   **MTE:** 25   **ETE:** 50

4 Credits: 0 4

5 Semester: [ ] [*] [ ]
   Autumn Spring Both

6 Pre-Requisite: Basics of Information Technology.

7 Subject Area: Computer Science

8 Objective: To familiarize students with the layered design and protocols of computer networks, including the Internet

9 Course Outcome:
A student who successfully fulfills the course requirements will be able to:
CO 1 Apply and Characterize computer networks from the view point of components and from the view point of services.
CO 2 Display good understanding of the flow of a protocol in general and a network protocol.
CO 3 Evaluate and select the appropriate technology to meet Data Link Layer requirements.
CO 4 Evaluate and Select the most suitable Application Layer protocol (such as HTTP, FTP, SMTP, DNS, BitTorrent) as per the requirements of the network application and work with available tools to demonstrate the working of these protocols.
CO 5 Design a Reliable Data Transfer Protocol and incrementally develop solutions for the requirements of Transport Layer.
CO 6 Describe the essential principles of Network Layers and use IP addressing to create subnets for any specific requirements.

10 Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
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.	**12**

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	**10**
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.	**12**
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.	**10**
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.	**11**
	TOTAL	**55**

11   Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	"Computer Networking – A Top Down Approach", James F. Kurose and Keith W. Ross, Pearson Fifth Edition.	**2014**
2	"Computer Networks" 4th 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, 4th Edition.	**2004**
5	"TCP/IP Protocol Suite", 4th Edition, Behrouz A Forouzan, TMH.	**2010**

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

Course Name: Master of Computer Applications (MCA)

1   Contact Hours: 45   **L**   3   **T**   0   **P**   0

2   Examination Duration(Hrs):   **Theory**   0   3   **Practical**   0   0

3   Relative Weightage: **CWE:**   25   **MTE:**   25   **ETE:**   50

4   Credits   0   3
     :

5   Semester: |____| |_*_| |____|
          Autumn   Spring   Both

6   Pre-Requisite: Basic of Computer Science.

7   Subject Area: Computer Science.

8   Objective: To familiarize students with the concepts of Database and their application in real life software development

9   Course Outcome:
A student who successfully fulfills the course requirements will be able to:
CO 1   Understand the concepts of database management and can differentiate the database approach with the file system approach.
CO 2   Sketch and develop Entity Relationship Diagrams for real world problems and design databases.
CO 3   Apply and analyze Relational database queries with the help of Structured Query Language (SQL) and construct simple and moderately advanced database queries in SQL/PL-SQL.
CO 4   Understand the basics of NoSQL and differentiate it with relational databases.
CO 5   Evaluate and Apply logical database design principles, including keys, constraints and database normalization and design normalized databases.
CO 6   Understand and defend the importance of concurrency control in Transaction Processing Systems .

10   Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
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.	5

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, Specialization and 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.	7
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, Variables, Datatypes, Conditions, Loops, Procedures, Functions, Triggers and cursors. Introduction to NoSql Database, Comparison of NoSql with Relational Database, Types of NoSql Databases.	13
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.	8
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.	8
	TOTAL	42

11   Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	Elmasri and Navathe: Fundamentals of Database Systems, 5th Edition, Pearson Education.	2007
2	Silberschatz, Korth and Sudharshan: Data base System Concepts,5th Edition, Mc-GrawHill.	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, 3rd Edition, McGraw-Hill.	2003

Subject Name: Virtualization and Cloud Computing   **Subject Code:**   TMC 205(2)

Course Name: Master of Computer Applications (MCA)

1   Contact Hours: 45   **L** 3   **T** 0   **P**   0

2   Examination Duration (Hrs):   **Theory** 0   3   **Practical**   0   0

3   Relative Weightage: **CWE:** 25   **MTE:** 25   **ETE:**   50

4   Credits: 0   3

5   Semester: ☐   ☐ *   ☐
                   Autum   **Spring**   **Bot**
                   n   **h**

6   Pre-Requisite: Elementary knowledge of network and distributed computing.

7   Subject Area: Computer Science.

8   Objective: To introduce the students with the idea of cloud computing and its application**.**

9   Course Outcome:
A student who successfully fulfills the course requirements will be able to:
CO 1   Understand various computing paradigms and the advent of cloud computing.
CO 2   Analyze cloud architecture, various models and services with AWS.
CO 3   Understand and analyze the Storage concepts of Cloud Computing.
CO 4   Explain virtualization and its role in cloud computing
CO 5   Evaluating Cloud management System and scheduling techniques.
CO 6   Deploying and handling cloud services offered by vendors like AWS, IBM

10   Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
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.	7
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	8

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	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).	9
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.	12
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.	09
	TOTAL	**45**

11   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

Course Name: Master of Computer Applications (MCA)

1 **Contact Hours:** 45   **L** 3   **T**   0 **P**   0

2 **Examination Duration (Hrs):**   **Theory**   0 3   **Practical**   0 0

3 **Relative Weightage:**   **CWE:** 25   **MTE:** 25   **ETE:** 50

4 **Credits:** 0   3

5 **Semester:** ☐   ☐ *   ☐
                   Autumn   Spring   Both

6 **Pre-Requisite:**   Basics of Information Technology

7 **Subject Area:**   Computer Science

8 **Objective:**   To familiarize students with the procedures and methods of software development and how to manage and produce efficient & cost-effective software systems.

9 **Learning Outcome:**
A student who successfully fulfills the course requirements will be able to:
CO 1 Understand and apply software engineering principles and development life cycle models in real life projects.
CO 2 Understand and analyze the importance of quality and reliability in software projects.
CO 3 Develop software requirement specification and design documents for software projects.
CO 4 Evaluate software in terms of size, cost and schedule using project management principles.
CO 5 Create and develop test cases using black box and white testing techniques.
CO 6 Understand and differentiate various development methodologies including Agile development, Component-Based development, and Cleanroom development.

10   Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
1	**Introduction:** Introduction to Software**,** Software Crisis, Software Processes & Characteristics, Introduction to Software engineering, Software life cycle models, Process Models. Software quality. **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.	8
2	**Software Project Management:** Software Project Management life	9

	cycle, **Software Project Planning Project Estimation**: Size Estimation: Lines of Code & Function Count, Cost Estimation Models, Risk Estimation and Management, Effort estimation, Project monitoring and control. **Project Scheduling:** Basic Concepts, Project Scheduling- Basic Principles, Relationship between People and Effort, Task Network, Scheduling, Gantt and PERT charts, Staffing.	
3	**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. **Software Design:** Design Concepts, Cohesion & Coupling, Function Oriented Design, Object Oriented Design, Software coding techniques and guidelines.	9
4	**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.	8
5	**Software Maintenance:** Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Software Configuration Management. Software Configuration Management vs Software maintenance. **Advanced Software Development Methodologies:** Agile method Methodology; Extreme programming; Rapid application development; Clean Room Software Development; Component Based Software Development.	8
	TOTAL	42

11   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. , 7th Ed.	2010
2	Stephen R. Schach, "Classical & Object Oriented Software Engineering", 7th Ed., TMH	2007
3	Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa, 3rd Ed.	2005
4	K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International, 4th Ed.	2009
5	Carlo Ghizzi , Mehdi Jazayeri and Dino Mandrioli, "Fundamental of Software Engineering", PHI, 3rd Ed.	2009

Subject Name: Professional Communication & Career Skill-II **Subject Code:** TMC 207

Course Name: Master of Computer Applications (MCA)

1 Contact Hours: 45   **L** 2 **T**   **P**

2 Examination Duration(Hrs):   **Theory** 0 3   **Practical** 0 0

3 Relative Weightage: **CWE:** 25   **MTE:** 25   **ETE:** 50

4 Credits: 0 2

5 Semester: ☐   ☐ *   ☐
     Autumn   **Spring**   **Both**

6 Pre-Requisite: Professional Communication I

7 Subject Area: Professional Communication.

8 Objective: To enhance the personality and the communication skills of the students

9 Course Outcome:
A student who successfully fulfills the course requirements will be able to:

CO 1. Apply the properties of numbers and the other concepts to solve different problems on number theory.

CO 2. Apply the concepts of Ratio and Proportion to solve the different types of questions in mixtures and solutions.

CO 3. Analyze the relation between speed, distance and time to effectively solve the problems of relative speed, boats and streams and trains. Understand the concept of Permutation, Combination and Probability to apply and practice the different types of questions.

CO 4. Demonstrate the ability to critically assess the statements & and draw inferences after critical analysis and evaluation of the text.

CO 5. Demonstrate a literal, inferential and evaluative comprehension of readings, through identification and analysis of main ideas and supporting details both implied and inferred.

10 Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
1	Classification of numbers, rules of divisibility, properties of remainders, LCM-HCF and their applications, concept of the last digit, concept of alpha numerals. Practice of questions based on number system concepts. Concept of percentage and percentage equivalent of fractions, multiplication	10

	factor, importance and understanding of the base in calculations, concept and application of the successive percentage change rule. **Concept of profit, loss and discount and its application. Understanding and practice of questions based on addition of impurity and unequal quantity buying and selling concept.**	
2	Concept and understanding of simple and compound interest and their difference, understanding CI as an application of the successive percentage change rule, concept of effective rate of interest and practice of all the types of problems in SI and CI. Concept and understanding of average, weighted average and its application. Practice of problem based on age related concepts. Concept of ratio proportion and its application. Concept, understanding and practice of mixtures and solutions including alligation and replacement of part of a solution.	9
3	Concepts of time, speed and distance, understanding the direct and inverse relations in the topic, average speed and its application. Understanding the concept and application of relative speed and practice of problems based on trains and boats and streams. Concepts of time and work and its application based problems using the LCM method for individual efficiencies and practice of problems based on group efficiencies. Concept, understanding and practice of questions based on permutation and combination, difference in the approach for different things and identical things. Concept, understanding and practice of questions based on probability. Understanding the concept of set theory, clocks, calendar, logarithms, mensuration, basic algebra and practice of various types of questions based on the applications.	11
4	**Applied Grammar and Verbal Reasoning:** Parallel construction. Pronoun and Antecedant based errors Introduction to Parajumbles, techniques to solve, types of questions and practice of parajumble questions. (Include 4 statement parajumbles and 6 statement parajumbles). Introduction to critical reasoning using statement assumption, statement conclusion, strengthen, weaken and drawing inference.	9
5	**Reading Skills:** 1. Practice of Advanced Level Reading Comprehension with respect to	6

	a) central idea,	
	b) tone and	
	c) types.	
	2. Resume Writing and Mock Interview Practice	
	TOTAL	**45**

11   Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	Advanced Technical communication by Malti Agarwal	2011
2	Business Communication by Galgotia Publishers.	2011
3	Technical Communication by Rizvi.	2011