MCBS1001 DISCRETE MATHEMATICS (3-0-0)

Course Objectives:

- To learn the mathematical foundations required for computer science.
- This course will help in understanding other courses in computer science.

Learning Outcomes:

Upon completion of this course, students will be able to:

CO1 : Define & describe various logical connectives and expressions along with rules of inferences.

CO2 : Apply various methods of proofs and proof strategies.

CO3 : learn the concepts of function and develop the various algorithms and its complexity.

CO4 : Model counting techniques using recurrence relations & generating functions for applications.

CO5 : Develop the concepts and applications of graphs in various computer science problems

UNIT-1:

Logic and Proofs: Propositional logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs. Sets: Venn Diagrams, Subsets, The size of a set, Power Sets, Cartesian Products, Set Operations.

UNIT-2:

Functions: One-to-One and Onto Functions, Inverse Functions and Compositions of Functions Partial Functions. Sequences and Summations. Algorithms, Searching Algorithms: Linear Search, Binary Search, Sorting: Bubble Sort, Insertion Sort, The Growth of Functions, Complexity of Algorithms.

UNIT-3:

Counting: The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Recurrence Relations.
Relations: Relations and their Properties, n-ary Relations and their Applications, Representing Relations, Closure of Relations, Equivalence Relations, Partial Orderings.

UNIT-4:
Graphs: Graph Terminology and Special Types of Graphs, Bipartite Graphs, Representing Graphs: Isomorphism of Graphs, Euler and Hamilton Paths, Shortest Path Problems: Dijkstra's Algorithm, Traveling Salesperson Problem, Planar Graphs, Graph Coloring. Trees: Tree Traversal, Minimum Spanning Trees.

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Mc Graw Hills International Seventh Edition.
2. C. L. Liu, "Elements of Discrete Mathematics", McGraw Hills International Second Edition.

Reference Books:

1. Elements of Discrete Mathematics by C. L. Liu and D.P. Mohapatra, TMH, 2012
2. J. P Tremblay, R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TMH, 1997.

MCPC1001 DIGITAL LOGIC DESIGN (3-0-0)

Course Objectives:

1. To introduce the fundamental concepts of digital logic and Boolean algebra.
2. To develop and understanding of combinational and sequential logic circuits.
3. To explore advanced topics such as memory elements, state machines, and programmable logic devices.

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1 : Analyze and design combinational logic circuits using Boolean algebra and Karnaugh maps.
CO2 : Design and implement sequential logic circuits, including flip-flops, counters, and registers.
CO3 : Apply knowledge of digital logic to solve real-world engineering problems.

Unit 1:

Binary Systems: Digital Computers and Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Boolean Algebra and Logic Gates: Boolean functions, Logic Operators, digital Logic Gates, Simplification of Boolean functions: Two and Three Variable Maps, Four Variable Map, Five Variable Map, Product of Sums Simplification, NAND and NOR Implementation, Don't Care Conditions.

Unit 2:

Combinational Logic: Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive OR Functions, Binary Adder and Subtractor, Decimal Adder, Magnitude Comparator, Decoders and Encoders, Multiplexers, Programmable Logic Array (PLA), Programmable Array Logic (PAL).

Unit 3:

Flip-Flops: RS Flip-Flop, D Flip-Flop, JK and T Flip-Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure, Design of Counters, Registers, Shift Register, Ripple Counters, Synchronous Counters, Timing Sequences, Random-Access Memory (RAM)

Unit 4:

Semiconductor RAM Memories: Internal Organization of Memory Chips, Static Memories, Dynamic RAMs, Read-only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory, Direct Memory Access, Memory Hierarchy, Cache Memory, Virtual Memory, Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems Memory elements: SRAM, DRAM, ROM, Programmable logic arrays (PLAs) and field-programmable gate arrays (FPGAs), Introduction to hardware description languages (HDLs) such as Verilog or VHDL, Introduction to digital simulation tools

Text Books:

1. "Digital Design" by M. Morris Mano and Michael D. Ciletti
2. "Fundamentals of Digital Logic with Verilog Design" by Stephen Brown and Zvonko Vranesic
3. “Computer Organisation and Embedded Systems” by Carl Hamacher, Z Vranesic, S Zaky and N Manjikian

Reference Books:

1. "Digital Systems: Principles and Applications" by Ronald J. Tocci, Neal S. Widmer, and Greg Moss
2. "Introduction to Logic Design" by Alan B. Marcovitz

MCPC1002 COMPUTER NETWORKS (3-0-0)

Objective:

1. Introduce students to the architecture, standards, and protocols of computer networks.
2. Provide an understanding of the functionalities of various network layers, including physical, data link, network, transport, and application layers.
3. Discuss the principles of routing, addressing, and internetworking in modern network environments.
4. Familiarize students with network applications, standard protocols, and techniques for ensuring quality of service and congestion control.

Module-I

Overview of the Internet: introduction to data communication, network application, Network hardware, Protocol, Layering Scenario, reference models: The OSI Model, TCP/IP model, Internet history, standards and administration; Comparison of the OSI and TCP/IP reference model. Physical Layer: data and signals: analog and digital, periodic analog signals, digital signals, transmission impairments, data rate limit, Guided transmission media, unguided transmission media, Wireless transmission, mobile telephone system.

Module–II

Data Link Layer: Design issues, error detection and correction design issues, elementary data link protocols, CRC codes, sliding window protocols, HDLC, the data link layer in the internet. Elementary Data Link Layer Protocols, sliding window protocols, noisy and noiseless channels.
THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth.

Module–III

Connecting devices: learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways, definition of multiplexing and types.

Network Layer: Network Layer Design issues, store and forward packet switching, connectionless and connection oriented networks-routing algorithms-optimality principle, circuit and packet switching, definition of flooding and multicast.

Module– IV

Routing protocols: Shortest Path, Routing uni-cast Distance Vector Routing, RIP, link state protocols, path vector routing. Internetworking: logical addressing, internet protocols, IP address, CIDR, IPv4 addressing, IPv6 Protocol addressing, addresses mapping, ICMP, IGMP,ARP,RARP, DHCP.

Module-V

Transport Protocols: process to process delivery, UDP, TCP, TCP Sliding Window, TCP Congestion Control, congestion control and quality of service.

Application Layer-World Wide Web, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS.

Course Outcome :

Upon successful completion of this course, students will be able to:

1. Explain the architecture and functioning of different network layers and their associated protocols.
2. Compare the OSI and TCP/IP reference models and understand their application in real-world networks.
3. Implement and troubleshoot data link layer protocols and error detection/correction methods.
4. Design and manage network systems using appropriate hardware and software tools, including IP addressing and routing protocols.
5. Utilize and manage network applications and protocols such as HTTP, FTP, email, TELNET, and DNS effectively.

Text Books :

1. "Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross.
2. "Data Communications and Networking" by Behrouz A. Forouzan.

References :

1. Computer networks by Tanenbaum, A.S., Pearson Education India.
2. Computer Networks by Bhushan Trivedi, Oxford University Press

MCPC1003 PROGRAMMING FOR PROBLEM SOLVING (3-0-0)

Course Objectives:

- To provide an understanding of basic programming concepts using the C programming language.
- To develop problem-solving skills using C programming constructs.
- To introduce students to algorithmic thinking and program design techniques.
- To enable students to write, compile, and debug programs in C.

Course Outcomes (CO):

CO1: Understand the fundamental concepts of programming using the C language.
CO2: Develop problem-solving skills through the application of programming constructs in C.
CO3: Design and implement functions and algorithms to solve complex problems.
CO4: Demonstrate proficiency in using pointers, arrays, and structures in C programming.
CO5: Apply error handling and debugging techniques to identify and resolve programming errors.
CO6: Utilize file handling mechanisms in C for input/output operations.
CO7: Appreciate the importance of data structures and their implementation in C.

Unit 1: Introduction to C Programming

Introduction to Problem Solving through programs, Flowcharts/Pseudo codes, the compilation process, Syntax and Semantic errors, Variables and Data Types , Arithmetic expressions, Relational Operations, Logical expressions; Conditional Branching and Iterative Loops.

Unit 2: Functions and Arrays

Introduction to Functions, Function Prototypes and Declarations, Parameter Passing in Functions, Recursion, Arrays: 2-D arrays, Character Arrays and Strings.

Unit 3: Pointers and Structures

Introduction to Pointers, Pointer Arithmetic, Dynamic Memory Allocation, Structures and Unions
File Handling in C, Self-Referential Structures and Introduction to Lists.

Unit 4: Advanced Concepts in C

Preprocessor Directives, Command Line Arguments, Bitwise Operators, Error Handling and Debugging Techniques, Introduction to Data Structures in C.

Textbooks:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Reference Books:

1. "C Programming: A Modern Approach" by K.N. King
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
3. "Let Us C" by Yashavant Kanetkar
4. "Programming in C" by Stephen G. Kochan

MCPC1004 DATABASE MANAGEMENT SYSTEMS (3-0-0)

Course Objective:

This course provides fundamental and practical knowledge on database concepts by means of organizing the information, storing and retrieve the information in an efficient and a flexible way from a well-structured relational model. This course ensures that every student will gain experience in creating data models and database design and be able to do the followings.

Focus the role of a database management system in an organization and construct ER Diagram.

Demonstrate basic database concepts, including the structure and operation of the relational data model and basic database queries using SQL.

Applying advanced database queries using Structured Query Language (SQL).

Evaluating logical database design principles and database normalization.

Demonstrate the concept of a database transaction, concurrency control, and data object locking and protocols.

Course Outcomes:

After successful completion of the course the student will be able to:
CO1: Understand database design principles.

CO2: Apply data Modelling using E-R diagrams.

CO3: Create refined data models using normalization.

CO4: Build database queries using Structured Query Language.

CO5: Understand the transaction management and concurrency control.

UNIT – 1
Introduction to DBMS: File system vs. DBMS, advantages of DBMS, storage data, queries, DBMS structure, Types of Databases – Hierarchical, Network, Relational, Key-Value, Object Oriented, XML DB Overview of File Structures in database, 3-schema architecture of DBMS, data independence, EF Codd Rule.

UNIT – 2

Data base Design: Data models, the importance of data models. E-R model: Entities, attributes and entity sets, relationship and relationship set, mapping cardinalities, keys, features of ER model, conceptual database design with ER model.

Relational model: Integrity constraints over relations and enforcement, querying relation data, logical database design, views, destroying/altering tables and views, Relational algebra, Extended relational algebra Operations.

UNIT- 3

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Reasoning about Functional Dependencies. Normal Forms, Properties of Decomposition, Normalization, different types of dependencies.

UNIT – 4

Basic SQL: Introduction to SQL, Basic SQL Queries: DML, DDL, DCL, and TCL

Structured Query Language (SQL): Select Commands, Union, Intersection, Except, Nested Queries, Aggregate Operators, Null values, Relational set operators, SQL join operators

Relational Algebra (RA): Selection, Projection, Set operations, joins

Relational Calculus (TRC, DRC): Tuple Relational Calculus, Domain Relational Calculus PL/SQL, Assertions, Triggers. **Introduction to Transaction Management**: ACID properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control. Concurrency Control: 2PL, Serializability and Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Concurrency control without locking. Crash Recovery: Aries, Recovering from a System Crash.

Advanced Database: OODB, WEB based DB, Data warehousing and Data mining.

Textbooks:

1. H.F. Korth, A. Silverschatz, Abraham," Database system concepts", Tata McGraw Hill Publication, 6e, 2011
2. Raghu Ramakrishna and Johannes Gehrke, Database Management Systems, McGraw-Hill, 3e, 2014

References:

1. D. Ullman, Principles of Database and Knowledge – Base Systems, Vol. 1, 1/e, Computer Science Press, 1990.
2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, 7e, 2016.
3. Er. Rajiv chopra, "Database management systems, A Practical Approach", S. Chand Publishing

MCHS1001 COMMUNICATIVE ENGLISH (2-0-0)

Course Objectives:

This course is designed to enhance the communication skills of MCA students, focusing on the specific needs of computer science professionals. The syllabus aims to develop proficiency in English for academic, professional, and everyday use.

Course Outcomes:

CO1: Students will be able to articulate the basic principles and processes of communication, identify and overcome common barriers, and distinguish between verbal and non-verbal communication methods.

CO2: Students will demonstrate improved listening skills through active listening techniques, effective comprehension, and the ability to engage in clear and confident public speaking, group discussions, and role plays.

CO3: Students will develop proficiency in writing professional documents including emails, memos, business letters, and technical reports, ensuring proper format, etiquette, and avoidance of plagiarism.

CO4: Students will be capable of preparing and delivering effective presentations using appropriate visual aids and tools, while also demonstrating a strong grasp of English grammar including state and event verbs, tense and aspect, and subject-verb agreement.

CO5: Students will understand the dynamics of interpersonal communication, the importance of workplace ethics, and cross-cultural communication. They will also learn to effectively communicate within teams, understand roles and responsibilities, and utilize collaborative tools and technologies.

CO6: Students will enhance their reading comprehension and critical analysis skills for both technical and non-technical texts, expand their vocabulary with strategies for learning new words and technical terms, and develop skills for writing effective blogs, social media posts, and website content.

UNIT 1: BASICS OF COMMUNICATION

1. Introduction to Communication: Definition and Process; Types of Communication: Verbal and Non-verbal; Barriers to Effective Communication

2. Listening Skills: Active Listening Techniques; Barriers to Effective Listening; Listening Comprehension Exercises

3. Speaking Skills: Basics of Pronunciation and Intonation; Public Speaking: Techniques and Practice; Group Discussions and Role Plays

UNIT 2: PROFESSIONAL COMMUNICATION

1. Business Writing: Email Writing: Format and Etiquette; Writing Memos and Notices; Business Letters: Inquiry, Complaint, and Job Application Letters; Writing Technical Reports; Avoiding Plagiarism

2. Presentation Skills: Preparing Effective Presentations; Visual Aids: Use of PowerPoint and Other Tools; Delivering Presentations with Confidence

3. Basics of English Grammar: State and Event Verbs; Tense and Aspect; Subject-Verb Agreement

UNIT 3: INTERPERSONAL SKILLS

1. Interpersonal Communication: Building Relationships through Communication; Importance of Ethics at the Workplace; Cross-Cultural Communication

2. Teamwork and Collaboration: Effective Team Communication; Roles and Responsibilities in a Team; Collaborative Tools and Technologies

3. Interview Skills: Preparing for an Interview; Common Interview Questions and Answers; Mock Interviews and Feedback

UNIT 4: ENHANCING LANGUAGE SKILLS

1. Reading Comprehension: Techniques for Effective Reading; Critical Reading and Analysis; Reading Technical and Non-Technical Texts

2. Vocabulary Building: Strategies for Learning New Words; Using Context Clues; Technical Vocabulary for Computer Science

3. Writing for the Web: Writing Blogs and Articles; Social Media Communication; Writing Content for Websites

TEXTBOOKS:

1. "Technical Communication" by Mike Markel
2. "English for Technical Communication" by Aysha Viswamohan
3. "Effective Technical Communication " by M Ashraf Rizvi

MCPC1201 COMPUTER NETWORKS LABORATORY (0-0-3)

Objective:
The Computer Networks Laboratory course aims to provide hands-on experience with the principles and practice of computer networks, focusing on both the theoretical and practical aspects of network design, implementation, and troubleshooting.

Course Outcomes:
By the end of the course, students will be able to:

1. Understand and implement various networking protocols.
2. Configure and troubleshoot network devices.
3. Analyze network performance.
4. Design and implement small-scale networks.

Laboratory Sessions:

1. **Introduction to Network Lab Tools:**
   - Overview of network simulation tools like Cisco Packet Tracer, GNS3, Wireshark.
   - Introduction to basic networking commands (ping, tracert, ipconfig/ifconfig).
2. **Basic Network Configuration:**
   - Setting up a simple peer-to-peer network.
   - Configuring IP addresses and subnet masks.
   - Testing network connectivity using ping and tracert.
3. **Error Detection and Correction:**
   - Implementing CRC error detection.
   - Simulating error correction mechanisms.
4. **Elementary Data Link Protocols:**
   - Simulation of sliding window protocols.
   - Analysis of protocol performance over noisy and noiseless channels.
5. **Medium Access Control:**
   - Configuring and analyzing Ethernet networks.
   - Setting up and testing Wireless LAN (WLAN) connections.
   - Exploring Bluetooth network configurations.
6. **Network Devices Configuration:**
   - Setting up and configuring switches, routers, and gateways.
   - Understanding the use of repeaters, hubs, and bridges in a network.
7. **Multiplexing Techniques:**
   - Implementing and analyzing different types of multiplexing (TDM, FDM).
8. **Routing Algorithms:**
   - Implementing and analyzing shortest path routing algorithms.
   - Configuring Distance Vector Routing (RIP) and Link State Routing (OSPF).
9. **IP Addressing and Subnetting:**
   - Configuring IPv4 and IPv6 addressing.
   - Subnetting practice and exercises.

10. **Address Mapping Protocols:**
    - Implementing and analyzing ARP, RARP, ICMP, IGMP.
    - Configuring and testing DHCP.
11. **Transport Layer Protocols:**
    - Simulation and analysis of TCP and UDP.
    - Configuring TCP sliding window and congestion control mechanisms.
12. **Quality of Service (QoS):**
    - Implementing and analyzing QoS in networks.
    - Configuring QoS settings on network devices.
13. **Application Layer Protocols:**
    - Setting up and testing HTTP, FTP, and DNS.
    - Configuring and analyzing email protocols (SMTP, POP3, IMAP).
    - Exploring TELNET and SSH for remote connectivity.

Reference Material:

- "Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross.
- "Data Communications and Networking" by Behrouz A. Forouzan.
- Cisco Packet Tracer and GNS3 Documentation.

MCPC1202 C PROGRAMMING LAB (0-0-3)

List of Experiments:

1. Simple C programs.
2. Using If and switch constructs programs
3. Looping related problems
4. Programs using functions
5. If statement, If..else statement, nesting if else statement, else if ladder, switch statement, goto statement, while
6. statement, do statement, for statement
7. One-dimensional arrays, two dimensional arrays, multi-dimensional arrays
8. Initialization of string variables, reading and writing strings, string handling functions
9. Programs using structures
10. Programs using unions
11. Initialization of pointer variables, address of variable, accessing a variable through its pointer
12. Pointer as Functions
13. Strings with Pointer: pointers and character strings, pointers and structures
14. Programs based on file handling
15. Command Line Arguments
16. Error Handling

MCPC1203 DATABASE MANAGEMENT SYSTEMS LAB (0-0-3)

List of Experiments:

1. Execute a single line and group functions for a table.
2. Execute DCL and TCL Commands.
3. Implement the query in SQL for a) insertion b) retrieval c) updating d) deletion.
4. Using Joins, Index, Key constraints and Normalization
5. Create views, partitions and locks for a particular DB
6. Write PL/SQL procedure for an application using exception handling
7. Write PL/SQL procedure for an application using cursors.
8. Write a DBMS program to prepare reports for an application using functions.
9. Write a PL/SQL block for transaction operations of a typical application using triggers.
10. Write a PL/SQL block for transaction operations of a typical application using package.
11. Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).
12. Writing Assertion
13. Implementing operation on relation using PL/SQL
14. Creating Forms
15. Generating Reports

MCHS1201 LANGUAGE LAB (0-0-3)

These lab experiments aim to provide practical, hands-on experience in various aspects of communicative English, tailored to the needs of MCA students.

List of Experiments:

UNIT 1: BASICS OF COMMUNICATION

Experiment 1: Communication Role Play
Objective: Understand verbal and non-verbal communication.
Activities:

1. Role-play different scenarios (e.g., a business meeting, a social gathering) focusing on body language, gestures, and spoken words.
2. Identify and discuss the barriers encountered.

Experiment 2: Active Listening Exercises
Objective: Enhance listening skills.
Activities:

1. Listen to a recorded speech and answer comprehension questions.
2. Engage in a paired listening activity where one student speaks and the other practices active listening, followed by feedback.

UNIT 2: PROFESSIONAL COMMUNICATION

Experiment 3: Email Writing Practice
Objective: Develop proficiency in writing professional emails.
Activities:

1. Write emails for different purposes (e.g., inquiry, complaint).
2. Peer review and discuss the format, tone, and etiquette of each email.

Experiment 4: Presentation Preparation and Delivery
Objective: Improve presentation skills.
Activities:

1. Prepare a PowerPoint presentation on a technical topic.
2. Deliver the presentation to the class, focusing on clarity, confidence, and use of visual aids. Receive and give constructive feedback.

UNIT 3: INTERPERSONAL SKILLS

Experiment 5: Team Communication Simulation

Objective: Enhance teamwork and collaboration skills.

Activities:

1. Engage in a group project simulation where roles and responsibilities are assigned.
2. Use collaborative tools (e.g., Google Docs) to work together and present findings.

Experiment 6: Mock Interviews

Objective: Prepare for job interviews.

Activities:

1. Participate in mock interviews with common interview questions.
2. Receive feedback on responses, body language, and overall performance from peers and instructor.

UNIT 4: ENHANCING LANGUAGE SKILLS

Experiment 7: Critical Reading Analysis

Objective: Improve critical reading skills.

Activities:

1. Read a technical article and identify key points, arguments, and conclusions.
2. Discuss the article in groups, focusing on analysis and interpretation.

Experiment 8: Vocabulary Building Exercises

Objective: Expand vocabulary.

Activities:

1. Use context clues to understand and define new technical terms from computer science texts.
2. Create flashcards for new vocabulary and engage in peer quizzes.

Experiment 9: Writing a Technical Blog

Objective: Develop web writing skills.

Activities:

1. Write a blog post on a recent technological advancement or trend.
2. Peers review the posts focusing on clarity, conciseness, and engagement.

Experiment 10: Social Media Communication

Objective: Practice concise and effective writing for social media.

Activities:

1. Create social media posts (e.g., tweets, LinkedIn updates) about a technical topic.
2. Discuss the effectiveness and engagement of each post, considering the target audience.