



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

School: School Of Computer Science & Information Technology										Batch: 2021-2023				
Department: Department of Computer Applications										Year: 1st				
Course: Master of Computer Applications (MCA)										Semester: I				
S N	Cate- gory	Course Code	Course Name	Periods			Cre dits	Evaluation Scheme					Subjec t Total Marks	
				L	T	P		Theory			Practical			
								AB Q	MS E	ES E	IP	EX P		
1	PCC	MCA- 101A	Data Structure with C	3	1	0	4	15	25	60	-	-	100	
2	PCC	MCA-103A	Computer Networks	3	0	0	3	15	25	60	-	-	100	
3	PCC	MCA-104A	Computer Organization and Architecture	3	1	0	4	15	25	60	-	-	100	
4	HSMC	MCA-102A	Research Methodology	2	1	0	3	15	25	60	-	-	100	
5	HSMC	MCA-105A	Financial Accounting	3	0	0	3	15	25	60	-	-	100	
6	PCC	MCA-151A	Data Structure with C Lab	0	0	2	2	-	-	-	60	40	100	
7	PCC	MCA-152A	Computer Organization and Architecture Lab	0	0	2	2				60	40	100	
8	PDP	MCA-106A	Human Values & Professional Ethics	2	1	0	3	15	25	60	-	-	100	
Total---->				16	4	4	24							

Abbreviations:

PCC: Programme Core Courses

PEC: Programme Elective Courses

AECC: Ability Enhancement Compulsory course

GE: General English

DSE: Discipline Specific Elective Course

L: Lecture

T: Tutorial

P: Practical

ABQ: Assignment Based Quiz

MSE: Mid Semester Examination

ESE: End Semester Examination

IP: Internal Practical

EXP: External Practical

PROJ: Project



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

School: School Of Computer Science & Information Technology								Batch: 2021-2023					
Department: Department of Computer Applications								Year: 1st					
Course: Master of Computer Applications (MCA)								Semester: II					
S N	Cate - gory	Course Code	Course Name	Periods			Cred its	Evaluation Scheme					Subjec t Total Marks
				L	T	P		Theory			Practical		
								AB Q	MS E	ES E	IP	EX P	
1	PCC	MCA- 202A	Web Development	2	0	0	2	15	25	60	-	-	100
2	PCC	MCA- 204A	Data Base Management System	3	0	0	3	15	25	60	-	-	100
3	PCC	MCA- 206A	Operating System	3	0	0	3	15	25	60	-	-	100
4	PCC	MCA- 208A	Cyber Security	2	0	0	2	15	25	60	-	-	100
5	PCC	MCA- 210A	Analysis and Design of Algorithm	3	0	0	3	15	25	60	-	-	100
6	PCC	MCA- 252A	Web Development Lab	0	0	2	1	-	-	-	60	40	100
7	PCC	MCA- 254A	Data Base Management System Lab	0	0	2	1				60	40	100
8	PCC	MCA- 256A	Analysis and Design of Algorithm Lab	0	0	2	1				60	40	100
Total---->				13	0	6	16						

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LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2022-23

School: School Of Computer Science & Information Technology								Batch: 2021-2023					
Department: Department of Computer Applications								Year: 2nd					
Course: Master of Computer Applications (MCA)								Semester: III					
S N	Cate - gory	Course Code	Course Name	Periods			Cr edi ts	Evaluation Scheme					Subjec t Total Marks
				L	T	P		Theory			Practical		
								AB Q	MS E	ES E	IP	EX P	
1	PCC	MCA- 201A	Computer Graphics & Multimedia	3	0	0	3	15	25	60	-	-	100
2	PCC	MCA- 203A	Software Testing	3	0	0	3	15	25	60	-	-	100
3	PCC	MCA- 205A	Python Programming	3	0	0	3	15	25	60	-	-	100
4	PCC	MCA- 207A	Data Mining and Data Warehousing	3	0	0	3	15	25	60	-	-	100
5	PEC		Elective-1	3	0	0	3	15	25	60	-	-	100
6	PCC	MCA- 251A	Computer Graphics & Multimedia Lab	0	2	4	4				60	40	100
7	PCC	MCA- 253A	Python Programming Lab	0	1	2	2				60	40	100
8	PROJ	MCA- 255A	Minor Project	0	0	4	2					100	100
Total---->				15	3	10	23						

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 PROJ: Project



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2022-23

School: School Of Computer Science & Information Technology								Batch: 2021-2023					
Department: Department of Computer Applications								Year: 2nd					
Course: Master of Computer Applications (MCA)								Semester: IV					
S N	Cate - gory	Course Code	Course Name	Periods			Credit s	Evaluation Scheme					Subjec t Total Marks
				L	T	P		Theory			Practical		
								AB Q	MS E	ES E	IP	EX P	
1	PCC	MCA- 224A	Artificial Intelligence	3	0	0	3	15	25	60	-	-	100
2	PEC		Elective-II	3	0	0	3	15	25	60	-	-	100
3	PROJ	MCA- 292A	Industry Internship (4 Weeks in Vacation of 3rd Sem.)	0	0	4	2	-	-	-	-	100	100
4	PROJ	MCA- 282A	Major Project	0	0	10	5	-	-	-	-	100	100
Total---->				6	0	14	13						

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IP: Internal Practical

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PROJ: Project



LINGAYA'S VIDYAPEETH SCHEME OF STUDIES

Elective I Courses		
S.No	Course Code	Course Name
1	MCA-209A	Cryptography & Data Compression
2	MCA-209B	Android Application Development
3	MCA-209C	Blockchain Technology
Elective II Courses		
S.No	Course Code	Course Name
1	MCA-222B	Soft Computing Techniques
2	MCA-222C	Deep Learning

Syllabus
Of
MCA
1st Year
1st Semester



MCA-101A	DATA STRUCTURE WITH C	L	T/SDA	P	Credit
		3	1	0	4

OBJECTIVE

To give the students knowledge about the data storage using different data structures and implementation using C programming language

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.

CO2: Understand basic data structures such as arrays, linked lists, stacks and queues.

CO3: Describe the hash function and concepts of collision and its resolution methods

CO4: Solve problem involving graphs, trees and heaps

CO5: Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

UNIT I

INTRODUCTION TO DATA STRUCTURES AND C: Introduction to programming – definitions and developing Algorithms and flowcharts for simple programs. Introduction to C Programming: Origin and history of c programming character set, Identifiers and keywords data types, constants, variables, operators, special operators, constants, Expressions, compound statements, structure of C program, Input and output function. Definition of data structures and abstract data types; linear vs. non-linear data types; Static and Dynamic implementations; Arrays; 2; Examples and real life applications. Time Complexity; Asymptotic Notations; Running Times; Best Case; Worst Case; Average Case; Introduction to Recursion.

UNIT II

STACKS AND QUEUES: Definition of Stacks; Array based implementation of stacks; Examples: Infix; postfix; prefix representation; Conversions; Applications; definition of Queues; Circular Queue; Array based implementation of Queues.

UNIT III

LINKED LISTS: Define Lists; different types of linked lists; Linked List implementation of stacks and queues; Implementation of Singly linked Lists and Circular Linked List; Applications.

UNIT IV

TREES AND GRAPHS: Definition of trees and Binary trees; Properties of Binary trees and Implementation; Binary Traversal pre-order; post order; In- order traversal; Binary Search Trees; Implementations. Definition of Undirected and Directed Graphs; The Array based implementation of graphs; Adjacency matrix; path matrix implementation; The Linked List representation of graphs; Graph Traversal – Breadth first Traversal; Depth first Traversal.

UNIT V

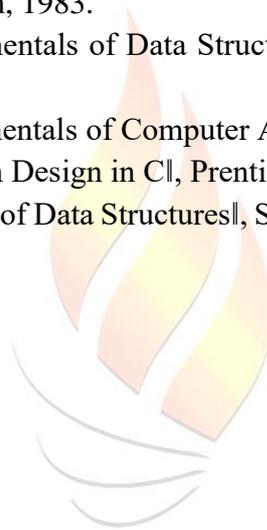
SORTING AND SEARCHING: Introduction; selection; insertions; bubble sort; Efficiency of above algorithms; Shell sort; Merge sort; Quick sort; Heap sort, Searching Algorithms: Straight Sequential Search; Binary Search (recursive & non-recursive Algorithms).

TEXT BOOKS

1. A.K. Sharma – Data structure Using C, 2nd edition pearson 2013
2. Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++, Prentice Hall of India, 2009.

REFERENCE BOOKS

1. Aho A. V., Hopcroft J. E. and Ullman T. D., —Data Structures and Algorithms, Original Edition, Addison-Wesley, Low Priced Edition, 1983.
2. Horowitz Ellis and S ahni S artaj, —Fundamentals of Data Structures, Addison-Wesley Pub, 1984.
3. Horowitz, S ahni and Rajasekaran, —Fundamentals of Computer Algorithms, 2007.
4. Kruse Robert, —Data Structures and Program Design in C, Prentice Hall of India, 1994
5. Lipschetz Jr. Seymour, —Theory & Problems of Data Structures, Schaum's Outline, Tata McGraw Hill



MCA-103A	COMPUTER NETWORKS	L	T/SDA	P	Credit
		3	0	0	3

OBJECTIVE: To have a fundamental understanding of the design, performance and state of the art of wireless communication systems, Topics covered include state of the art wireless standards and research and thus changes substantially form one offering of this course to the next PRE-REQUISITES: Knowledge of computers hardware and software.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Understand computer network basics, network architecture, TCP/IP and OSI reference models.

CO2: Identify and understand various techniques and modes of transmission

CO3: Describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN

CO4: Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme

CO5: Discuss the elements and protocols of transport layer. Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS

UNIT I

INTRODUCTION TO NETWORKS & LAN: Overview of networks: topologies, LAN, MAN, WAN. Network reference Models: OSI and TCP/IP, Layers and their functions and protocols. Networking Devices: Hubs, Switches, Repeater, etc., Bridges, Router, gateways etc., Data Transmission media, Switching Techniques, Modulation and multiplexing techniques.

OVERVIEW OF LAN: LAN standards, Channel access methods: CSMA, CSMA/CD, Token ring. Ethernet: layered architecture, Fast Ethernet: layered architecture, Gigabit Ethernet (IEEE 802.3z).

UNIT II

NETWORK LAYER AND TRANSPORT LAYER: Point -to Pont Networks, Introduction to Internet Protocol, IP Datagram, IP Addressing, routing, IP packet, IP address, IPv4 & IPv6. Congestion Control & Quality of services (QoS) –Congestion Control in TCP & Frame Relay Network; QOS; Flow Characteristics; Technique to improve Congestion Control; Scheduling; traffic shaping, Transport layer Protocols: TCP functions, segments and connections. UDP, TCP verses UDP.

UNIT III

WIDE AREA NETWORKS: Introduction to WAN, WAN technologies: SONET/SDH, ATM: ATM cell, layered architecture, ATM signaling, addressing and applications. Frame Relay Technology Overview and Standards. ISDN & B-ISDN: Technology Overview, Interfaces and Channels, Layered Protocol architecture and Frame Format.

UNIT IV

INTERNET SUITE OF PROTOCOLS: Application Layer: Introduction to application layer and protocols, WWW, HTTP, DNS. E-Mail and protocols: SMTP, IMAP and MIME. File transfer protocols: FTP and TFTP. Network management protocol: SNMP. Voice over IP (VoIP).

UNIT V

Network Management and Security: Simple Network Management Protocol (SNMP). Data Encryption & Cryptographic techniques. Firewalls: types, architecture and applications, VLANs: architecture and applications, Internet Security protocol (IPsec).

TEXT BOOK

Tanenbaum Andrew S., “Computer Networks”, 4th Edition, Pearson Education/Prentice Hall of India, 2003.

REFERENCE BOOKS

1. Forouzan Behrouz A, “Data Communications and Networking”, Tata McGraw Hill.
2. Stallings William, “Data and Computer Communication”, 5th Edition, Prentice Hall of India, 1997.
3. Fred Halsall, “Data Communications, Computer Networks and Open Systems”, 4th edition, Addison Wesley, Low Price Edition, 2000.
4. Tittel E. D., “Computer Networking”, Tata McGraw Hill, 2002



MCA-104A	COMPUTER ORGANIZATION AND ARCHITECTURE	L T P	C r
		3-1-0	4

OBJECTIVE

To make the students savvy about hardware, their counterparts and frame constructed with these hardware components

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Explain the organization of basic computer, its design and the design of control unit.

CO2: Demonstrate the working of central processing unit and RISC and CISC Architecture.

CO3: Describe the operations and language of the register transfer, micro-operations and I/O organization.

CO4: Understand the organization of memory and memory management hardware.

CO5: Elaborate advanced concepts of computer architecture, Parallel Processing, inter processor communication and synchronization.

UNIT-I

INTRODUCTION OF COMPUTER & COMPUTER ARITHMETIC: Store Program Concept, Flynn's Classification of computers, Von Neumann Architecture, Generation of Computer, Classification of Computers, Addition And Subtraction With Signed-Magnitude, Multiplication Algorithm, Booth Multiplication Algorithm, Array Multiplier, Division Algorithm, Hardware Algorithm, Divide Overflow, Floating-Point Arithmetic Operations, BCD Adder, BCD Subtraction.

UNIT-II

ORGANIZATION OF A COMPUTER: Stack Organization, Register Stack, Memory Stack, Instruction Formats, Three- Address Instructions, Two – Address Instructions, One- Address Instructions, Zero Address Instructions, RISC Instructions, Addressing Modes Reduced Instruction Set Computer, CISC Characteristics RISC Characteristics.

UNIT-III

INPUT, OUTPUT & MEMORY ORGANIZATION: Modes of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPU IOP Communication, Memory Hierarchy, Main Memory, Auxiliary Memory, Cache Memory, Virtual Memory. Address Space and Memory Space, cache memory: associative & direct mapped cache organizations.

UNIT-IV

PIPELINING & SUPERSCALAR TECHNIQUE: Linear pipeline processor – asynchronous and synchronous model, clocking and timing control, speedup, efficiency and throughput. Nonlinear Pipeline Processor – reservation and latency analysis, collision free scheduling; Instruction Pipeline Design – principles & mechanisms; dynamic instruction scheduling, branch handling techniques, branch prediction. Arithmetic Pipeline Design - computer arithmetic principles, static Arithmetic pipeline.

UNIT-V

MULTIPROCESSOR ARCHITECTURE: Symmetric shared memory architectures, distributed shared memory architectures, models of memory consistency, cache coherence

problem, Snoopy cache coherence protocol, directory-based protocols, design challenges of directory protocols, memory-based directory protocols, cache-based directory protocols, protocol design tradeoffs, synchronization,

TEXT BOOKS

1. Kai Hwang, “Advanced computer architecture”; TMH, 1993.
2. “Computer System Architecture”, M.Morris Mano

REFERENCES

1. “Computer System Architecture”, John. P. Hayes.
2. “Computer Architecture and parallel Processing “, Hwang K. Briggs.
3. D.Sima, T.Fountain, P.Kasuk, “Advanced Computer Architecture-A Design space Approach,” Addison Wesley, 1997.



MCA-102A	RESEARCH METHODOLOGY	L	T/SDA	P	Credit
		2	1	0	3

OBJECTIVES

1. To familiarize participants with basic of research and the research process.
2. To enable the participants in conducting research work and formulating research synopsis and report.
3. To familiarize participants with Statistical packages such as SPSS/EXCEL.
4. To impart knowledge for enabling students to develop data analytics skills and meaningful interpretation to the data sets so as to solve the business/Research problem.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.

CO2: Discuss different methodologies and techniques used in research work.

CO3: Have basic knowledge on qualitative research techniques.

CO4: Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis

CO5: Propose the required numerical skills necessary to carry out research.

UNIT I

RESEARCH METHODOLOGY: Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India.

UNIT II

RESEARCH DESIGN: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration. Reviewing the literature: Place of the literature review in research, Bringing clarity and focus to your research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed. Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs. Design of Sample Surveys: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs

UNIT III

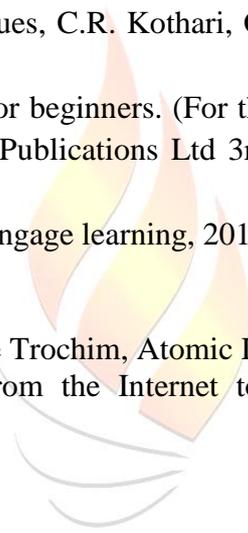
DATA COLLECTION & IPR: Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method. Interpretation and Report Writing: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout. Introduction to Intellectual Property (IP), different types of IPs and its importance in the present scenario, Indian patent acts 1970. Design act 2000. The Semi-Conductor Integrated Circuits Layout Design (SICLD) Act, 2000. Copyright Act 1957. Trade Mark Act, 1999

TEXT BOOKS

1. Research Methodology: Methods and Techniques, C.R. Kothari, Gaurav Garg New Age International 4th Edition, 2018.
2. Research Methodology a step-by- step guide for beginners. (For the topic Reviewing the literature under module Ranjit Kumar SAGE Publications Ltd 3rd Edition, 2011 Study Material.
3. Intellectual property, Debirag E. Bouchoux, Cengage learning, 2013.

REFERENCE BOOKS

1. Research Methods: the concise knowledge base Trochim, Atomic Dog Publishing, 2005.
2. Conducting Research Literature Reviews: From the Internet to Paper Fink A Sage Publications, 2009.



MCA-105A	FINANCIAL ACCOUNTING	L	T/SDA	P	Credit
		3	0	0	3

OBJECTIVES: To help the students to develop cognizance of the importance of accounting in organization financial statements and how people analyze the corporate financial under different conditions and understand why people describe the financial statements in different manner. To provide the students to analyze specific characteristics of Logistics Management Accounting and their future action for expenses and income and synthesize related information and evaluate options for most logical and optimal solution such that they would be able to predict and control cost incurrence and improve results

COURSE OUTCOMES

The students undergoing this course will be able to:

- CO1:** Demonstrate the applicability of the concept of accounting to understand the managerial Decisions and financial statements
- CO2:** Apply the Financial Statement Analysis associate with Financial Data in the organization.
- CO3:** Analyze the complexities associated with management of cost of product and services in the Organization
- CO4:** Demonstrate how the concepts of accounting and costing could integrate while identification and resolution of problems pertaining to LM Sector
- CO5:** Enable optimal solution such that they would be able to predict and control cost incurrence and improve results.

UNIT I

INTRODUCTION TO ACCOUNTING: Definition of Accounting and its advantages & limitations, Scope of accounting. Branches of Accounting - Financial Accounting - Cost Accounting - Management Accounting, users of Accounting information, Methods of Accounting, Double Entry Accounting System Types of Accounts and Rules for Debit and Credit Preparation of Journal, Ledger and Trial Balance.

UNIT II

FINAL ACCOUNTS: Preparation of Final Accounts (Sole Proprietorship only), Preparation of Trading A/c, Profit & Loss A/c and Balance Sheet covering simple adjustments.

UNIT III

ACCOUNTING RATIOS: Meaning, Advantages and Limitations of Accounting ratios, Computation of profitability, liquidity, solvency, and turnover ratios. Cost Accounting: Meaning and definition of Cost Accounting – its Advantages & Limitations Marginal Costing: Meaning-Advantages- Limitations, Break Even Point, Margin of Safety, Profit Volume Ratio.

UNIT IV

INTRODUCTION TO FINANCIAL MANAGEMENT: Meaning of financial management, functions and objectives of financial management- Profit Maximization and wealth maximization, basic finance decisions, changing role of finance.

TEXT BOOKS

1. S.N. Maheswari, & S.K. Maheshwari, “Advanced Management Accounting”, Vikas Publishing House, 2010
2. M.Y. Khan and P.K. Jain, “Management Accounting”, Tata McGraw Hill, 2009
3. M Y. Khan and P.K. Jain , “Cost Accounting”, Tata McGraw Hill, 2008

REFERENCE BOOKS

1. Vijay Kumar , “Accounting for Management”, Tata McGraw Hill, 2015
2. Anthony, N. Robert, Hawkins and Merchant ,“Accounting: Text and Cases(SIB)”, McGraw Hill, 2013
3. Weston, John. Fred. Thomas, E.Copeland , “Managerial finance”, Dryden press, 1988



MCA-151A	DATA STRUCTURE WITH C LAB	L	T/SDA	P	Credit
		0	0	2	2

COURSE OUTCOMES

CO1 Be able to design and analyze the time and space efficiency of the data structure

CO2 Be capable to identify the appropriate data structure for given problem

CO3 Have practical knowledge on the applications of data structures

1. Write C program to input and output the text message.
2. Write C Program to perform all arithmetic operations.
3. Write C Program to utilize the math function.
4. Write C Program to perform the mathematical expressions.
5. Write C Program for Local and Global Variables.
6. Write C Program for internal static and external static variables.
7. Write C Program to find the roots of a Quadratic equation.
8. Write C Programs for all the Operators. (Arithmetical, Logical, Relational, Bitwise).
9. Write C Programs for Increment and Decrement Operators.
10. Write C Programs to implement the Ternary Operator.
11. Write C Programs for special Operators.
12. Write C Programs for all the Control Structures. (Sequential Control Structures, Conditional Control Structures, Iterative Control Structures).
13. Write C Programs to display the different types of patterns using nested for loop.
14. Write C Program for Statements. (switch, break, goto, continue etc.,).
15. Write C Program to print biggest number from n numbers.
16. Write a C Program to find the given integer number is even or odd number.
17. Write a C Program to calculate the factorial of a given number.
18. Write a C Program to swap the two numbers using temp variable and without using temp variable.
19. Reading and Printing a single dimensional array of elements.
20. Ascending and descending of an array.
21. Sum of all odd numbers and sum of all even numbers in a single dimensional array.
22. Mathematical operations on single dimensional arrays.
23. Reading and Printing a multi dimensional array of elements.
24. Mathematical operations on multi dimensional array of elements.
25. Passing an array element to a function.
26. Reading and Printing a string.
27. C Programs on String functions.
28. Write a C program to calculate string length by writing the user-define function.
29. Function declaration and initialization.
30. C Program to differentiate the parameters and arguments in functions.
31. Programs for different types of inbuilt functions.
32. Call by value and Call by reference programs in functions.
33. Write a program to swap the given 2 number using passing by reference.
34. Write C Programs to perform all valid arithmetic operations using pointers.
35. C programs on Structures and accessing of members of the structures.
36. Write a C program to print a book information (Book name, Book no, author name) by writing a structure.
37. Write a C program by passing structure elements to a function and display employee information (emp no, emp name, emp salary, and emp address).
38. C Programs on Reading a file from the secondary storage device.

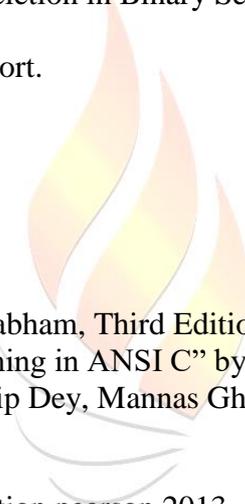
39. C Program on writing and appending a file on the secondary storage device.
40. C Program on Opening and closing a file.
41. Search an element in a two-dimensional array using linear search.
42. Using iteration and recursion concepts write programs for finding the element in the array using Binary Search Method
43. Inserting & deleting an element in the array
44. Tower of Hanoi problem using recursion
45. Perform following operations on matrices using functions only a) Addition b) Subtraction c) Multiplication d) Transpose
46. Static & dynamic Implementation of stack (push & pop operation)
47. Implementation of Circular queue (insert & delete operation)
48. Create a linear linked list & perform operations such as insert, delete, update, reverse in the link list
49. Create a circular linked list & perform operations such as insert, delete
50. Implement binary search tree. (Insertion and Deletion in Binary Search Tree)
51. Simulates the various tree traversal algorithms
52. Implementation Bubble, Insertion & selection sort.
53. Implementation of quick sort
54. Implementation of merge sort
55. Implementation of heap sort
56. Simulate various graph traversing algorithms.

TEXT BOOKS

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications.
2. Let Us C by Yashwanth Kanethar.
3. "Programming in ANSI C" by E. Balaguruswamy.
4. Programming in C, 2nd Edition, Oxford by Pradip Dey, Mannas Ghosh.

REFERENCE BOOKS

1. A.K. Sharma – Data structure Using C, 2nd edition pearson 2013
2. R. S. Salaria -Data Structure Using C
3. Kruse Robert, —Data Structures and Program Design in C, Prentice Hall of India, 1994
4. Lipschitz Jr. Seymour, —Theory & Problems of Data Structures, Schaum's Outline, 2nd Edition, Tata McGraw Hill



MCA-152A	COMPUTER ORGANIZATION & ARCHITECTURE LAB	L	T/SDA	P	Cr
		0	0	2	2

COURSE OUTCOMES

CO1: Implementation of Logic Gates (AND,OR,NOT,NOR,NAND etc) and De’Morgan’s Theorem.

CO2: Implementation of Adders (Half and Full)

CO3: Implementation of Flip Flops.

LIST OF EXPERIMENTS

1. To study and perform about logic gates.
2. To study and perform about De’Morgan’s Theorem.
3. To study and perform about NAND and NOR as a universal gate.
4. To design and implement circuit that converts binary code to gray code.
5. To study and perform about Half Adder and full Adder.
6. To study and perform about Half subtractor and full subtractor.
7. To design 3-bit odd/even parity generator and checker.
8. To study and perform about R-S and D flip flop.
9. To study and perform about J-K and T flip flop.
10. To study and perform about Master slave JK flip flop.
11. To realize Boolean functions using multiplexer.
12. To study and perform about Decoder and Demultiplexer.
13. To study the use of decoder for BCD to seven segment LED display.
14. To study universal shift register

Syllabus
of
MCA
1st Year
2nd Semester



MCA-202A	WEB DEVELOPMENT	L T P	Cr
		2 0 0	2

COURSE OUTCOMES

CO1: Explain the history of the internet and related internet concepts that are vital in understanding web development.

CO2: Discuss the insights of internet programming and implement complete application over the web.

CO3: Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.

CO4: Utilize the concepts of JavaScript and Java

CO5: Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design web sites.

UNIT I

HYPertext MARKUP LANGUAGE: Plugin's and Helper Application, XML and XHTML, The Anatomy of HTML, Structure and other semantic elements of HTML 4.1, **HTML 5:** HTML responsive, HTML entities, HTML 5 canvas, HTML API, HTML5 Data Storage, HTML5 Plugin's HTML5 Audio and Video, HTML5 Geolocation.

UNIT II

POWER OF CSS: CSS Introduction, Syntax and different CSS properties, CSS3: Rounded Corner, border images, CSS3 transitions and animations, CSS3 multiple columns, CSS3 box sizing, Responsive Web Designing: Introduction, viewport, Grid View, Media Query: add a breakpoint, including breakpoint, orientation, Bootstrap3.

UNIT III

CLIENT SIDE PROGRAMMING: Introduction to JavaScript syntax: output, Comments, variables, functions, operators, conditions, switch, loop; JavaScript event handling, objects and functions, J Query: Introduction, Selectors, J Query Events and Effects, J Query HTML.

UNIT IV

SERVER SIDE PROGRAMMING: Basics of PHP: Installation, syntax, variables, output, data types, operators, conditional loop i.e. if-else, switch; while loop, for loop, multidimensional arrays, Predefined PHP Functions and creating user defined functions; PHP form handling and database connectivity; Managing Sessions: Using Session Variables, Destroying a Session; Cookies: Storing Data in Cookies, Setting Cookies.

UNIT V

AJAX and My SQL: Introduction to AJAX, AJAX Request and Response, AJAX Events, MySQL Introduction, Installation, SQL Syntax: Where, And, OR, Update, Delete, SQL Joins, Create DB, Create Table, SQL Keys, SQL Functions: Avg, Count, Max, Min, Sum, Group By, UCase, LCase, AJAX and PHP.

TEXTBOOK

Uttam K. Roy, "Web Technology", Oxford Publication

REFERENCES

1. Musciano Chuck, "HTML & XHTML: The Definitive Guide", Bill Kennedy, 4th Edition, 2000
2. Holzner Steven, "XHTML Black Book", Paraglyph Press, 2000
3. Uttam K. Roy, "Web Technology", Oxford Publication
4. Kamal Raj, "Internet and Web Technologies", Tata McGraw Hill, 2002
5. Godbole Achyut S. and Kahate Atul, "Web Technologies, Tata McGraw Hill, 2003
6. Roger S. Pressman, David Lowe, "Web Engineering". Tata McGraw Hill Publication, 2007



MCA-204A	DATA BASE MANAGEMENT SYSTEM	L T P	Cr
		3 0 0	3

COURSE OBJECTIVE

To provide knowledge about various organizations and management information systems, keeping in view the aspects of share ability, availability, evolvability and integrity

PRE-REQUISITES

Knowledge of data structures, discrete mathematical structures

COURSE OUTCOMES

CO1: Define the basic concepts of DBMS and demonstrate the basic elements of a relational database management system

CO2: Identify the data models for relevant problems and Design entity relationship models.

CO3: Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.

CO4: Demonstrate their understanding of key notions of query evaluation and optimization techniques and Extend normalization for the development of application software's.

CO5: Synthesize the concepts of transaction management, concurrency control and recovery.

UNIT I

INTRODUCTION: What is database, Purpose of database system; advantages of using DBMS; database concept and architecture; data abstraction; data models; instances and schema; data independence; schema architecture; database languages; database administrator; database users

UNIT II

DATA MODELING: Entity sets attributes and keys, relationships (ER); database modeling using entity; type role and structural constraints, weak and strong entity types; enhanced entity-relationship (EER), ER diagram design of an E-R database schema; specialization and generalization

UNIT III

RELATIONAL MODEL: Relational model: relational model -basic concepts, enforcing data integrity constraints, Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators; extended relational algebra operations, Calculus: Tuple relational calculus, Domain relational Calculus; Codd's rules.

UNIT IV

DATABASE DESIGN AND SQL: Database design process; relational database design, anomalies in a database; functional dependencies membership and minimal covers normal forms, multi-valued dependencies, join dependencies, inclusion dependencies; reduction of an E-R schema to tables; effect of de-normalization on database performance, Query-by-example (QBE), Introduction to SQL, basic queries in SQL, advanced queries in SQL, functions in SQL; basic data retrieval, aggregation, categorization, updates in SQLs; views in SQL.

UNIT V

TRANSACTION PROCESSING: Desirable properties of transactions, implementation of

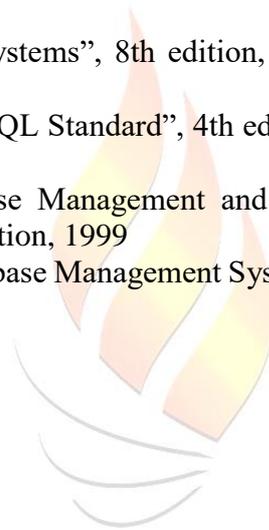
atomicity and durability; reconsistent model, read only and write only model; concurrent executions, schedules and recoverability; serializability of schedules concurrency control; serializability algorithms; testing for serializability; precedence graph; concurrency control, deadlock handling - detection and resolution.

TEXT BOOK

1. Silberschatz A., Korth H. F. and Sudarshan S., “Database System Concepts”,6th edition, McGraw-Hill, International Edition,2010
2. Steven Feuerstein, Bill Pribyl , “Oracle PL/SQL”, O'Reilly Media , 4th Edition, 2005

REFERENCE BOOKS:

1. Desai Bipin, “Introduction to Database Management System”, Galgotia Publications, 1991
2. Elmasri R. and Navathe S. B., “Fundamentals of Database Systems”, 6th edition, Addison-Wesley, Low Priced Edition, 2010
3. Date C. J., “An Introduction to Database Systems”, 8th edition, Addison-Wesley, Low Priced Edition, 2003
4. Date C. J. and Darwen H., “A Guide to the SQL Standard”, 4th edition, Addison-Wesley, 2003
5. Hansen G. W. and Hansen J. V., “Database Management and Design”, 2nd edition, Prentice- Hall of India, Eastern Economy Edition, 1999
6. Majumdar A. K. and Bhattacharyya P., “Database Management Systems”, 5th edition, Tata McGraw- Hill Publishing, 1999.



MCA-206A	OPERATING SYSTEMS	L T P	Cr
		3 0 0	3

OBJECTIVE

To provide the knowledge of internals, different types and purpose of operating systems

PRE-REQUISITES

Knowledge of computer organization and architecture programming skills

COURSE OUTCOMES

CO1: Understand the basics of operating systems like kernel, shell, types and views of operating systems

CO2: Describe the various CPU scheduling algorithms and remove deadlocks.

CO3: Explain various memory management techniques and concept of thrashing

CO4: Use disk management and disk scheduling algorithms for better utilization of external memory.

CO5: Recognize file system interface, protection and security mechanisms. Explain the various features of distributed OS like Unix, Linux, windows etc

UNIT I

INTRODUCTION: Introduction to operating system concepts (including multitasking, multiprogramming, multi user, multithreading, etc)., types of operating systems: batch operating system, time-sharing systems, distributed OS, network OS, real time OS, embedded and smart card OS, various operating system services, architecture, system programs and calls.

UNIT II

PROCESS MANAGEMENT: Process concept, Life cycle and implementation of process, Thread usage and implementation in user space and in kernel, process scheduling, operation on processes, CPU scheduling, scheduling criteria, scheduling algorithms -First Come First Serve (FCFS), Shortest-Job-First (SJF), priority scheduling, Round Robin (RR), multilevel feedback queue scheduling.

UNIT III

Deadlocks, Deadlock characteristics, prevention, avoidance using banker's algorithm, detection and recovery; Critical section problems, mutual exclusion with busy waiting, Process synchronization, semaphores: binary and counting semaphores, Classical IPC problems: dining philosophers' problem, readers-writers problem.

UNIT IV

MEMORY MANAGEMENT: Logical & physical address space, swapping, contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, segmentation with paging, virtual memory management - demand paging & page-replacement algorithms, demand segmentation.

UNIT V

I/O AND FILE SYSTEMS: I/O hardware, device controllers, interrupt handlers, device drivers, application I/O interface, kernel, transforming I/O requests, performance issues, Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, introduction to distributed file system.

LINUX/UNIX SYSTEM: LINUX/UNIX architecture, UNIX system calls for processes and file system management, basic commands of LINUX/UNIX, shell interpreter, shell scripts.

TEXT BOOK

1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition, 2014, ISBN10: 0133805913 • ISBN13: 9780133805918
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons ,Inc., 9th Edition,2012, ISBN 9781118063330
3. Maurice J. Bach, “Design of UNIX Operating System”, PHI
4. Silberchatz et al, “Operating System Concepts”, 5th edition, Addison-Wesley, 1998

REFERENCE BOOKS

1. Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, Inc., 1st Edition, 2007.ISBN10: 0596009526 | ISBN13: 9780596009526
2. Harvey M. Deitel, Operating Systems, Prentice Hall, 3rd Edition,2003, ISBN10: 0131828274 | ISBN13: 9780131828278
3. Andrew S. Tanenbaum, Modern Operating System, Prentice Hall, 3rd Edition, 2007,ISBN10: 0136006639 | ISBN13: 9780136006633
4. Operating System in depth by Thomson
5. Tanenbaum A., “Modern Operating Systems”, Prentice-Hall, 1992
6. Stallings William, “Operating Systems Internals and Design Principles”, 4th edition, Prentice-Hall, 2001
7. Dhamdhare D. M., “Operating System”, 2nd Edition, Tata McGraw Hill, 1999
8. Kernighan Brian and Pike Rob, “The Unix Programming Environment”, Prentice Hall of India, 1984
9. Bach Maurich, “Design of the Unix Operating System”, Prentice Hall of India, 1986
10. Muster John, “Introduction to UNIX and LINUX”, Tata McGraw Hill, 2003
11. Ritchie Colin, “Operating System Incorporating Unix & Windows”, Tata McGraw Hill, 1974
12. Madnick Stuart and Donovan John, “Operating Systems”, Tata McGraw Hill, 2001
13. Deitel, “Operating Systems”, Addison-Wesley, 1990

MCA-208A	CYBER SECURITY	L T P	Cr
		2 0 0	2

OBJECTIVES

The objective of this course is to create architectural, algorithmic and technological foundations for ensuring cyber security, maintenance of the privacy of individuals, the confidentiality of organizations, and the protection of sensitive information, despite the requirement that information be released publicly or semi-publicly.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Know about the security issues in case of cyber

CO2: Learn about the related concepts of data like privacy attacks, policies etc.

CO3: Aware about the architecture and structural organization for a safe cyber system

CO4: Know about the practice policies for the real world

CO5: Learn about the ways of investigations and handling of evidence in cyber forensic

UNIT I

BASIC CYBER SECURITY CONCEPTS: Introduction to Cyber Security, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy, Nodal Authority, International convention on Cyberspace.

UNIT :- II

BASIC DATA PRIVACY CONCEPTS: Fundamental Concepts, Definitions, Statistics, Data Privacy Attacks, Data linking and profiling, access control models, role based access control, Discretionary and mandatory access control, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

UNIT III

CYBER SECURITY VULNERABILITIES AND CYBER SECURITY SAFEGUARDS: Cyber Security Vulnerabilities – Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Poor Cyber Security Awareness. Cyber Security Safeguards – Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

UNIT IV

DATA EXPLOSION: Statistics and Lack of barriers in Collection and Distribution of Person-specific information, Mathematical model for characterizing and comparing real-world data sharing practices and policies and for computing privacy and risk measurements.

SURVEY OF TECHNIQUES: Protection models, Disclosure control, inferring entity identities, Strength and weaknesses of techniques, entry specific databases, computation systems for protecting delimited data, protecting textual documents, Scrub.

UNIT V

CYBER FORENSICS: Introduction to Cyber Forensics, Handling Preliminary Investigations, controlling an Investigation, conducting disk-based analysis, Investigating Information-hiding, Scrutinizing E-mail, Validating E-mail header information, Tracing Internet access, Tracing memory in real-time.

TEXT BOOK

“Cyber security for Beginners” by Raef Meeuwisse

REFERENCE BOOKS

1. “Cyber security for Seniors “ by Dr. Steve Krants
2. “Ghost in the Wires: My Adventures as the World's Most Wanted Hacker” by Kevin Mitnick.
3. Charles P. Pfleeger, Shari Lawerance Pfleeger, “Analysing Computer Security”, Pearson Education India.
4. V.K. Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.
5. Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla ,“Introduction to Information Security and Cyber Law” Willey Dreamtech Press.
6. Schou, Shoemaker, “Information Assurance for the Enterprise”, Tata McGraw Hill.
7. CHANDER, HARISH, “Cyber Laws And It Protection”, PHI Learning Private Limited, Delhi, India

MCA-210A	ANALYSIS & DESIGN OF ALGORITHMS	L T P	Cr
		3 0 0	3

OBJECTIVE:

To relay the theoretical and practical aspects of design of algorithms

PRE-REQUISITES

Knowledge of fundamentals of basic computer programming for implementing algorithms.

COURSE OUTCOMES

CO1: Define the basic concepts of algorithms and analyze the performance of algorithms.

CO2: Discuss various algorithm design techniques for developing algorithms.

CO3: Discuss various searching, sorting and graph traversal algorithms.

CO4: Understand NP completeness and identify different NP complete problems.

CO5: Discuss various advanced topics on algorithms.

UNIT I

BRIEF REVIEW: Growth of functions, Asymptotic Notations, Representation of Graphs, Breadth First Search, Depth First Search and Data Structures for Disjoint Sets.

UNIT II

DIVIDE AND CONQUER: General method; binary search; merge sort; quick sort; selection sort; Strassen's matrix multiplication algorithms and analysis of algorithms for these problems.

UNIT III

GREEDY AND DYNAMIC ALGORITHMS : Activity selection; Fractional Knapsack, Job Sequencing with dead line; task scheduling problem. Matrix multiplications; 0/1 knapsack; the traveling salesperson problem.

UNIT IV

ELEMENTARY GRAPH ALGORITHM AND TREES: Representation of Graph; Breadth-first search, Depth first search; topological sort; strongly connected components , Growing a minimum spanning tree; Kruskal & Prim's algorithms; Single source shortest path: Dijkstra's algorithm.

UNIT V

BACK TRACKING: General method; 8 queens' problem; graph colouring; Hamiltonian cycles; analysis of these problems. Introduction to NP hard & NP complete

TEXT BOOKS

Cormen Thomas H., Leiserson Charles E. and Rivest Ronald L., "Introduction to Algorithms", Tata McGraw Hill, 1990

REFERENCES

1. A. V. Aho, J. E. Hopcroft, J. D. Ullman, "The Design and Analysis of Computer Algorithms", Addison Wesley, 1998.
2. Ellis Horowitz and Sartaz Sahani, "Computer Algorithms", Galgotia Publications, 1999.
3. D. E. Knuth, "The Art of Computer Programming", 2 ndEd., Addison Wesley, 1998.

MCA-252A	WEB DEVELOPMENT LAB	L T P	Cr
		0 0 2	1

COURSE OUTCOMES

CO1: Implement and Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.

CO2: Utilize the concepts of JavaScript and Java

CO3: Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design web sites.

LIST OF EXPERIMENT

HTML

1. Simple HTML
2. Hyper Links
3. Using Frames
4. Registration Form with Table

CSS

5. Inline Style , Internal Style ,and external Style Sheets

JAVA SCRIPT

6. Use user defined function to get array of values and sort them in ascending order
7. Demonstrate String and Math Object's predefined methods
8. Demonstrate Array Objects and Date Object's predefined methods
9. Exception Handling
10. Calendar Creation : Display all month

Event Handling

11. Validation of registration form
12. Open a Window from the current window
13. Change color of background at each click of button or refresh of a page
14. Display calendar for the month and year selected from combo box
15. OnMouseover event

XML

16. Create a any catalog
17. Display the catalog created using CSS and XSL

PHP

18. File operation
19. Regular Expression, Array, Math, Date function.



MCA-254A	DATA BASE MANAGEMENT SYSTEM LAB	L T P	Cr
		0-0-2	1

COURSE OUTCOMES

CO1: Implement the basic concepts of DBMS and Demonstrate the basic elements of a relational database management system

CO2: Identify the data models for relevant problems and Design entity relationship models.

CO3: Design and Implement of entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.

CO4: Demonstrate their understanding of key notions of query evaluation and optimization techniques and Extend normalization for the development of application software's.

LIST OF EXPRIMENTS

1. Introduction to PL/SQL
2. Write a program to carry out
 - a. Creation of table
 - b. Insertion of data into table
 - c. Viewing of data into table: All rows and all columns, Selected columns and all rows, Selected rows and all columns, Selected rows and selected columns, Elimination of duplicates from selected statements, Sorting of data into a table.
 - d. Deletion of data from given table: Removal of all rows, Removal of selected rows
 - e. Updating of table contents: Updating all rows, Updating of record conditionally
 - f. Modifying the structure of table: Adding new column, Modifying existing column
 - g. Renaming tables
 - h. Destroying tables
 - i. Examining objects created by user: Finding tables created by user, Finding column details of table created
 - j. Computation on table data: Arithmetic operators, Logical operators (AND, OR, NOT), Range searching (BETWEEN, NOT BETWEEN), Pattern matching (LIKE, IN, NOT IN)
3. Oracle set functions (Scalar, Group & Pattern Matching Operator): AVG, SUM, MIN, MAX, COUNT, COUNT(*), ABS, ROUND, LENGTH, SUBSTR, POWER, SQRT, LOWER, UPPER, LPAD, RPAD, LTRIM, RTRIM
4. Data constraints at column level and at table level: NULL value concept, UNIQUE constraints, Primary key constraint, Foreign key constraint, Check constraint.
5. VIEWS: Creation of views, Renaming of columns in view, Selection, Updation, Destroy
6. Grouping Data from tables in SQL
7. INDEXES
8. SEQUENCES
9. Granting and Revoking Permissions in SQL
10. CURSORS & its Applications
11. Create Function and use Cursor in Function

12. TRIGGERS
13. Hands on Exercises

REFERENCE BOOKS

1. SQL, PL/SQL the Programming Language of Oracle, Ivan Bayross
2. Date C. J. and Darwen H., "A Guide to the SQL Standard", 4th edition, Addison-Wesley, 2003
3. Desai Bipin, "Introduction to Database Management System", Galgotia Publications, 1991
4. Date C. J., "An Introduction to Database Systems", 8th edition, Addison-Wesley, Low Priced Edition



MCA-256A	ANALYSIS AND DESIGN OF ALGORITHMS LAB	L	T/SDA	P	Credit
		0	0	2	1

OBJECTIVE

Design, develop, and implement the specified algorithms for the following problems using Java language under LINUX /Windows environment. Netbeans /Eclipse IDE tool can be used for development and demonstration.

COURSE OUTCOMES

CO1 Be able to design and analyze the time and space efficiency of the data structure

CO2 Be capable to identify the appropriate data structure for given problem

CO3 Have practical knowledge on the applications of data structures

LIST OF PROGRAMS

1.
 - A. Create a Java class called Student with the following details as variables within it. (i) USN (ii) Name (iii) Branch (iv) Phone Write a Java program to create nStudent objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.
 - B. Write a Java program to implement the Stack using arrays. Write Push(), Pop(), and Display() methods to demonstrate its working.
2.
 - A. Design a superclass called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories.
 - B. Write a Java class called Customer to store their name and date_of_birth. The date_of_birth format should be dd/mm/yyyy. Write methods to read customer data as and display as using StringTokenizer class considering the delimiter character as “/”.
3.
 - A. Write a Java program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero.
 - B. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.
4. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n > 5000 and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide and- conquer method works along with its time complexity analysis: worst case, average case and best case.
5. Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of n > 5000, and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide and- conquer method works along with its time complexity analysis: worst case, average case and best case.

6. Implement in Java, the 0/1 Knapsack problem using (a) Dynamic Programming method (b) Greedy method.
7. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm. Write the program in Java.
8. Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm. Use Union-Find algorithms in your program.
9. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
10. Write Java programs to
 - A. Implement All-Pairs Shortest Paths problem using Floyd's algorithm.
 - B. Implement Travelling Sales Person problem using Dynamic programming.
11. Design and implement in Java to find a subset of a given set $S = \{S_1, S_2, \dots, S_n\}$ of n positive integers whose SUM is equal to a given positive integer d . For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$, there are two solutions $\{1, 2, 6\}$ and $\{1, 8\}$. Display a suitable message, if the given problem instance doesn't have a solution.
12. Design and implement in Java to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.



Syllabus
of
MCA
3rd Semester



MCA-201A	COMPUTER GRAPHICS & MULTIMEDIA	L T P	Cr
		3 0 0	3

OBJECTIVE

To impart the knowledge about the different graphics, image, color models as well as its role in real world applications

COURSE OUTCOMES

The students undergoing this course will be able to:

- CO1:** Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
- CO2:** Use of geometric transformations on graphics objects and their application in composite form. Extract scene with different clipping methods and its transformation to graphics display device
- CO3:** Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. Render projected objects to naturalize the scene in 2D view and use of illumination models for this.
- CO4:** Understand the basics of computer graphics, framework for multimedia systems; multimedia devices.
- CO5:** Understand the basics of Multimedia graphics, different graphics systems and applications of computer graphics.

UNIT-I

INTRODUCTION: What is computer graphics, computer graphics applications, computer graphics hardware and software, two-dimensional graphics primitives: points and lines, line drawing algorithms: DDA, Bresenham; circle drawing algorithms: using polar coordinates, Bresenham circle drawing, midpoint circle drawing algorithm; polygon filling algorithm, boundary filled algorithm, scan-line algorithm, flood fill algorithm.

UNIT-II

TWO-DIMENSIONAL VIEWING Clipping: The 2-D viewing pipeline, windows, viewports, window to View port mapping; clipping: point, clipping line (algorithms): 4 bit code algorithm, Sutherland-Cohen algorithm, parametric line clipping algorithm (Cyrus Beck). Sutherland-Hodgeman polygon clipping algorithm

UNIT-III

2D TRANSFORMATION & 3D GRAPHICS: Homogeneous coordinates system, two dimensional transformations: transformations, translation, scaling, rotation, reflection, shearing, transformation, composite transformation. Three dimensional graphics concept, matrix, Representation of 3-D transformations, composition of 3-D transformation.

UNIT-IV

BASICS OF MULTIMEDIA TECHNOLOGY & APPLICATIONS: Computers, communication and entertainment, multimedia an introduction; framework for multimedia

systems; multimedia devices; CD Audio, CD-ROM, CD-I, presentation devices and the user interface; multimedia presentation and authoring; professional development tools; Applications of environment in various fields.

UNIT-V

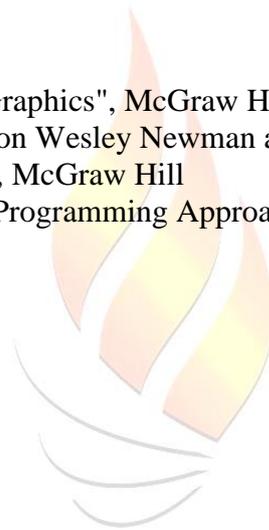
LAN AND MULTIMEDIA: internet, World WideWeb and multimedia distribution network: ATM & ADSL; multimedia servers and databases; vector graphics; 3D graphics programs; animation techniques; shading; anti-aliasing; morphing; video on demand.

TEXT BOOK

Computer Graphics – Donald Hearn & M.Pauline Baker, Prentice Hall of India

REFERENCES:

1. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
2. Asthana, Sinha, "Computer Graphics", Addison Wesley Newman and Sproul,
3. "Principle of Interactive Computer Graphics", McGraw Hill
4. Steven Harrington, "Computer Graphics", A Programming Approach, 2nd Edition



MCA-203A	SOFTWARE TESTING	L T P	Cr
		3 0 0	3

Objectives:

Software testing is an activity which aims at evaluating the quality of a software product and also to improve it by identifying defects. Software testing strives to achieve its objectives but has certain limitations. However, adherence to the established objectives ensures effective testing.

COURSE OUTCOMES

After completing this course, the students will be able:

CO1: To know about the basic concepts of software testing

CO2: To learn about the various techniques of software testing as well as building the test plan

CO3: To create different test cases in different situations

CO4: To use different tools for building test reports, risks as well as test cases

CO5: To automate the testing process

UNIT I

Brief introduction to software systems and SDLC, Basic concepts Of Basic Testing Vocabulary, Quality Assurance versus Quality Control, The Cost of Quality, Software Quality Factors, How Quality is Defined, Why Do We Test Software? What is a Defect? The Multiple Roles of the Software Tester (People Relationships), Scope of Testing, When Should Testing Occur? Testing Constraints, Life Cycle Testing, Independent Testing, what is a QA Process? Levels of Testing, The “V” Concept of Testing

UNIT II

Testing Techniques of Structural versus Functional Technique Categories, Verification versus Validation, Static versus Dynamic Testing, Examples of Specific Testing Techniques
Test Administration Test Planning, Customization of the Test Process, Budgeting, Scheduling
Create the Test Plan, Prerequisites to test planning, Understand the Characteristics of the Software Being Developed, Build the Test Plan, Write the Test Plan

UNIT III

Test Cases: Test case Design, Building test cases, Test data mining, Test execution, Test Reporting, Defect Management, Test Coverage – Traceability matrix,
Test Metrics – Guidelines and usage, Test reporting: Guidelines for writing test reports

UNIT IV

Test Tools used to Build Test Reports, Managing Change Software Configuration Management, Change Management, Risks – Risk Analysis and Management with examples
User Acceptance testing – in detail explanation with details.
Case Study: How to test web, stand alone and database applications – with examples.

UNIT V

Automation Testing Basics – why, when and how to perform automation testing, Factors for choosing a particular tool, An overview for the major functional testing tools, Overview of Test management and bug tracking tools

Test books

1. A Practitioner's Guide to Software Test Design, Lee Copeland, 2003
2. The Art of Software Testing, 2nd edition, Glenford Myers, et. el., 2004

Reference Books

1. *Software Testing Techniques*, 2nd edition, Boris Beizer, 1990
2. *How to Break Software: A Practical Guide to Testing*, James Whittaker, 2002
3. *Testing Object-Oriented Systems: Models, Patterns, and Tools*, Robert V. Binder, 1999



MCA-205A	PYTHON PROGRAMMING	L-T-P	Cr
		3-0-0	3

OBJECTIVE

To build programming logic and thereby developing skills in problem solving using Python programming language; To be able to do testing and debugging of code written in Python Emphasize the concepts and constructs rather than on language features.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Understand the building blocks of Internet of Things and characteristics

CO2: Describe the various application areas of IoT.

CO3: Design a basic IoT product using Raspberry Pi and sensors.

CO4: Deploy an IoT application and connect to the cloud.

CO5: Simulate/implement given problem scenario and analyze its performance.

UNIT I

PLANNING THE COMPUTER PROGRAM AND PROBLEM SOLVING

TECHNIQUES: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation. Flow charting, decision table, algorithms, structured programming concepts, Programming methodologies viz. Top-down and bottom-up programming.

UNIT II

OVERVIEW OF PROGRAMMING & INTRODUCTION TO PYTHON: Structure of a Python Program, Elements of Python. Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic Operator, Relation a l operator, Logical or Boolean operator, Assignment, Operator, Ternary operator ,Bit wise operator, Increment or Decrement operator).

UNIT III

CREATING PYTHON PROGRAMS: Input and Output Statements, Control Statements (Looping- while Loop, for Loop ,Loop Control ,Conditional Statement-if...else, Difference between break ,continue and pass).

UNIT IV

STRUCTURES& FUNCTIONS: Numbers, Strings, Lists, Tuples, Dictionary, Date & Time, Modules, Defining Functions, Exit function, default arguments.

UNIT V

Classes, Object-oriented Programming and Exception: Abstract Data Types and Classes, Inheritance, Encapsulation and information hiding, Handling exceptions

TEXT BOOKS:

John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India

REFERENCE BOOKS:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.org2010
3. Allen Downey, Jeffrey Elkner, Chris Meyers ,How to think like a computer scientist :Learning with Python, Freely available online.2012
4. <http://docs.python.org/3/tutorial/index.html>
5. <http://interactivepython.org/courselib/static/pythonds>
6. <http://www.ibiblio.org/g2swap/byteofpython/read/>



MCA-207A	DATA MINING AND DATA WAREHOUSING	L T P	Cr
		3 0 0	3

OBJECTIVE

This course introduces basic concepts, tasks, methods, and techniques in data mining. The emphasis is on various data mining problems and their solutions. Students will develop an understanding of the data mining process and issues, learn various techniques for data mining, and apply the techniques in solving data mining problems using data mining tools and systems. Students will also be exposed to a sample of data mining applications.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Understand the functionality of the various data mining and data warehousing component

CO2: Appreciate the strengths and limitations of various data mining and data warehousing models

CO3: Explain the analyzing techniques of various data

CO4: Describe different methodologies used in data mining and data ware housing.

CO5: Compare different approaches of data ware housing and data mining with various technologies.

UNIT I

DATA WAREHOUSING: Definition, usage and trends. DBMS vs data warehouse, data marts, metadata, multidimensional data mode, data cubes, schemas for multidimensional database: stars, snowflakes and fact constellations.

UNIT II

DATA WAREHOUSE ARCHITECTURE AND IMPLEMENTATION: OLTP vs. OLAP, ROLAP vs MOLAP, types of OLAP, servers, 3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager, Computation of data cubes, OLAP queries manager, data warehouse back end tools, complex aggregation at multiple granularities, tuning and testing of data warehouse.

UNIT III

DATA MINING & ITS CURRENT TRENDS: Definition and task, KDD versus data mining, data mining techniques, Spatial databases, multimedia databases, time series and sequence data, mining text databases and mining Word Wide Web tools and applications. Strategy and business model current trends in data mining, open research area should be added in the course.

UNIT IV

DATA MINING QUERY LANGUAGES: Data specification, specifying knowledge, hierarchy specification, pattern presentation and visualization specification, data mining languages and standardization of data mining.

UNIT V

DATA MINING TECHNIQUES: Association rules, clustering techniques and implementation, decision tree knowledge discovery through neural networks and genetic algorithm, rough sets, support vector machines and fuzzy techniques.

TEXT BOOK

Data Mining Techbniques by ArjunPujri,PHI, Publication

REFERENCES:

1. Berson, “Data Warehousing, Data-Mining & OLAP”, TMH
2. Mallach, “Decision Support and Data Warehousing System”, TMH
3. Bhavani Thura-is-ingham, “Data-Mining Technologies, Techniques Tools & Trends”, CRC Press
4. Navathe, “Fundamental of Database System”, Pearson Education
5. Margaret H. Dunham, “Data-Mining. Introductory & Advanced Topics”, Pearson Education
6. Pieter Adriaans, Dolf Zantinge, “Data-Mining”, Pearson Education



MCA-209A	CRYPTOGRAPHY AND DATA COMPRESSION	L T P	Cr
		3 0 0	3

OBJECTIVE

The course will provide an overview of cryptographic techniques applicable in an IT environment, and outline the constraints and limitations of realistic secure systems. A running theme is the tradeoff between usability and security of a system.

PRE-REQUISITES

A working knowledge of C is assumed and essential.

COURSE OUTCOMES

CO1: Understand and analyze public-key cryptography, RSA and other public-key cryptosystems

CO2: Analyze and design hash and MAC algorithms, and digital signatures.

CO3: Design network application security schemes, such as PGP, S/ MIME, IPsec, SSL, TLS, HTTPS, SSH, etc.

CO4: Understand key management and distribution schemes and design User Authentication Protocol

CO5: Know about Intruders and Intruder Detection mechanisms, Types of Malicious software, Firewall Characteristics, Types of Firewalls, Firewall Location and Configurations.

UNIT I

COMPRESSION: Packing; Huffman coding; run length encoding; Lempel-Ziv-Welch; Phil Katz's PKZIP; Delta modulation; JPEG.

UNIT II

ERROR DETECTION AND CORRECTION: Parity; 1, 2, n-dimensions, Hamming codes; p-out-of-q codes

UNIT III

CRYPTOGRAPHY: Vocabulary; history, steganography – visual, textual; cipher hiding; false errors; public key cryptography - authentication, signatures, deniability

UNIT IV

MATHEMATICS: Information; confusion; diffusion; modular arithmetic; inverses; Fermat's little theorem, Chinese remainder theorem; factoring; prime numbers; discrete logarithms

UNIT V

ALGORITHMS: DES; AES (Rijndael); IDEA; one time pad; secret sharing and splitting; RSA; elliptic curves; modes; random numbers

TEXT BOOKS

1. Johannes A. Buchmann, “Introduction to Cryptography”, Springer-Verlag.
2. Schneier B., “Applied Cryptography: Protocols, Algorithms and Source Code in C”, 2nd edition, Wiley, 1996.

REFERENCE BOOKS

1. IEEE, “Integration of Data Compression and Cryptography: Another Way to Increase the Information Security”, IEEE Computer Society
2. Desai Suhag, “Security in Computing”, Pearson Education
3. Trappe W. and Washington L., “Introduction to Cryptography”, 2nd edition, Pearson Education, 2006



MCA-251A	COMPUTER GRAPHICS AND MULTIMEDIA LAB	L T P	Cr
		0 2 4	4

COURSE OUTCOMES

The students undergoing this course will be able:

CO1: To get familiar with different types of media

CO2: To implement the motion in still images

CO3: To learn about shape tweening of objects & alphabets

CO4: To use the macromedia flash

CO5: To know how to add text in the file

List of Experiments

PART -1 Basics/Inbuilt functions in computer graphics

1. To draw a line using inbuilt functions.
2. To draw a circle/Ellipse using inbuilt functions.
3. To draw a rectangle using inbuilt functions.
4. To change the background and foreground color using inbuilt functions.
5. To fill area using inbuilt functions.
6. To draw a triangle using inbuilt functions and a circle is centered at each corner of the triangle.

PART-2 Line/circle/ellipse drawing algorithms

7. To draw a line using DDA Line drawing algorithm.
8. To draw a line using Bresenham Line drawing algorithm.
9. To draw a circle using eight way symmetry.
10. To draw a circle using incremental circle drawing algorithm.
11. To draw a circle using mid point/Bresenham circle drawing algorithm.
12. To draw an Ellipse using midpoint ellipse drawing algorithm.

PART-3 Polygon Filling/Area Filling/Region filling

13. Polygon filling/area filling using boundary fill algorithm.
14. Polygon filling/area filling using flood fill algorithm.
15. Polygon filling/area filling using Scan line algorithm.

PART-4 2D Clipping/2D Transformation /Window to View port mapping

16. To clip a line using Midpoint Line clipping algorithm.
17. To clip a line using Cohen Sutherland /Four bit op-code line clipping algorithm.
18. To clip a line using Cyrus Back line clipping algorithm.
19. To implement a clock.
20. To implement a screen saver.
21. To transform a 2D object (Line, Rectangle, circle) using
 - Translation
 - Scaling
 - Rotation
 - Reflection
 - Shearing
- 22 To transform a 2D object (Line, Rectangle, circle) using Homogenous Coordinate system.
 - Translation
 - Scaling

- Rotation
- Reflection
- Shearing

23 To transform window to view port.

24 To zoom an object.

25 To perform reverse zooming.

PART-5 Projection and 3D Transformation

26 To perform perspective projection.

27 To perform parallel projection.

28 To perform 3D Transformation.

- Translation
- Scaling
- Rotation

PART – 6 List of Experiments Based on Multimedia

29 Create Motion Tweening using Macromedia Flash(Moving Ball).

30 Create Spot Light using Macromedia Flash.

31 Create Shape Tweening using Macromedia Flash.

32 Create Shadow of building that change according to position of Sun using Macromedia

FLASH

- 33** Create and show the use of guided layer using Macromedia Flash(Any Example).
- 34** Create Animated Pool Table.
- 35** Create Animated Birthday card.
- 36** Create Bow & Arrow hitting a Ball.
- 37** Create Masking Effect with Motion Twinning.
- 38** Create Animation of Moving Car.

MCA-253A	PYTHON PROGRAMMING LAB	L T P	Cr
		0-1-2	2

COURSE OUTCOMES

After completing this course, the students will be able to:

CO1 Define and demonstrate the use of built-in data structures “lists” and “dictionary”.

CO2 Design and implement a program to solve a real-world problem

CO3 Design and implement GUI application and how to handle exceptions and files.

CO4 Make database connectivity in python programming language.

PROGRAM 1: PROGRAMS USING IF ELSE STRUCTURE

- a) Find the Largest Among Three Numbers
- b) Python Program to Check Leap Year
- c) Python Program to Take in the Marks of 5 Subjects and Display the Grade
- d) Python Program to Check if a Date is Valid and Print next date

PROGRAM 2: PROGRAMS USING FOR AND WHILE LOOP

- a) Python Program to check whether given number is Prime Number or not
- b) Python Program to Find LCM of two numbers
- c) Write a Python program to compute the GCD of two numbers
- d) Python Program to Find the Sum of Digits in a Number
- e) Python Program to convert binary number to decimal number
- f) Python Program to Display Fibonacci sequence Using Recursion

PROGRAM 3: PROGRAM USING LIST AND STRING DATA STRUCTURE

- a) Write Python Program to input a list of integers, (1) display the no of elements in the list (2) display minimum and maximum element in the list (3) display sum of square of all the element in the list (4) (5) add a new element at end and display the list (6) add a new element at given index and display list (7) display the occurrence of given element in the list (8) remove the given element in the list (9) add element from a new list from given list (10) sort the given list & reverse the given list (11) also perform slicing, concatenation and multiplication operation
- b) A fruit seller sells different type of fruits. Type of fruits and corresponding rates are stored in two different lists. Customer can order any type of fruit (one or more type) in any quantity. If total bill of customer is greater than 500, customer is given 10% discount. If any of the fruits required by the customer is not available in the store, then consider the bill amount to be -1. Write a Python program to calculate and display the bill amount
- c) Write a Python program to display all the permutations of given string (don't use python permutation function)
- d) Accept two strings 'string1' and 'string2' as input from the user. Generate a resultant string-1, such that it is a concatenated string of all upper case alphabets from both the strings in the order they appear. Generate a resultant string-2 that contain character which are in both string1 and 2 Print the actual resultant string-1 and resultant string-2

PROGRAM 4: PROGRAMS USING CONCEPT OF SETS, TUPLE & DICTIONARY

- a) Write a Python program that take a string as input and store the character and occurrence of each character in a dictionary. Create two lists from dictionary first having each character in sorted order of their frequency and second having corresponding frequency.
- b) A furniture seller sells different type of furniture, Type of Furniture and rates are stored in a dictionary. Customer can order any type of furniture (one or more type) in any quantity. If total bill of customer is greater than 10,000, customer is given 5% discount. 8% GST is charged on total bill. If any of the furniture required by the customer is not available in the store, then consider the bill amount to be -1. Write a Python program to calculate and display the bill amount
- c) Consider a scenario from Lingayas Vidyapeeth. Given below are two Sets representing the names of students enrolled for a particular course: `java_course = {"Anmol", "Rahul", "Priyanka", "Pratik"}` `python_course = {"Rahul", "Ram", "Nazim", "Vishal"}` Write a Python program to list the number of students enrolled for: 1) Python course 2) Java course only 3) Python course only 4) Both Java and Python courses 5) Either Java or Python courses but not both 6) Either Java or Python
- d) Students name and their corresponding marks are stored in a dictionary. Write a Python program to perform following (1) Display name and marks of each student (2) Display the names of top two scorer (3) display the class average for this course (4) check if the marks for given student is stored in dictionary or not, if not add the name and marks in the dictionary else display his/her marks (5) delete the name and marks of a given student in the dictionary (6) add name and marks from another dictionary and display combined dictionary

PROGRAM 5: USING FUNCTION IN PYTHON:

- a) Write Python functions using the concept of Keyword & default arguments and write a program to use them
- b) Write python functions to use the concept of variable length argument & global variable. Write a program to use these functions
- c) Write a recursive function to solve the Tower of Hanoi Problem

PROGRAM 6: PROGRAM USING CONCEPT OF CLASS, OBJECT, CLASS VARIABLE, CLASS METHOD, STATIC METHOD

- a) Create a class Account with name, account no and balance as attribute and no_of_accounts as class variable. Account no should be generated automatically (starting from 1) using the class variable no_of_account. Add the methods for displaying the account information, depositing given amount, withdrawing given amount and initializer method to initialize the object. Create objects of Account class and call different method to test the class
- b) Create a class Employee with name, empid, salary as attribute and no_of_employee and annual_incr (% annual increment) as class variable. empid should be generated automatically (starting from 1) using the class variable, no_of_employee. Add the instance methods for displaying the employee information, annually increasing the salary with help of class variable annual_incr, class method to change the value of annual_incr and initializer method to initialize the object. Create objects of employee class and call different method to test the class (program using class method)
- c) Write a Program to showing the use of built in class attributes (`__doc__`, `__dict__`, `__name__`, `__module__`, `__bases__`) and special methods(`__del__()`, `__str__()`) and built in function `isinstance()`

PROGRAM 7: PROGRAM USING THE CONCEPT OF INHERITANCE

- a) Create a class Polygon to represent a polygon having no of sides and a list having magnitude of each side as attribute. Add the inputSides() to input sides and displaySides() to display sides as methods. Derive a class Triangle from Polygon and add an additional method displayArea() to display area. Create object of Triangle and call different methods to test the class
- b) Create a class Person having name, age, as attributes, __init__() method to initialize the object and display() to display person information. Derive a class Student from Person having roll no, University name, branch as additional attributes and __init__(), display() to display student information and change_Branch() method. Create object of Student type and call different methods to test the class.
- c) Write a program to show the concept of multiple inheritance in python

Program 8: Program using the concept of Polymorphism, operator overloading

- a) In a retail outlet there are two modes of bill Payment (1) Cash : Calculation includes VAT(10%) Total Amount = Purchase amount + VAT (2) Credit card: Calculation includes processing charge and VAT Total Amount = Purchase amount + VAT (10%) + Processing charge (2%) The act of bill payment is same but the formula used for calculation of total amount differs as per the mode of payment. Can the Payment maker simply call a method and that method dynamically selects the formula for the total amount? Demonstrate this Polymorphic behaviour with code.
- b) Write a program to create a class to represent length in feet and inch. Overload the “+” operator to add the two object of length type.
- c) Write a program to overload comparison operator in python

PROGRAM 9: PROGRAM ON FILE HANDLING IN PYTHON

- a) Write a python program to write few lines on a file, read it back and create a dictionary having each word in file as keys in dictionary and occurrence of these word as values and print the dictionary.
- b) A file student.txt store student information. Information about each student is written on separate line in the form: roll-no student-name (student-name may consist of any number of words).Write a Python program that takes student roll no as input and print the student name. If roll no is not present in the file it display : “roll no not present in the file”
- c) Write a python program to read a file that contains email ids on the separate lines in the form: “personname@companyname.com. Create a new file that contain only company names, read the new file to print the company name

PROGRAM 10: PROGRAM ON EXCEPTION HANDLING

- a) Write a function divide (arg1, arg2) to divide arg1 by arg2. Use the exception handling mechanism to handle all type of possible exceptions that may occur. Take the value of arg1 and arg2(of any type) from user as input and call the function divide to print the result of division or suitable message if any type of exception occurs(use also else and finally block)
- b) Write a program to open a file in read only mode read data from file and then try to write data on file. Use the exception handling mechanism to handle all type of possible exception

- c) Write a Python program that takes email id, mobile number and age as inputs from user. Validate each and raise user defined exceptions accordingly

Note:-

Email id: there must be only one @ and At least one “.”

Mobile number must be 10 digits

Age must be a positive number less than 101

PROGRAM 11: PROGRAM ON MULTITHREADING

- a) Write two functions : print_even(n) and print_odd(n) to print even numbers and print odd numbers respectively up to integer n. Create two thread objects by passing these function in thread class constructor to execute these functions in two different thread. Use sleep() method to see how these functions are executed concurrently(* use start() method to start and join() method to wait for thread to terminate)
- b) Write a python program to use the concept of multithreading by Overriding run() method in a subclass of threading.Thread.
- c) Write a python program using the concept of thread synchronization.

REFERENCE BOOKS

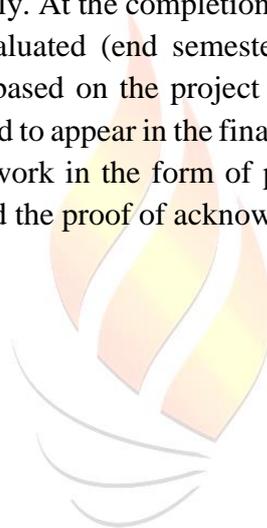
1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist :Learning with Python, Freelyavailableonline.2012
3. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India

MCA-255A	MINOR PROJECT	L-T-P	CR
		0-0-4	2

OBJECTIVE

The student shall be capable of identifying a problem related to the program of study and carry out wholesome research on it leading to findings which will facilitate development of a new/improved product, process for the benefit of the society.

The projects should be socially relevant and research oriented ones. Student is expected to do an individual project or in group of 3 members. The project work is carried out in two phases – Minor Project in III semester and Major Project in IV semester. Major project of the project work shall be in continuation of Minor Project only. At the completion of a project the student will submit a project report, which will be evaluated (end semester assessment) by duly appointed examiner(s). This evaluation will be based on the project report and a viva voce examination on the project. Student will be allowed to appear in the final viva voce examination only if he / she has submitted his / her project work in the form of paper for presentation / publication in a conference / journal and produced the proof of acknowledgement of receipt of paper from the organizers / publishers.



Syllabus
of
MCA
4th Semester



MCA-224A	ARTIFICIAL INTELLIGENCE	L-T-P	Cr
		3-0-0	3

OBJECTIVE

To impart knowledge about the intelligence, artificial intelligence and their role in real world applications

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems. Solve basic AI based problems

CO2: Define the concept of Artificial Intelligence and Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

CO3: Apply AI techniques to real-world problems to develop intelligent systems.

CO4: Select appropriately from a range of techniques when implementing intelligent systems.

CO5: Discuss the basics of ANN and different optimizations techniques.

UNIT I

INTRODUCTION TO AI AND SEARCH TECHNIQUES: Foundation and history of AI; data, information and knowledge; agents, AI problems and techniques – AI programming languages, problem space representation with examples; blind search strategies, breadth first search, depth first search, heuristic search techniques: hill climbing; best first search, A* algorithm AO* algorithm, Means-ends analysis.

UNIT II

KNOWLEDGE REPRESENTATION ISSUES AND STRUCTURE: predicate logic; logic programming; constraint propagation; representing knowledge using rules, semantic nets, partitioned nets, parallel implementation of semantic nets; frames, common sense reasoning and thematic role frames; architecture of knowledge based system; rule based systems; forward and backward chaining; frame based systems.

UNIT III

REASONING UNDER UNCERTAINTY: Reasoning under uncertainty, non-monotonic reasoning; review of probability; Bayes' probabilistic inferences and Dempster Shafer theory; symbolic reasoning under uncertainty; statistical reasoning, fuzzy reasoning.

UNIT IV

PLANNING & GAME PLAYING: Minimax search procedure; goal stack planning; non linear planning, hierarchical planning, planning in situational calculus; representation for planning; partial order planning algorithm

UNIT V

LEARNING AND APPLICATIONS OF ARTIFICIAL INTELLIGENCE:: Basic concepts; rote learning, learning by taking advices, learning by problem solving, learning from examples, discovery as learning, learning by analogy; explanation based learning; neural nets; genetic algorithm ,Principles of natural language processing; expert systems, knowledge acquisition concepts; AI application to robotics, and current trends in intelligent systems

REFERENCE BOOKS

1. Rich Elaine and Knight Kevin, “Artificial Intelligence”, 3rd Edition, Tata McGraw Hill, 1991
2. Nilson Nils J., “Artificial Intelligence”, McGraw-Hill, New York 1971
3. Russell Stuart and Norvig Peter, “Artificial Intelligence: A Modern Approach”, Prentice Hall of India, 1998
4. Negnevitsky, “Artificial Intelligence: A Guide to Intelligent System”, Pearson Education, 2004.
5. Patterson O. W., “Introduction to Artificial Intelligence & Expert Systems”, Prentice Hall of India, 1996.
6. Winston Patrick Henry, “Artificial Intelligence”, 3rd Edition, Addition Wesley, 1992
7. Clockson & Mellish, “Programming PROLOG”, 3rd Edition, Narosa Publications, 2002.



MCA-209C	BLOCKCHAIN TECHNOLOGY	L T P	Cr
		3 0 0	3

OBJECTIVE

The primary objective of this course is to provide a broad introduction to blockchain and its application. Blockchain is the distributed and decentralized database technology behind this cryptocurrency. This course explores the fundamentals of the public, transparent, secure, immutable and distributed database called blockchain. Blockchains can be used to record and transfer any digital asset not just currency.

PRE-REQUISITES

Basics of centralized and distributed database and network technologies

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Discover blockchain technology

CO2: Learn and explain why we need blockchain as well working of blockchain

CO3: Simulations of blockchain without any central controlling agency

CO4: Design and implementation of new ways of using blockchain for application

CO5: Explore different platforms such as Ethereum to build applications

UNIT I

INTRODUCTION: History of centralized services, differences between centralized, decentralized and distributed peer to peer networks, why blockchain, Types of blockchain (Permission/Permissionless), History of Bitcoin and other related aspects

UNIT II

OVERVIEW OF BLOCKCHAIN TECHNOLOGY: What is blockchain, transactions, blocks, hashes, consensus, verify and confirm blocks

HASHES: hash cryptography, Encryption vs Hashing

TRANSACTIONS: Recording transactions, Digital Signatures, verifying and confirming transactions

BLOCKS: Hash pointers, blocks

CONSENSU BUILDING: Distributed consensus, Byzantine generals problem

CONSENSUS MECHANISMS: POW, POS, POB, POA, POET

Blockchain architecture, Markle root tree and blockchain as well as blockchain world of Web 3.0

UNIT III

MINING AND SIMULATING BLOCKCHAIN: Game theory behind competitive mining, Race to beat the others (including hackers), Incentives – mining and transaction fees, CPU considerations, Energy expanding in mining, profitability, mining pools, blockchain for Bigdata

UNIT IV

BITCOINS, SECURITY & SAFEGUARD: Bitcoin creation and economy, bitcoin exchanges, bitcoin limited supply and deflation, famous hacks, wallets,

SECURITY AND SAFEGUARDS: Protecting blockchain from attackers, forks – soft and hard, Blockchain security: Key management in bitcoin, case studies

UNIT V

PLATFORM AND APPLICATIONS: Introduction to blockchain platform: Etherneum, hyperledger, IOTA, EOS, Multichain, bigchain, Corda, Openchain, SOLIDIFY, Design a new blockchain, potential for disruption, How to incentivize blockchain, design a distributed application (DAPP),

BLOCKCHAIN APPLICATIONS: Government, Identity management, auto executing contracts, three signature escrow, triple entry accounting, elections and voting? Property records, titles, micropayments, Notary, sidechains, blockchain smart contracts, challenges and research issues in blockchain

TEXTBOOKS

1. Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions by Arshdeep Bikramaditya Signal, Gautam Dhameja (Priyansu Sekhar Panda., APress.
2. Blockchain Applications: A Hands-On Approach by Bahga, Vijay Madisetti
3. Blockchain by Melanie Swan, O'Reilly

REFERENCES

1. Bitcoin and Cryptocurrency Technologies by Aravind Narayan. Joseph Bonneau, Princeton
2. Bitcoin and Blockchain Basics: A non-technical introduction for beginners by Arthu.T Books.



MCA-282A	MAJOR PROJECT	L-T-P	CR
		0-0-10	5

OBJECTIVES

1. Identify and discuss the role and importance of research in the emerging Technology and Engineering
2. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem
3. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
4. Ability to present the findings of their technical solution in a written report.
5. Presenting the work in International/ National conference or reputed journals

COURSE OUTCOMES

After undergoing this course, the students will be able to:

CO1:Develop aptitude for research and independent learning.

CO2:Demonstrate the ability to carry out literature survey and select unresolved problems in the domain of the selected project topic

CO3:Gain the expertise to use new tools and techniques for the design and development.

CO4:Acquire the knowledge and awareness to carry out cost-effective and environment friendly designs.

CO5:Develop the ability to write good technical report, to make oral presentation of the work, and to publish the work in reputed conferences/journals.

The Major project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study.

The Major research Project should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain
- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Implementation and Verification
- Report and presentation
- Experimental verification / Proof of concept
- Design, fabrication, testing of Communication System.

Course Objective:

This course enables the students:

1. To know the basic functions of different AI branches.
2. To understand the functionalities of neural networks .
3. To know the application of fuzzy logic.
4. To understand the basic functionalities of optimizations through soft computing.
5. To find the basic functions of soft computing.

Course Outcomes:

After the completion of this course, students will be able to:

CO1: Solve numerical on Fuzzy sets and Fuzzy Reasoning.

CO2: Develop Fuzzy Inference System (FIS).

CO3: Solve problems on Genetic Algorithms

CO4: Explain concepts of neural networks

CO5: Develop neural networks models for various applications.

UNIT – I

Introduction to Artificial Intelligence System, Neural Network, Fuzzy Logic & Genetic Algorithm. Fuzzy Set Theory: Fuzzy Versus Crisp, Crisp Set, Fuzzy Set, Crisp Relation, Fuzzy Relations.

UNIT -II

Fuzzy System: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based System, Defuzzification Methods, and Applications.

UNIT – III

Genetic Algorithms, Basic Concepts, Creation Of Offspring, Working Principle, Encoding, Fitness Function, Reproduction. Genetic Modeling, Inheritance Operations, Cross Over, Inversion And Deletion, Mutation Operator, Bit Wise Operators, Generation Cycle, Convergence Of Genetic Algorithm, Application, Multi-Level Optimization, Real Life Problems, Difference And Similarities Between GA And Other Traditional Methods, Advanced In GA.

UNIT- IV

Fundamentals Of Neural Networks, Basic Concepts Of Neural Network, Human Brain, Model Of An Artificial Neuron, Neural Network Architectures, Characteristic Of Neural Networks, Learning Method, History Of Neural Network Research, Early Neural Network Architectures, MP Neurons.

UNIT – V

Back Propagation Network Architecture Of Back Propagation Network, Back Propagation Learning, Illustration, Applications, Effect Of Tuning Parameters Of The Back Propagation Neural Network, Selection Of Various Parameters In BPN, Variations Of Standard Back Propagation Algorithm. Associative Memory And Adaptive Resonance Theory, Autocorrelations, Hetrocorrelators , Multiple Training Encoding Strategy, Exponential BAM, Associative Memory For Real Coded Pattern Pairs, Applications, Introduction To Adaptive Resonance Theory.

Text Book:

1. Rajasekharan S. &Vijayalakshmi G. A. “Neural Network Fuzzy Logic and GeneticAlgorithm Synthesis and Applications”, Prentice Hall of India PLT, Pai, 2004.

Reference Book:

1.Jang JyhShing R, Sun C. T., Mizutani E. “Neuro Fuzzy and Soft Computing –A Computational Approach to Learning and Machine Intelligence”, Prentice Hall of India, 1997.

MCA-222C	DEEP LEARNING	L T P	Cr
		3 0 0	3

OBJECTIVES

The objective of this course is to cover the fundamental of neural networks as well as some advanced topics such as recurrent neural networks, long short term memory cells and convolutional neural networks. The course also requires students to implement programming assignments related to these topics.

COURSE OUTCOMES

- CO1:** Understand the fundamentals and current usage of the TensorFlow library for deep learning research and the graphical computational model of TensorFlow
- CO2:** Understand the context of neural networks and deep learning
- CO3:** Design recurrent neural networks with attention mechanisms for natural language classification, generation, and translation.
- CO4:** Perform regularization, training optimization, and hyperparameter selection on deep models.
- CO5:** Explore the parameters for neural networks

UNIT 1

BASICS: Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm.

FEEDFORWARD NETWORKS: Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders.

UNIT II

DEEP NEURAL NETWORKS: Difficulty of training deep neural networks, Greedy layerwise training.

BETTER TRAINING OF NEURAL NETWORKS: Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).

UNIT III

RECURRENT NEURAL NETWORKS: Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs

CONVOLUTIONAL NEURAL NETWORKS: LeNet, AlexNet.

UNIT IV

GENERATIVE MODELS: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines.

UNIT V

RECENT TRENDS: Variational Autoencoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning

APPLICATIONS: Vision, NLP, Speech (just an overview of different applications in 2-3 lectures)

TEXT BOOKS

Deep Learning, Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016.

REFERENCES

1. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996
2. Pattern Recognition and Machine Learning, Christopher Bishop, 2007

