(AUTONOMOUS) NAAC 'A' GRADE

SYLLABUS FOR MCA

1st & 2nd SEMESTER

Batch 2024 onwards

Semester-I

S. No	Course Code	Course name	Course Type	Cd	L	T	P	Marks		
								MSE	Final Exam	Total
1	MCA-101	Operating System	PCC	4	4	0	0	40	60	100
2	MCA-102	Database Management System	PCC	4	4	0	0	40	60	100
3	MCA-103	Computer Architecture & VLSI Design	PCC	4	4	0	0	40	60	100
4	MCA-104	Discrete Mathematics	PCC	4	4	0	0	40	60	100
5	MCA-111	Operating System Lab	PCC	3	0	0	6	-	75	75
6	MCA-112	Database Lab	PCC	3	0	0	6	-	75	75
			Total	22	16	0	12	160	390	550

BRIDGE COURSE

Students admitted to MCA Programme who have not studied computer science subjects at UG level and/or have not passed mathematics paper at 10+2 level, are required to enroll, and compulsorily pass the Bridge Course- PSCSATB100 of four credits in addition to the passing regular Semester I course given above during Semester-I, in order to get eligible for admission to Semester – III of MCA 2-years Programme. This course will be of qualifying nature only, needs to be completed and passed in first year of MCA to become eligible for subsequent Semester-III, and will not be included in the total credits earned by the student against MCA final degree. The bridge course exam will be conducted twice a year. Rests of the students are not required to take the Bridge Course. The exam of Bridge Course shall be conducted twice a year. The details of the Bridge Course are given below-

S. No	Course Code	Course name	Course Type	Cd	L	T	P	Marks		
								MSE	Final Exam	Total
1	MCA-100	Programming in C and Fundamental of Mathematics	BRIDGE COURSE	4	4	0	0	40	60	100
Total				4	4	0	0	40	60	100

Semester-II

S. No	Course Code	Course name	Course Type	Cd	L	T	P	Marks		
								MSE	Final Exam	Total
1	MCA-201	Data Structures	PCC	4	4	0	0	40	60	100
2	MCA-202	Object Oriented Programming in Java	PCC	4	4	0	0	40	60	100
3	MCA-203	Computer Networks	PCC	4	4	0	0	40	60	100
4	MCA-224	Design & Analysis of Algorithms	PCC	4	4	0	0	40	60	100
5	MCA-225	Artificial Intelligence	PCC	4	4	0	0	40	60	100
6	MCA-211	Data Structure Lab	PCC	3	0	0	3	-	75	75
7	MCA-212	Java Programming Lab	PCC	3	0	0	6	-	75	75
8	NCC-201	Placement Overview and Career Planning	NCC	0	0	0	2	Satisfactory / Not Satisfactory		S/NS**
			Total	26	20	0	10	200	450	650

Semester 1

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-101	Operating Systems	PCC	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Demonstrate understanding of the concepts, structure, and design of operating systems.
CO2	Articulate the general architecture of modern computer operating systems including its impact on application design and performance.
CO3	Develop understanding of inter process communication and synchronization mechanisms
CO4	Analyze the interplay and conflicts in resource usage in a multi-user, multi-tasking environment with an understanding of the trade-offs involved.
CO5	Implement the basic concepts of Unix & Linux and programs using shell programming.

Detailed Syllabus

Section-A

UNIT–I :Introduction to Operating Systems: Evolution of operating systems, Operating systems concepts, Types of operating systems, Different views of the operating system, Operating system services, System calls, Types of system calls, Operating system Structure, Layered Approach, Micro kernels, Virtual machines.

(10 Hrs)

UNIT–2: Process Management: Process concept, Operation on processes, Inter-process communication, Mutual exclusion, Introduction to Process scheduling, Scheduling algorithms, Process Synchronization, Inter process Synchronization, Critical section problem, Semaphores, Monitors, Message passing, Deadlocks, System Model, Deadlock characterization, Deadlock prevention, Deadlock avoidance.

(10 Hrs)

UNIT–3: Memory Management: Memory management, Swapping, Contiguous memory allocation, Relocation & protection, Memory management, Paging, Segmentation, Intel Pentium Segmentation, Intel Pentium Paging, Virtual memory, Demand paging, Performance of demand paging, Page replacement algorithms: FIFO, Optimal, LRU, Counting based page replacement.

(10 Hrs)

Section-B

UNIT–4: File & I/O Management: File & I/O Management Files system structure, File system implementation, Directory Implementation. Allocation Methods, contiguous allocation, linked allocation, Indexed allocation Disk organization, Disk space management, Disk scheduling, Disk Management, RAID Structure.

(10 Hrs)

UNIT –5: Introduction to LINUX/UNIX: Files and Directories: pathname; Directory Tree; current working directory; Relative pathname; Referring to home directories; Device files; File permissions; Pipes; Trees; mount, init, Files, Directories, Processes, Commands: pwd, mkdir, rmdir, ls, cat, more, mv, cp, rm, diff, wc, pwd, wc, who write, who am i, passwd, ps, kill, date, cal,man, gzip, df, chmod, mkdir, cd. Filters: pr, head, tail, cut, paste, sort, uniq, nl, tr.
Regular Expression: grep; egrep; fgrep, Vi-Editor, adding and replacing text, commands in Command mode, Deletion,Navigation, pattern search, repeating commands, Shell Programming, Logical Operators, If else Statement, Case structure, Looping.

(10 Hrs)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Operating System Concepts	Abraham Silberschatz, Peter B. Galvin, Gerg Gagne	Wiley	9th (2015)
2	Operating System Design and Implementation	Andrew S. Tanenbaum	Pearson Education	3rd (2006)
3.	UNIX Concepts and Application	Sumitabha Das	Tata McGraw Hill,	4th(2017)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
2	Operating Systems: Internals and Design Principles	William Stallings	Pearson Education	9th (2018)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-102	Database Management System	PCC	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Identify the basic concepts, architecture and various data models used in Database Management Systems
CO2	Design ER-models to represent simple database application
CO3	Understand normalization theory and apply such knowledge to the normalization of a database.
CO4	Articulate the basic issues of transaction processing and concurrency control.
CO5	Implement advanced database queries using Structured Query Language (SQL).

Detailed Syllabus

Section-A

UNIT–I: Database Concepts: Traditional file-based system, Conventional file organizations, Need of Database Management System, Components of DBMS, Introduction to hierarchical and network data models. Schemas and Instances, Data independence, three level Architecture of Database, Centralized and client server architecture for DBMS

(10 Hrs)

UNIT–2: Relational Data Model: Entity relationship model, Relational Database Design using ER to Relational Mapping, EER Model, Joins, Relational Algebra and Relational Calculus Concepts, Queries using Relational Algebra and Calculus.

(10 Hrs)

UNIT–3: Normalization: Concept of keys, Functional dependencies, Inference rules, Covers, Closure, Equivalence of functional dependencies, Multivalued dependencies, Theory of normalization, Normal forms (1st to 5th), BCNF, Join dependency, Domain key normal form.

(10 Hrs)

Section-B

UNIT–4: Concurrency Control: Transaction processing, Deadlocks, Concurrency control, Locking techniques, Timestamp ordering, Recovery techniques, Distributed Database Concepts.

(08 Hrs)

UNIT–5: SQL: SQL query processing, Table creation and management, inbuilt functions, Data integrity constraints, Views, Joins, Operators, Privileges, roles and security policies.

(12 Hrs)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Database System Concepts	Korth, Silberchatz	Mcgraw Hill Education	6th (2013)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Fundamentals of Database System	ElmasriRame, Navathe Shamkant	Pearson Education	7th (2015)
2.	The power of Oracle 9i	R. A. Parida	Firewall Media Publications	1st(2010)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-103	Computer Architecture & VLSI Design	PCC	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Understand components of digital electronics, logical organization and the computer arithmetic.
CO2	Minimize the expressions using Karnaugh map method and implement them using Logic Gates.
CO3	Design and analyze various combinational and sequential circuits
CO4	Understand the organization and structure of computer memory.
CO5	Understand the basic parts of a VHDL model

Detailed Syllabus

Section-A

UNIT–I: Digital Systems and Number Representation: Von Neumann architecture, digital and analog systems. Number system, their types & conversions; Decimal, Binary, Octal, Hexadecimal; Binary Arithmetic: Binary arithmetic operations, Representation of negative numbers; 1's complement and 2's complement, Code Representation: BCD code & Excess-3 and their rules of arithmetic operations.

(10 Hrs)

UNIT–2: Logic Gates and Boolean algebra: AND, OR, NOT, NAND, XOR, NOR, XNOR gates, Boolean laws and their Expressions. Representation in SOP, POS form and their simplifications, K–map, code converters, Error detection & correction: Hamming code.

(10 Hrs)

UNIT–3: Combinational and sequential Circuits : Half & Full adders & subtractors, parallel adders, Encoder, decoder, Multiplexer De-Multiplexer, Flip-flops and their types, level clocking and edge triggered clocking, Registers and their types, bi-directional register.

(10 Hrs)

Section-B

UNIT–4: Memories and bus structure: Basic memory cell, Memory hierarchy, characteristics, memory types and accessing techniques, static and dynamic Memory, cache memory. Memory address map to CPU, bus structure, memory-mapped and I/O mapped technique, Modes of I/O transfers, instruction & interrupt life cycle.

(10 Hrs)

UNIT –5: VHDL components and tools: Introduction to VHDL, need and importance of VHDL, characteristics, basic components of VHDL -entities, architectures, configuration, package, library, simple VHDL program. Understanding tools and environments– GHDL VHDL simulator, Xilinx ISE (FPGA synthesis tool set), IMAGE simulation accelerator (FPGA based co-simulation environment).

(10 Hrs)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Fundamentals of Digital Circuits	Anand Kumar	PHI	4th (2016)
2	Digital Electronics	A. K. Maini	Wiley India	1st (2007)
3	Digital Electronics	Kharate	Oxford	1st (2012)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Digital Design	M. Morris Mano	Pearson	5th (2012)
2	Computer System Architecture	M. M. Mano	Pearson	3rd (2012)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-104	Discrete Mathematics	PCC	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Explain problems using recurrence relations.
CO2	Analyze the role of Relations and Functions in computer science
CO3	Model problems in Computer Science using graphs and trees.
CO4	Describe basic terminology of mathematical logic to solve a variety of problems.
CO5	Model problems in Computer Science using, trees and Graph coloring

Detailed Syllabus
Section-A

Unit I Overview of Counting: Basic principles of counting, pigeon-hole principle, generating functions, recurrence Relations, linear recurrence relations with constant coefficients, modelling various problems as recurrence relations ,Homogenous recurrence relations and their solutions, particular solutions and total solution. Problems of Fibonacci Numbers and tower of Hanoi and their solution using recurrence relation.

(10 Hrs.)

Unit II: Relations and Functions: Domain, range and inverse of Relation, Composition of relations, Types of elations, Closure of relations etc. Relation Vs Function, Types of functions, Sum and product of functions, functions used in Computer Science (Floor and Ceil function, Remainder, characteristic and hash function).

(10 Hrs.)

Unit III: Theory of Graphs: Basic terminology of graphs, multigraphs, directed and weighted graphs, paths and circuits, Types of graphs, Computer representation of graphs, Operations on Graphs, spanning trees using BFS, DFS and their applications, shortest path in weighted graphs and planar graphs, Detection of planarity. Eulerian paths and circuits, Hamiltonian paths and circuits.

(10 Hrs.)

Section B

Unit-IV: Trees and Graph Coloring: Tree and its properties, Center of a tree and rooted trees, tree traversals, minimal spanning trees, cut sets, etc. Coloring of graphs, dual graph; Vertex coloring, Chromatic number; Chromatic polynomial, The four color problem, edge coloring, Coloring algorithms. Applications of trees and graph coloring

(10Hrs.)

Unit-V: Mathematical Logic: Propositions, connectives, conditionals and biconditionals, well-formed formulas, tautologies, equivalence of formulas, duality law, normal forms, inference theory for propositional calculus; predicate ,calculus: predicates, free and bound variables, inference theory of predicate calculus. Introduction to algebraic structures, groups

(10Hrs)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Discrete Mathematics	Kenneth Rosen	McGraw Hill Education	7th (2017)
2	Graph Theory with applications to Engineering and Computer Science	Narsingh Deo	Prentice Hall	1st (2016)
3	Discrete Mathematics structure with applications to Computer Science	Jean-Paul Tremblay and R Manohar	McGraw Hill Education	1st (2017)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Concrete Mathematics	Ronald Graham, Donald Knuth, and Oren Patashnik	Pearson Education Publishers	2nd (2008)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-111	Operating System Lab	PCC	3	0	0	6	-	75	75

Course Outcomes

At the end of the course the student will be able to	
CO1	Utilize Unix/Linux commands.
CO2	Implement the file permissions
CO3	Effectively sort and manipulate text data
CO4	Develop programs by making use of shell programming.
CO5	Create the user define functions

List of Activities for Unix Lab

S. No.	Activities
1	Using cd, pwd, ls to navigate through the file system.
2	Creating, renaming, deleting directories using mkdir, mv, rmdir.
3	Creating, viewing, and editing files using touch, cat, vi or nano.
4	Copying, moving, and deleting files using cp, mv, rm.
5	Understanding file permissions (read, write, execute) using ls -l.
6	Changing file permissions using chmod.
7	Using wildcards (*, ?, []) for file matching.
8	Using >, <, | for redirecting input/output and piping commands.
9	Using grep, sed, awk for text processing.
10	Sorting data using sort, uniq.
11	Comparing files using diff, cmp.
12	Using regular expressions with grep, sed, awk
13	Creating and executing shell scripts.
14	Using variables, control flow statements (if, else, for, while)
15	Defining and using functions in shell scripts.

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-112	Database Lab	PCC	3	0	0	6	-	75	75

Course Outcomes

At the end of the course the student will be able to	
CO1	Create, modify,database structures and data.
CO2	Create tables with constraints to enforce data rules and relationships.
CO3	Group data and apply clauses to filter aggregated results.
CO4	Create SQL views to simplify data management and enhance query efficiency.
CO5	Efficiently query and combine data from multiple tables.

Lab Activities for Database Lab

S. No.	Activities
1	To execute the DDL commands • CREATE • ALTER • DROP • RENAME • TRUNCATE
2	To execute DML commands • INSERT • UPDATE • DELETE • SELECT
3	Creating tables with constraints: • NOT NULL • UNIQUE • PRIMARY KEY • FOREIGN KEY
4	Implementation of Number function-abs(),min(),max(),ceiling(),floor(),round(),mod(),pow()
5	Implementation of Aggregate Function-count(),sum(),avg(),min(),max()
6	Implementation of Conversion Function-cast(),convert(),TO_CHAR(),TO_DATE(),TO_NUMBER()
7	Implementation of Character Function-length(),INITCAP(),LOWER(),UPPER(),TRIM(),CONCAT()
8	Implementation of Date Function
9	Implementation of Group By & having clause
10	Implementation of Order by clause

11	Implementation of Views • Create Views • Insert data in views • Selecting a data from views • Filtering Data from a View • Updating Data of Views
12	Implementation of different types of Joins • Inner Join • Outer Join • Natural Join etc
13	Implementation of Arithmetic operators
14	Implementation of Comparison operators
15	Implementation of logical operators
16	Creating Users, Roles, and Granting Privileges • Create a database named student • Create two users: student and teacher • Create two roles: data_reader and data_writer • Grant appropriate privileges to roles. • Assign roles to users.

BRIDGE COURSE

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-100	Programming in C and Fundamental of Mathematics	BRIDGE COURSE	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Develop basic understanding of the Computer System & programming skills.
CO2	Understand the mathematical concepts and terminologies that are essential to the study of Computer Science.
CO3	Write and execute programs, and hence use computers effectively for problem solving.
CO4	Choose the right programming constructs & data representation formats based on the requirements.
CO5	Understand and approach the Computer Science subjects in a better way.

Detailed Syllabus
Section-A

UNIT-I:Computer Fundamentals & C Basics: Introduction to Computer System, Architecture, Memory Organization, CPU Organization, Software concepts, steps for problem solving, Computer as a tool for problem solving. Program Design tools: Algorithm, Pseudo code and Flowchart Designing, History of C, Characteristics of C, Executing C–program, C Program Structure, Data Types, Variables and Constants, Input Output statements, Type-Casting, Operators and Expressions.

(10Hrs)

UNIT-2: Control Statements, Functions & Arrays: Selection statements, Repetitive statements, Errors, Functions, Recursion, Storage classes, Arrays, Strings,

(10Hrs)

UNIT-3: Preprocessor, User Defined Data types & Files: Standard C Preprocessor Directives, Pointers, Dynamic Memory Allocation, Structures, Unions, Concepts of File Management, Working with text and Binary Files.

(10Hrs)

Section-B

UNIT-4: Set Theory & Calculus: Sets, Relations and Functions, Limits and Continuity; Differentiation and Integration; Differential Equations of first Order and first degree.

(10Hrs)

UNIT-5: Matrices, Probability & Vector Algebra :Matrices & Determinants, Solution of linear equations, Basic concepts of Probability, Permutation & Combination and Progressions, Vector Algebra concepts, vector addition & products**.**

(10Hrs)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Fundamentals of Computers	V. Rajaraman and N Adabala	Prentice Hall India	6th(2014)
2	Let us C	Yashwant Kanetkar	BPB Publications	17th(2020)
3	Vector Algebra	R. Gupta	Laxmi Publications	4th(2005)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Programming with ANSI-C	E. Balagurusamy	Tata McGraw Hill,	6th(2012)

Semester 2

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-201	Data Structures	**PCC**	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Understand the basics of data types and data structures.
CO2	Compare different data structures in context of their properties.
CO3	Identify the use of appropriate data structures to solve a given problem.
CO4	Apply different data structures to solve different sorting and searching problems.
CO5	Appreciate applicability of advanced data structures to model and solve real world problems.

Detailed Syllabus

Section-A

UNIT–I: Fundamental Notations: Primitive and composite data types, self-referential structures, Algorithms, Types of data structures, Operations, Time and space complexity of algorithms, Asymptotic notation.

(10Hrs)

UNIT–2 : Linear Data Structures: Arrays, Linked lists, Stacks, Queues, operations and their complexities, Implementations, Applications.

(10Hrs)

UNIT–3:Non-Linear Data Structures: Trees, Binary Trees, traversing binary trees, threaded binary trees, Binary search trees, heaps, Graphs, Traversing graphs.

(10Hrs)

Section-B

UNIT–4: Indexing Structures : ISAM, m-way trees, B–trees, B+–trees, Hashing techniques for direct access, Collision in hashing, Collision resolution.

(08 Hrs)

UNIT–5: Sorting & Searching: Internal and External sorts, Bubble sort, Insertion sort, Selection sort, Shell sort, Quick sort, Radix sort, Merge sort, Types of merging. Searching-linear and binary search methods, Comparison of sorting and searching methods.

(12Hrs)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Data Structure using C	Langsam, Yedidyah, Moshe J. Augenstein, and Aaron M. Tenenbaum	Pearson Education	1st (2019)
2	Data Structures and Program Design in C	Robert L. Kruse and Bruce P. Leung	Pearson Education	2nd (2006)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Data Structures with C	Seymour Lipschutz,	Schaum Outlines	2011

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-202	Object Oriented Programming in Java	PCC	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Appreciate the foundational data structures in Java
CO2	Apply object-oriented decomposition to model real-world scenarios and applications through objects and Classes.
CO3	Appreciate advanced features in Java and their applications.
CO4	Assimilate and implement Event and GUI based Programming model in Java.
CO5	Design dynamic web application using database connectivity.

Detailed Syllabus

Section-A

UNIT–I: Java Language Basics: Features, Object Oriented concepts, Java Virtual Machine Concepts, Primitive Data Type and Variables, Java Keywords, Java Operators, Expressions, Control Statements and Arrays. Class and Objects, Static methods, Constructors, Method Overloading

(10Hrs)

UNIT–2: Inheritance, Packages and Interfaces: Inheritance, Access Control, Method Overriding, Garbage Collection, Abstract Classes, Polymorphism, Packages, Interfaces, Exceptions Handling, Types of Exceptions, Writing Exception Subclasses, Multithreading, Synchronization in Java.

(10Hrs)

UNIT–3: I/O, Files and Applets Programming: I/O in Java, Byte Stream Classes, Character Stream Classes, Reading and Writing to Console, Reading and Writing Files, The Transient and Volatile Modifiers, String and String Buffer Class, Applet Class, An Applet Skeleton, adding images & sound, Passing parameters to an applet.

(10Hrs)

Section-B

UNIT–4: Events and AWT : AWT Components, Building User Interface with AWT, Handling Events of Mouse and Keyboards, Event Delegation Model (Events, Listeners, interfaces), Layouts and Layout Manager

(10Hrs)

UNIT–5: Regular Expression and JDBC: Regular Expressions; JDBC implementation, Connection class, Statements, Types of statement objects, (Statement, Prepared Statement and Callable Statement), Types of result set, Result Set Metadata, Catching Database Results, Handling database Queries, JDBC and AWT.

(10Hrs)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	JAVA: THE COMPLETE REFERENCE	Herbert Schildt	McGraw Hill Education	12th (2022)
2	Object Oriented Programming in Java	Rick Halterman	Southern Adventist University	1st (2008)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Java 8 Programming Black Book	D.T. Editorial Services	Dreamtech Press	6th (2015)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-203	Computer Networks	PCC	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Understand the basic taxonomy and terminology of the computer networking model and architecture.
CO2	Articulate the fundamentals concepts of data communication and protocols.
CO3	Understand the network design and performance issues.
CO4	Understand the Importance and Applications of Internet Protocols
CO5	Explore the basic knowledge of cryptography and network security.

Detailed Syllabus

Section-A

UNIT–I: Fundamentals of Communication: Fundamentals of Communication, Modulation, Data Encoding, OSI reference model, TCP/IP model, network standardization, Inter-networking. Physical layer, Switching Technique, Transmission media, Co-axial, Twisted Pair and Fiber Optic Cables, Transmission Impairments, Electromagnetic Spectrum, Radio waves, Microwaves, Satellites, Wireless Mobile Telecommunications Technology.

(10Hrs)

UNIT–2: Data Transmission and Media access Methods: Data Link layer, Design issues, Frame, Error detection and correction, Flow Control, Elementary Data link protocols, Character-oriented and Bit-oriented Protocols, Sliding window protocols, Channel allocation methods, TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision free protocols, IEEE standard 802 for LANS, Ethernet, Token Bus, Token ring.

(10Hrs)

UNIT–3: Network Establishment Concepts: Network Layer, Store and Forward Packet Switching, Connectionless and Connection-oriented services, Virtual Circuit, Routing Algorithms, Shortest path, Flooding, Link State, Distant vector, Hierarchical, Broadcast and Multicast Routing. OSPF, BGP, Congestion, Congestion control algorithms.

(10Hrs)

Section-B

UNIT–4: Internet Protocols : TCP/TP Protocol, IP Addresses, Classes of IP Addresses, Subnets, IPv6, Network layer in the Internet, Internet Control, Protocols, ARP, RARP, BOOTP, DHCP, Transport Layer, Protocol Stack, TCP and UDP, Transport Services Primitives, Sockets, Socket Programming concept.

(10Hrs)

UNIT–5: Network Application and Network Security : Application layer, Name service (DNS), Domain Hierarchy, Name servers, Name resolutions, Traditional applications, Telnet, FTP, SMTP, MIME, World wide web-HTTP, HTTP Methods, Cryptographic Algorithms, DES, AES, RSA, Key exchange methods, Authentication Protocol, Digital Signatures.

(10Hrs)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Computer Networks: A System Approach	W. Stallings	Pearson Education	2nd (2010)
2	Computer Networks: A System Approach	L. L. Peterson	Morgan Kauffman	5th (2011)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Computer Networking: A Top-Down Approach Featuring the Internet	Kurose & Ross	Pearson Education	3rd (2005)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-204	Design & Analysis of Algorithms	PCC	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Understand written algorithms in terms of their composite steps and transformations
CO2	Understand the design and analysis of various algorithms.
CO3	Apply important algorithmic design paradigms.
CO4	Analyze and compare the algorithms on the basis of asymptotic complexity.
CO5	Gain understanding of applicability of algorithms in devising optimal solutions to given problems in diverse domains.

Detailed Syllabus

Section-A

UNIT–I: Review of Algorithms and Data Structures: Introduction to algorithm analysis: Introduction to algorithms, Algorithm Specifications, performance analysis. Recursion and Induction: recursive procedures, recurrence relations, induction proofs, proving correctness. Randomized Algorithms: Basic of Probability Theory, Description of Randomized algorithms, Identifying the repeated Elements, Partiality Testing, Advantages and Disadvantages of using randomized algorithms.

(10Hrs)

UNIT–2: Basics of Analysis: Asymptotic Bounds, Concept of Efficiency of an Algorithm, Well Known Asymptotic Functions & Notations, Well Known Sorting Algorithms, Comparison of Sorting Algorithms, Best-Case and Worst-Case Analyses, Average-Case Analysis, Amortized Analysis

(10Hrs)

UNIT–3: Design Techniques-I:Divide-and-Conquer, General Method, Multiplication of two n-bit numbers, Binary Search, Merge Sort, Quick Sort, Stassen's Matrix multiplication, Exponentiation, Dynamic Programming, General Method, The Problem of Making Change, The Principle of Optimality, Chained Matrix Multiplication.

(10Hrs)

Section B

UNIT–4: Design Techniques-II : Backtracking, General method, n-queen's problem, Sum of subsets problem, Greedy Algorithms, General Method, Knapsack problem, Job sequencing with deadlines, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Single Source Shortest Path Algorithm

(10Hrs)

UNIT–5: Classification of Problems & Graphs Algorithms: Non-Deterministic Algorithms, Complexity classes, Introduction to NP-Completeness, Establishing NP-Completeness of Problems, NP-Completeness Proofs, NP-Hard Problems, Graphs Algorithms: Traversing Trees, Depth-First Search, Breadth-First Search, Best-First Search & Topological Sort.

(**10Hrs)**

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Introduction to Algorithms	T.Cormen, C. Lieserson, R.Rivest, C.Stein	Prentice-Hall/India	3rd (2009)
2	Algorithms	S. Dasgupta, C. Papadimitriou, Umesh Vazirani	McGraw Hill Education	1st (2017)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Fundamentals of Computer Algorithms	Ellis Horowitz, Sartaj Sahni	Universities Press	2nd (2008)
2	Algorithms Design: Foundations, Analysis, and Internet Examples	Michael T. Goodrich, Roberto Tamassia	Wiley	1st (2006)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-205	Artificial Intelligence	PCC	4	4	0	0	40	60	100

Course Outcomes

At the end of the course the student will be able to	
CO1	Assimilate the fundamental concepts in Artificial Intelligence
CO2	Analyze a real-world problem for implementation and understand the dynamic behavior of a system.
CO3	Apply techniques in applications which involve perception, reasoning and learning.
CO4	Develop a practical skills in designing and implementing multi-agent systems and genetic algorithms
CO5	Use different machine learning techniques to design AI machine and enveloping applications for real world Problems.

Detailed Syllabus

Section-A

UNIT-I: Introduction: Introduction to AI: History of AI, Basic Elements of AI, Introduction to Turing Machine, Turing Test and Rational Agent, Approaches; State Space Representation of Problems, Game Playing, Min-Max Search, Alpha Beta Cutoff Procedures, Introduction to Expert system, Expert System Life Cycle, Study of existing expert systems like MYCIN and DENDRAL.

(10Hrs)

UNIT-2: Searching Techniques: Heuristic Search techniques-Hill Climbing, Best first search: OR graph, A* algorithm, Problem Reduction: AND-OR graph, The AO* Algorithm. Constraint satisfaction: Introduction and algorithm.

(10Hrs)

UNIT-3: Knowledge Representation: Knowledge Representation Structures: Prepositional Logic, First Order Predicate Logic, CNF, DNF, Prenex Normal Form, Resolution, Unification, Inference Mechanisms Semantic Nets, Frames, Scripts, conceptual dependences, Procedural & Declarative knowledge, Reasoning, Uncertainty.

(10Hrs)

Section-B

UNIT–4: Multi Agent Systems and Genetic Algorithms: Multi Agent Systems: Agents and Objects; Agents and Expert Systems; Generic Structure of Multiagent System, Semantic Web, Agent Communication, Knowledge Sharing using Ontologies, Agent Development Tools, Genetic Algorithms (GA): Encoding Strategies, Genetic Operators, Fitness Functions and GA Cycle; Problem Solving using GA.

(10Hrs)

UNIT–5: Understanding Natural Languages: Understanding Natural Languages: Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Fillmore's grammar; grammar-free analyzers, sentence generation.

(10Hrs)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Artificial Intelligence: A Modern Approach	S. Russell and P. Norvig	Pearson Education,	2nd(2012)
2	Introduction to Artificial Intelligence and Expert Systems	Dan W. Patterson	Prentice Hall India	1st(2015)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Our final invention: Artificial intelligence and the end of the human era	Barrat, James	Macmillan,	2nd(2013)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
MCA-211	Data Structures using C Lab	PCC	3	0	0	6	-	75	75

Course Outcomes

At the end of the course the student will be able to:-	
CO1	Implement lists, stacks, queues, and trees using arrays in C.
CO2	Create the different types of linked lists and perform its operations using C.
CO3	Create data structure and perform its operations using C.
CO4	Identify the data structure to develop programs for real world applications.
CO5	Assess the applicability of given data structure for a particular use-case scenario.

List of Activities for Data Structures Using CLab

S. No.	Activities
1	Implement a List using Array and develop functions to perform insertion, deletion and linear search operations.
2	Implement a Stack using Array and develop functions to perform push and pop operations.
3	Write a program to check if a given expression is correctly parenthesized using Stacks.
4	Write a program to evaluate postfix, prefix and infix expressions using Stacks.
5	Write a program to convert an infix expression to its corresponding postfix and prefix expressions and vice-versa.
6	Implement a Queue using Array and develop functions to perform enqueue and dequeue operations.
7	Implement a Singly Linked List and develop functions to perform insertion, deletion and linear search operations.
8	Implement a Doubly Linked List and develop functions to perform insertion, deletion and linear search operations.
9	Implement a Circular Linked List and develop functions to perform insertion, deletion and linear search operations.
10	Implement a Stack using Linked List and develop functions to perform push and pop operations.
11	Implement a Queue using Linked List and develop functions to perform enqueue and dequeue operations.
12	Implement a Priority Queue using Linked List and develop functions to perform enqueue and dequeue operations.
13	Implement a Binary Tree using Array and develop functions to perform traversal, searching, insertion and deletion operations.
14	Implement a Binary Search Tree using Array and develop functions to perform traversal, searching, insertion and deletion operations.
15	Implement a Binary Tree using Linked List and develop functions to perform traversal, searching, insertion and deletion operations.
16	Implement a Binary Search Tree using Linked List and develop functions to perform traversal, searching, insertion and deletion operations.

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
MCA-212	Java Programming Lab	PCC	3	0	0	6	-	75	75

Course Outcomes

At the end of the course the student will be able to:-	
CO1	Use an integrated development environment to write object-oriented Java programs.
CO2	Implement the control statements in Java
CO3	Apply object-oriented programming principles to design Java applications
CO4	Effectively handle file I/O operations in Java.
CO5	Develop Java applets to create GUI

List of Activities for Java Lab

S. No.	Activities
1	Write a program to check whether the no id evn or odd ,
2	Write a program to calculate factorial of a no using while loop
3	Write a program to generate a series from 1 to 10 using for loop
4	Write a program to generate a table of a no
5	Write a program to check whether the no is Armstrong or not.
6	Write a program to generate fibonacii series
7	Write a program to calculate base to power of a no
8	Write a program to implement constructors in Java
9	Write a program to implement classes and objects in Java
10	Write a program to implement inbuilt mathematical functions
11	Write a program to check whether the string is palindrome or not
12	Write a program to implement inbuilt string functions
13	Write a program to implement inheritance in Java
14	Write a program to implement packages in Java
15	Write a program to implement multi threading in Java
16	Write a program to implement priority based threads
17	Write a program to read a file
18	Write a program to write a file
19	Write a program to copy the contents of one file into another file
20	Write a program to implement inter faces
21	Write a program to implement applets in Java

22	Write a program to pass parameters to an applet
23	Write a program to calculate factorial of a using applets
24	Write a program to implements events in Java
25	Write a program to implement flow layout and border layout
26	Write a program to Grid layout and Card Layout.

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total

NCC-201	Placement Overview and Career Planning	NCC	0	0	0	2	Satisfactory / Not Satisfactory	S/NS**

Course Outcomes

At the end of the course the student will be able to	
CO1	Demonstrate proficiency in quantitative problem solving.
CO2	Reason logically and perform deductions on the given problem statement.
CO3	Comprehend and assimilate a variety of technical and non-technical literature.
CO4	Communicate effectively for a wide variety of purposes and audiences.
CO5	Solve problems effectively in competitive exams.

List of Activities for Placement overview and Career Planning

S.No	Activity Title
1	Practice Quantitative Aptitude: Vedic Mathematics concepts, Simplification, Quadratic Equations, Surds and Indices, Average and Weighted average, Mixtures and Allegations. Percentages, Profit and Loss, Simple and Compound Interest, Ratio and Proportion, Partnership, Age Problems, Word Problems. Time and Work; Time, speed and Distance; Menstruation- Cylinder, Cone, Sphere; Number Systems; Sequence and Series; Permutation and Combination; Probability; Logarithms; Functions; Data Interpretation. Data Arrangement, Clocks and Calendars, Different patterns of Puzzles – Quantitative Based, Data Sufficiency, order and Ranking, Direction sense.
2	Practice Logical Reasoning questions on following topics: Venn Diagram, Syllogisms / Deductions, Abstract Reasoning, Logical Connectives, Input Output, Attention to detail, Selection Decision table, Logical Sequence Words, Coding Decoding, Coded Inequalities, Number Series, Alpha Series, Analogy, Crypt arithmetic, Blood Relations.
3	Verbal Ability: General Grammar Rules and Grammar Essentials: Nouns, Verbs and Pronouns; Subject-Verb Agreement; Pronoun-Antecedent Agreement; Punctuations. Concept Building for: Reading Comprehension, Passage Analysis, Vocabulary building, Confusing words, Sentence Completion, Verbal Analogy, Spotting errors in sentences. Jumbled Sentences, Sentence Improvisation, Writing Skills - Essay Writing, Writing Skills - Email Writing, Critical Reasoning, Reading Comprehension Advanced + Para Jumbles, Gap - Bridging.
4	Learn various effective communication skills: Word Power enhancement; Attention to Detail: spacing, punctuation, spelling, and other finer aspects; Verbal and non-verbal communication skills; Written English with emphasis on writing grammatically correct technical / official letters, applications and reports; Getting rid of inhibitions and building confidence; Assertive and Submissive communication; Using Language for Convincing and Persuasion; Art of asking Questions.
5	To participate in a national level aptitude test to assess the learners ability on quantitative, verbal, logical Reasoning, soft skills and technical skills.
6	To prepare for group discussion and personal interviews and understanding your personality type.
7	Explore job roles and responsibilities of different job postings and prepare your resume accordingly.
8	Explore higher education opportunities in India and abroad and shortlist the possible universities.