

**SYLLABUS
OF
COURSE
MASTER OF COMPUTER APPLICATION
FOR THE SESSION
2021-22**



**CENTRE FOR DISTANCE AND ONLINE EDUCATION
SAMBALPUR UNIVERSITY
JYOTI VIHAR, BURLA,
SAMBALPUR, ODISHA - 768019**

RECOMMENDATIONS OF THE BOARD OF STUDIES IN MASTER OF COMPUTER APPLICATION

(Dr. Chandra Sekhar Panda)

Reader and HOD,
Dept. of Computer Science and
Application,
Sambalpur University,
Jyoti Vihar, Burla

(Dr. Sudarson Jena)

Associate Professor and HOD,
Dept. of Computer Science
Engineering and Application,
SUIIT, Jyoti Vihar, Burla

(Dr. Satchidananda Dehuri)

Professor and HOD,
Dept. of Information and
Communication Technology,
Fakir Mohan University,
Balasore

**CENTRE FOR DISTANCE AND ONLINE EDUCATION
SAMBALPUR UNIVERSITY**

MASTER OF COMPUTER APPLICATION

Duration- Two years

SCHEME OF SYLLABUS

First Semester

Paper Code	Title of the Paper	L	T/P	Credit
MCA-101	OOPS using C++	2	1	3
MCA-102	Operating System	2	1	3
MCA-103	Computer Organization and Architecture	2	1	4
MCA-104	Discrete Mathematics	2	1	4
MCA-105	Financial Accounting	2	1	4
Total Theory Credits				18
Laboratory				
MCA-106	Lab on C++	0	2	2
MCA-107	Lab on OS	0	2	2
Total Laboratory Credits				4
TOTAL SEMESTER CREDITS				22

Second Semester

Paper Code	Title of the Paper	L	T/P	Credit
MCA-201	Python Programming	2	1	3
MCA-202	Data Structure	2	1	3
MCA-203	Software Engineering	2	1	4
MCA-204	Data Communication and Networking	2	1	4
MCA-205	Theory of Computation	2	1	4
Total Theory Credits				18
Laboratory				
MCA-206	Lab on Python	0	2	2
MCA-207	Lab on Data Structure using C	0	2	2
Total Laboratory Credits				4
TOTAL SEMESTER CREDITS				22

Third Semester

Paper Code	Title of the Paper	L	T/P	Credit
MCA-301	Database Management System	2	1	3
MCA-302	Web Technology	2	1	3
MCA-303	Information Security	2	1	4
MCA-304	Artificial Intelligence	2	1	4
MCA-305	Soft Computing	2	1	4
Total Theory Credits				18
Laboratory				
MCA-306	Lab on DBMS	0	2	2
MCA-307	Lab on WT	0	2	2
MCA-308	Minor Project			2
Total Laboratory Credits				6
TOTAL SEMESTER CREDITS				24

Fourth Semester

Paper Code	Title of the Paper	L	T/P	Credit
MCA-401	Project Work			16
MCA-402	Comprehensive Viva-Voce			6
TOTAL SEMESTER CREDITS				22

Total Programme Credits

Semester	I	II	III	IV	TOTAL
Total Credit	22	22	24	22	90

First semester

MCA-101: OOPS using C++

Objectives

- To understand basics concept of OOPS which includes classes, objects etc.
- To understand inheritance and polymorphism concept
- To understand how to use exceptional handling in C++

UNIT-I

Object-Oriented programming paradigm, Drawbacks of procedural programming, Advantages of OOP, Basic data types, Tokens, Keywords, Identifiers, Variables, Operators: Arithmetic, Relational, Logical, Assignment, Ternary, Bitwise, Unary Operators, Expressions and statements, Input and Output in C++, manipulators with parameters, Flow of control - if, if-else, while, do-while, for loop, Switch, break and continue.

UNIT-II

Defining and initializing arrays, accessing array elements, Single and multidimensional arrays. Character array, string variables, reading multiple lines, arrays of strings, specifying the structure, accessing structure members, array of structures. Classes and objects, Class declaration, Data member and Member functions, private and public members, scope resolution operator

UNIT-III

Inline Functions, Passing objects as arguments, returning objects, Function overloading, Friend function, constructors, destructors, overloaded constructors, Types of Constructor, operator overloading: Unary Operator, Binary Operator,

UNIT-IV

Inheritance: Derived Class and Base Class, specifying the derived class, accessing base class members, the protected access specifier, abstract base class, single, multilevel, multiple inheritance, ambiguity and multiple inheritance. Polymorphism, pointers, Virtual base class, Virtual functions & dynamic binding, Exception handling.

Books Recommended:

1. E. Balguruswamy, "Object-Oriented programming with C++", TMH, 5th Edition, 2011
2. R.Lafore, "Object-oriented programming in TURBO C++", Galgotia, 1st Edition, 1997
3. Y.P.Kanetkar, "Let us C++", BPB publication, 2nd Edition, 2015
4. Stanley B. Lippman, Josée Lajoie, "C++ Primer", Pearson Education, 4th Edition

MCA-102: Operating System

Objectives

- To understand the principles of operating system
- To understand the scheduling process in computer

UNIT-I

Evolution of Operating Systems: Types of operating systems, Logical View and User View, System Components, Operating system services. The process management: Process concept, Process Control Block, Process Scheduling, Short terms and long term Schedulers, Context Switch.

UNIT-II

CPU Scheduling: CPU-I/O cycle, CPU Scheduler, pre-emptive Scheduling, Dispatcher, Scheduling criteria, Scheduling Algorithms- FCFS, SJF, Priority and round robin scheduling. Deadlocks: Deadlock characterization, Resource Allocation Graph, Methods of handling Deadlocks, Deadlock prevention & avoidance, Deadlock Detection and deadlock Recovery.

UNIT-III

Memory Management: logical versus physical Address, Swapping, Memory allocation, paging, segmentation, address mapping. Page fault, Page replacement algorithms FIFO, Optimal, LRU.

UNIT-IV

File Systems: general model of a file system, Logical and Physical file system, Disk structure, disk scheduling: FCFS scheduling SSTF scheduling, SCAN scheduling, C-SCAN scheduling, LOOK scheduling.

Books Recommended:

1. Silberschatz & P.B. Galvin, "Operating Systems Concepts", Addison - Wesley, 9th Edition, 201
2. Tanenbaum, " Modern Operating System", Pearson Education, 3rd Edition, 2015
3. William Stallings , "Operating Systems: Internals and Design Principles", 6th Edition
4. Dhananjay Dhamdhare, "Operating System a Concept Based Approach", 3rd Edition, 2017

MCA-103: Computer Organization and Architecture

Objectives

- To impart the essential knowledge on the fundamentals and applications of digital circuits and digital computing principles
- To provide an overview on the design principles of digital computing systems
- To provide technical knowledge about various digital hardware components

UNIT-I

Basic organization of the computer and block level description of the functional units as related to the execution of a program. Von-Neumann's architecture. Digital logic gates, Boolean algebra, Boolean Function and simplification, Simplification of Boolean function using K-Map. Canonical form of Boolean functions-SOP and POS.

UNIT-II

Combinational and Sequential Circuits- Adders, Subtractors, Carry-Look-Ahead (CLA) adder, encoder and decoders, multiplexer and demultiplexer. Flip Flops- RS, JK, D, T and Master Slave Flip Flops. Registers and counters.

UNIT-III

CPU Organization: Instruction codes, Computer Instructions, Instruction Cycles, Execution of Instructions, Instruction Formats (Zero, One and Two address instruction), Addressing Modes, Discussions about RISC versus CISC architectures.

UNIT-IV

Memory and IO access: Memory maps, Read Write operation, Programmed IO, Concept of handshaking, Polled and interrupt driven IO, DMA controller and data transfer. IO subsystems: Interfacing with IO devices. Memory organization: static and dynamic memory; Memory Hierarchy, cache memory and its access techniques; Virtual memory.

Books Recommended:

1. M. Morris Mano, "Computer System Architecture", PHI, 3rd Edition
2. William Stallings , "Computer Organization and Architecture", Pearson / PHI, 9th Edition, 2013
3. B.RAM , "Fundamentals of Microprocessor and Microcontrollers", Dhanpat Rai Publication, 2010 Edition
4. Er. Rajiv Chopra ,"Computer Architecture and Organization", S.Chand
5. B.Ram , " Computer Fundamentals- Architecture and Organization", New Age, 2009 Edition
6. B.P.Singh and Renu Singh , "Advanced Microprocessors and microcontrollers", New Age, 2008 Edition

MCA-104: Discrete Mathematics

Objectives

- To get familiar and understand the fundamental notions in discrete mathematics
- To understand and demonstrate the basic concept of an algorithm and its application in combinatorial mathematics
- To identify the basic properties of graphs and trees and model simple applications
- To understand the basic concept of group theory and its application
- To get familiar with some statistical measures

UNIT – I

Fundamentals of logic, Propositional equivalences, Predicates and Quantifiers, Methods of Proof, Sequences and summations, Mathematical Induction. Sets, Set operations, Properties of binary relations, Equivalence relations and partitions, Partial ordering relations and lattices, Properties of lattices, Distributive and Complemented lattices, Boolean algebra.

UNIT – II

The basics of counting, Permutations and Combinations, Recurrence relations, Solving Recurrence relations, Generating functions, Inclusion-exclusion.

UNIT – III

Groups, Subgroups, Cosets and Lagrange's Theorem, Codes and Group codes, Homomorphism and Normal subgroups, Isomorphism, Ring, Integral Domains and Fields.

UNIT-IV

Introduction to graphs, Graph terminology, Representing graphs and Graph isomorphism, Euler and Hamilton paths, Introduction to trees, Applications of trees. Frequency Distribution, Measures of Central Tendencies, Dispersion, Skewness, Kurtosis, Mathematical Expectation.

Books Recommended:

1. Kenneth H. Rosen, "Discrete Mathematics & Its Application", TMH, 7th Edition, 2011
2. C. L. Liu, "Elements of Discrete Mathematics", TMH, 2nd Edition, 2000
3. Bernardi Kolman, Robert C. Busby, Sharon Ross, "Discrete Mathematical Structure", PHI, 6th Edition, 2008
4. S.P.Gupta, "Statistical Methods", S.Chand & Sons, 2011 Edition

MCA-105: Financial Accounting

Objectives

- This course is intended to introduce the basic theory, concepts and practice of financial accounting and to enable students to understand information contained in the published financial statements of companies and other organizations. It includes the preparation of accounting statements, but their uses and limitations will also be emphasized. Course contents

UNIT – I

Meaning and Scope of Accounting : Overview of Accounting, Users of Accounting, Accounting Concepts Conventions, Book keeping and Accounting, Principles of Accounting, Basic Accounting terminologies, Accounting Equation , Overview to Depreciation (straight line and diminishing method) .

UNIT – II

Accounting Standards and IFRS: International Accounting Principles and Standards; Matching of Indian Accounting Standards with International Accounting Standards, Human Resource Accounting, Forensic Accounting.

UNIT – III

Mechanics of Accounting : Double entry system of Accounting, Journalizing of transactions; Ledger posting and Trial Balance ,Preparation of final accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Excel Application to make Balance sheet, Case studies and Workshops.

UNIT – IV

Analysis of financial statement: Ratio Analysis- solvency ratios, Profitability ratios, activity ratios, liquidity ratios, Market capitalization ratios; Common Size Statement; Comparative Balance Sheet and Trend Analysis of manufacturing, Service & banking organizations, Case Study and Workshops in analyzing Balance sheet.

Concepts of Working Capital and its types, Determinants of Working Capital, methods of calculating Working Capital, Working Capital Financing. Cash Flow Statement: Various cash and non-cash transactions, flow of cash, difference between cash flow and fund flow, preparation of Cash Flow Statement and its analysis.

Books Recommended:

1. Maheshwari S.N & Maheshwari S K – A text book of Accounting for Management (Vikas, 10th Edition)
2. Essentials of Financial Accounting (based on IFRS), Bhattacharya (PHI,3rd Ed.)
3. Khan and Jain - Financial Management (Tata McGraw Hill, 7th Ed.)
4. PC Tulsian - Financial Accounting (Pearson, 2016)
5. Dhamija - Financial Accounting for managers: (Prentice Hall, 2nd Edition).

MCA-106 : Lab on C++

1. Write a Program to find greatest among three numbers using nested if...else statement.
2. Write a Program to check a number is prime or not.
3. Write a Program to find the GCD and LCM of two numbers.
4. Write a Program for Swapping of two numbers using pass by value.
5. Write a Program for Swapping of two numbers using pass by address.
6. Write a Program for Swapping of two numbers using pass by reference.
7. Write a Program to find sum of four numbers using default argument passing.
8. Write a Program to find square and cube of a number using inline function.
9. Write a Program to find the factorial of a number.
10. Write a Program to find reverse of a number.
11. Write a program to find sum of four numbers using default argument passing in member function.
12. Write a Program to find area of circle, triangle and rectangle using function overloading.

13. Write a program to show the ways of calling constructors and destructors.
14. Write a program to perform ++ operator overloading using member function.
15. Write a program to perform ++ operator overloading using friend function.
16. Write a program to perform two complex number additions.
17. Write a program to perform addition of time.
18. Write a program to perform single inheritance.
19. Write a program to perform multiple inheritance
20. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class.

MCA-107 : Lab on OS

1. Definition of UNIX o/s and its features.
2. Introduction to UNIX file system and directory structures
3. Introduction to Unix commands
4. Introduction to advance Unix commands(Grep, Sed, Wall, Mail, Chmod, Chown)
5. Introduction to VI editor
6. Practise on VI editor
7. Introduction to shell programming
8. Write a program to check whether a number is even or odd
9. WAP to find even and odd from a group of number
10. WAP to find the factorial of a number
11. WAP to cut hour from date command and wish according to time
12. WAP to find sum of all odd numbers from 1 to 100.
13. WAP to search a number from a list of numbers.
14. WAP to find GCD and LCM of a number.
15. WAP to find reverse of a number.
16. WAP to sort an array
17. WAP a program to enter a character and display its type using case
18. WAP to enter a string and find the number of words and characters of a string.
19. WAP to guess a number till the correct guess using until clause.
20. WAP to enter a file and check whether it is an ordinary file or special file.

Second semester

MCA-201: Programming using Python

Objectives

- To understand the basic principles of the Python Language.
- To use the tools to do simple programs in python.

UNIT-I

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

UNIT-II

Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

UNIT-III

Overview of Programming: Structure of a Python Program, Elements of Python. Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)

UNIT-IV

Creating Python Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments

Books Recommended:

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 , Freely available online.20

MCA-202: Data Structure

Objectives

- To learn how the choice of data structures impacts the performance of programs
- To study specific data structures such as arrays, linear lists, stacks, queues, hash tables, binary trees, binary search trees, heaps and AVL trees.
- To learn efficient searching and sorting techniques

UNIT-I

Introduction: Basic Terminology, Data structure, Time and space complexity, Review of Array, Structures, Pointers. Stack: Definition, Representation, Stack operations, Applications (Infix–Prefix–Postfix Conversion & Evaluation, Recursion).

UNIT-II

Queues: Definition, Representation, Types of queue, Queue operations, Applications. Linked Lists: Dynamic memory allocation, representation, Linked list insertion and deletion, Searching, Traversing in a list, Doubly linked list, Sparse matrices.

UNIT-III

Trees: Tree Terminologies, General Tree, Binary Tree, Representations, Traversing, BST, Operations on BST, Heap tree, AVL Search Trees, M-way search tree, Applications of all trees.

UNIT-IV

Sorting: Selection Sort, Bubble sort, Insertion Sorts, Merge Sort, Quick Sort, Radix Sort, Heap sort. Searching: Linear search, Binary search.

Books Recommended:

1. Horowitz E. & Sahni S and S.Rajasekaran, "Fundamentals of Computer Algorithms", Universities Press, 2nd Edition, 2008
2. Aho, Hopcroft & Ullman, "The Design and Analysis of Computer Algorithms", Pearson, 1st Edition, 1974
3. T.H.Cormen, C.E Leiserson, R.L.Rivest and C.Stein," Introduction to Algorithms", PHI, 3rd Edition, 2009
4. D.E. Knuth, "Fundamental Algorithms", Addison-wesley, 3rd Edition

MCA-203: Software Engineering

Objectives

- To understand the importance of software engineering lifecycle models in the development of software
- To understand the various design principles in modeling a software
- To develop a software which adheres to the standard benchmarks
- To undergo the technical know in the process of software testing Outcomes

UNIT-I

Introductory concepts: Introduction, definition, objectives, Life cycle Models. Software project management concept, project planning, metrics, estimation techniques: empirical and heuristic (COCOMO), Scheduling, Staffing, Risk management and Software configuration management. Requirements analysis and specification: Requirement gathering and analysis, SRS.

UNIT-II

Software Design: Overview of Design, Cohesion and coupling, Function oriented software design. Object oriented Design: Object modelling using UML, use case diagram, class diagram, interaction diagrams: activity diagram, Package, Component and Deployment diagram, State chart.

UNIT-III

Coding and Testing: Coding, Code review, software documentation, testing, unit testing, black box and white box testing, debugging, integration and system testing. Maintenance:

Characteristics, controlling factors, maintenance tasks, side effects, types of maintenance - Re Engineering - Reverse Engineering - Maintenance tools and techniques.

UNIT-IV

Software quality: SEI CMM and ISO-9000. Software reliability and fault-tolerance. Computer-aided software engineering (CASE): Characteristics of CASE Tools, Architecture of CASE environment, Software reuse

Books Recommended:

1. Rajib Mall, " Fundamentals of Software Engineering", PHI, 4th edition.
2. R.S. Pressman, "Software Engineering Practitioner's Approach", TMH, 7th Edition, 2010
3. Sommerville, "Software Engineering ", Pearson Pub, 9 th edition, 2010

Pankaj Jalote, "A Concise Introduction to Software Engineering", Springer

MCA-204 : Data Communication and Networking

Objectives

- To know about networks and topologies
- To know the knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities
- To understand the principles of data communication and internet protocol
- To know the knowledge about application layer protocols

UNIT-I

Overview of Data Communications and Networking. Networking - Needs and Advantages, Network Types- Client, Server and Peers. Network Topology-Bus, Star, Ring, Star and Mesh Topologies (Features, Advantages and disadvantages of each type). Mode of data communication. Analog and Digital data and signals.

Digital Transmission: Line coding, Sampling, Transmission mode. Analog Transmission: Modulation of Digital Data. Multiplexing: FDM, WDM and TDM, Transmission Media: Guided Media, Unguided media (wireless), Switching techniques: Circuit switching and Packet switching.

UNIT-II

Data Link Layer: Error Detection and correction: Type of Errors, Detection, Error Correction. Data Link control and protocols: Flow and error Control, Stop-and-wait ARQ. Go-Back-N - ARQ, Selective Repeat ARQ, HDLC. Point-to-Point Access: PPP. Point-to Point Protocol, PPP Stack. Multiple-Access: Random Access, Controlled Access, Channelization. Local Area Network: Ethernet. Traditional Ethernet, Fast Ethernet, Gigabit Ethernet. Token bus (IEEE- 802.4), Token ring (IEEE-802.5).

UNIT-III

Network Layer: Host to Host Delivery: Internetworking, addressing and Routing. Network Layer Protocols: ARP, IPv4, ICMP, IPv6, Transport Layer; Process to process Delivery: UDP; TCP congestion control and Quality of service.

UNIT-IV

Application Layer: Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP) and File transfer (FTP), Telnet, HTTP and WWW, Cryptography.

Books Recommended:

1. B.A. Forouzan, "Data Communication and Networking", TMH, 4th Edition, 2006
2. A.S. Tannenbaum, "Computer Networks", Pearson, 5th Edition, 2012
3. William Stallings, "Data and Computer Communications", Pearson, 8 th Edition, 2009
4. Rajneesh Agrawal, "Data Communication And Computer Networks", S Chand, 1st Edition, 2005

MCA-205 : Theory of Computation

Objectives

- Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
- Enhance/develop students' ability to understand the computation and algorithms.
- Develop and conduct mathematical proofs for computation and algorithms.
- To understand about Turing Machine

UNIT-I

Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

UNIT-II

Regular expression : Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages.

UNIT-III

Context Free Grammar : Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols,

Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs

Push Down Automata (PDA): Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, PDA with two stacks.

UNIT-IV

Turing Machine : Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory

Books Recommended:

1. John E. Hopcroft, Rajeev Motwani and Jeffery D. Ullman, Automata Theory, Languages, and Computation (3rd. Edition), Pearson Education, 2008.
2. Peter Linz, An Introduction to Formal Languages and Automata, Paperback – 2011

MCA-206 : Lab on Python

1. Python program to add two numbers.
2. Maximum of two numbers in Python
3. Python Program for factorial of a number
4. Python Program for simple interest and compound interest
5. Python Program to check Armstrong Number
6. Python Program for Program to find area of a circle
7. Python program to check whether a number is Prime or not
8. Python Program for n^{th} Fibonacci number
9. Python Program to find sum of array
10. Python Program to find largest element in an array
11. Python Program to sorting an array
12. Python programming to inverse of a matrix
13. Python Programming to sum of two matrix
14. Python Program to multiplication of two matrices
15. Python programming to concatenation of two string
16. Python Programming to reverse of a string

MCA-207 : Lab on Data structure using C

1. Implementation of Stack Using Array.
2. Implementation of Queue Using Array.
3. Implementation of Infix to Postfix Conversion using Stack.
4. Evaluation of Postfix Expression using Stack.
5. Implementation of Singly Linked List.
6. Implementation of Doubly Linked List.
7. Implementation of Stack Using Linked List.
8. Implementation of Queue Using Linked List.
9. Implementation of Binary Tree Traversal : Preorder, Inorder and Postorder.

10. Implementation of Binary Search Tree.
11. Implementation of Bubble Sort algorithms
12. Implementation of insertion sort algorithms
13. Implementation of quick Sort algorithms
14. Implementation of merge Sort algorithms
15. Implementation of heap Sort algorithms
16. Implementation of Linear Search Algorithms
17. Implementation of Binary Search Algorithms
18. Implementation of Hashing using hash functions.

Third semester

MCA-301: Database Management System

Objectives

- To know about database management system and its structure
- To understand the different types of models used in database
- To know the different types of keys and it's uses
- To get basic idea about transaction and concurrency control system

UNIT-I

Introduction to Database Systems: Data and Information, Database: Definition, Database Management, Structure, Limitations of traditional file processing systems, Advantages and disadvantages of DBMS, Users of DBMS. Database Architecture and Environment: Components of DBMS, Data Independence and 3-tier architecture and View of Data. Data Model: Concept, Applications, types of Data models: Hierarchical, Network, Relational, Entity Relationship model: Concepts of entity, entity set, attributes, E-R diagram.

UNIT-II

Relational Query Languages, Relational Algebra and operations, Tuple and Domain Relational Calculus, Keys: Super key, candidate, primary, composite, Alternate and foreign keys. Strong and weak entities. Integrity constraints. SQL- Languages: DDL, DML and DCL.

UNIT-III

Relational Database Design: Domain and Functional dependency, Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF, 5NF), Dependency Preservation decomposition and Lossless Join. Codd's rules. Object Oriented Databases Need for OODBMS, Object structure: Class, polymorphism, encapsulation, inheritance.

UNIT-IV

Specialization, Generalization, and Aggregation. Object modeling techniques. The distributed databases - Motivation for Distributed Database, Distributed Database concepts. Transaction Management: Transaction Management and Concurrency Control Transaction: Properties (ACID), states, Commit, Rollback Concurrency: Control, Lost update problems, Locks, two phase locking, serialization.

Books Recommended:

1. Silberschatz, Korth, Sudarshan, "Database System Concepts", McGraw Hill, 4th Edition 2002
2. Elmasari, Navathe, "Fundamentals of Database Systems", Pearson, 7th Edition, 2016
3. Ramakrishnan, "Database Management Systems", McGraw Higher Ed, 3rd Edition, 2014
4. Atul Kahate, "Introduction to Database Management Systems", Pearson Education, 1st Edition, 200

MCA-302: Web Technology**Objectives**

- To know basic about web technology
- To know designing of web page
- To know the different types of attributes and tags used in web page
- To know the creation of tables and its attributes
- To know the concept of java script

UNIT-I

Introduction to the Internet Basics : The Basics of the Internet, Concepts of Domain, IP Addressing, Resolving Domain Names, Overview of TCP/IP and its Services, www,

Designing Pages with HTML : Introduction to HTML, Essential Tags, Deprecated Tags, Tags and Attributes, Text Styles and Text Arrangements, Text, Effects, Exposure to Various Tags (div, marquee, nobr, dfn, hr, listing, comment, img), Color and Background of Web Pages, Lists and their types, Attributes of Image Tag, Hypertext, Hyperlink and Hypermedia, Links, Anchors and URLs, Links to External Documents, Different Sections of a Page and Graphics, Footnote and E-mailing, Creating Table, Frame, Form and Style Sheet.

UNIT-II

DHTML :Dynamic HTML, Document Object Model, Features of DHTML, CSSP (Cascading Style Sheet Positioning) and JSSS (JavaScript assisted Style Sheet), Layers of Netscape, The ID Attribute, DHTML Events.

UNIT-III

JavaScript :Objects, Methods, Events and Functions, Tags, Operators, Data Types, Literals and Type Casting in JavaScript, Programming construct, Array and Dialog Boxes, Relating JavaScript to DHTML, Dynamically Changing Text, Style, Content

UNIT-IV

FrontPage : FrontPage Basics, Web Terminologies, Phases of Planning and Building Web Sites, The FTP, HTTP and WPP Features, FrontPage Views, Adding Pictures, Backgrounds, Links, Relating Front Page to DHTML

Books Recommended:

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India.
2. Web Technologies, Black Book, dreamtech Press
3. HTML 5, Black Book, dreamtech Press
4. Web Design, Joel Sklar, Cengage Learning
5. Developing Web Applications in PHP and AJAX, Harwani, McGrawHill
6. Internet and World Wide Web How to program, P.J. Deitel& H.M. Deitel, Pearson

MCA-303 : Information Security

Objectives

- The objective is to learn Security Goals, Attacks, Security services and Mechanism, understand different cryptographic algorithms, know about viruses and malicious code, security in operating systems, database security, network security, legal and ethical issues.

UNIT-I

Introduction to Information Security: Security Goals, Attacks, Security services and Mechanism. Cryptography: Plain Text and Cipher Text, Encryption and Decryption, Substitution cipher, Transposition Cipher, Stream and Block Cipher, Modern block ciphers, Modern stream Ciphers

UNIT-II

Data Encryption Standard (DES), Security of DES, Advanced Encryption Standard (AES), Analysis of AES, Use of Modern Block Ciphers, Use of Stream ciphers. Public Key Encryption, Hash Functions, Key exchange, Digital Signatures

UNIT-III

Viruses and Malicious Code: Secure Programs, Non-malicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats Operating Systems Security: Access Control, File Protection, User Authentication, Security Policies, Models of Security

UNIT-IV

Data base Security: Security requirements, Reliability and integrity, Sensitive data, Inference, multilevel database, proposals for multilevel security. Security in Network: Threats in Network, Network Security Controls, Firewalls, Intrusion Detection Systems, Secure E-Mail. Legal and Ethical Issues: Protection of data and Information Laws, Employees rights, Software failure, Computer Crime, Privacy, Ethics

Books Recommended:

1. B. A. Forouzan & D Mukhopadhyay ,Cryptography and Network Security., McGraw Hill, 2nd ed.2010
2. Stallings ,Cryptography and Network Security., PHI, 4th ed.2010
3. Kahate, Cryptography and Network Security, TMH.

MCA-304 : Artificial Intelligence

Objectives

- Understanding of basic concepts in Artificial Intelligence
- Understanding intelligent agents, Reasoning & Logic propositional Logic.
- Understand concept of planning in Artificial intelligence
- Getting concepts on Learning in Artificial Neural Networks and various neural network models

UNIT –I

Introduction to Artificial Intelligence: History of Artificial Intelligence, State of the Art. Solving Problems by Searching: problem solving Agents, Formulating problems, Example problems, and searching for Solutions, Search Strategies, Avoiding Repeated States, and Constraint Satisfaction Search. Informed Search Methods: Best-First Search, Heuristic Functions, Memory Bounded Search, and Iterative Improvement Algorithms.

UNIT –II

Intelligent Agents: Introduction, How Agents should Act, Structure of Intelligent Agents, Environments. Agents That Reason Logically; A Knowledge-Based Agent, The Wumpus World Environment, Representation, Reasoning & Logic propositional Logic : A very simple Logic, An agent for the Wumpus World. Building a Knowledge Base; Properties of Good and Bad Knowledge Bases, Knowledge Engineering. Inference in First-Order Logic: Inference Rules Involving Quantifiers, An Example Proof. Generalized Modus Ponens, Forward and Backward, Chaining, Resolution.

UNIT –III

Planning A Simple Planning Agent From Problem Solving to Planning. Planning in Situation Calculus. Basic Representations for Planning. A Partial-Order planning Example, A partial Order planning algorithm, Planning With partially Instantiated Operators

UNIT –IV

Learning in Artificial Neural Networks. How the Brain Works, Neural Networks, perceptions, Multi-layered Feed Forward Networks Applications Back propagation algorithm Applications of Neural Networks.

Books Recommended:

1. Russell S.J. & Norvig P, Artificial Intelligence – A modern Approach (ISBN 0-131-038-052) Prentice Hall Inc, 2002.
2. Winston P.H, Artificial Intelligence (3rd Edigion), McGraw Hill.
3. E.Rich and K.Knight, Artificial Intelligence, - TMH

MCA-305 : Soft Computing

Objectives

- To know Neural Network techniques and its applications
- To know various Soft Computing techniques

- Get knowledge of fuzzy logic. To know applications of advanced Neural Networks.
- Get knowledge of Applications of Hybrid soft computing techniques.

UNIT-I

Introduction to Soft Computing: Evolution of Computing - Soft Computing Constituents – From Conventional to Computational Intelligence - Machine Learning Basics

UNIT-II

Neural Networks: Machine Learning using Neural Network, Adaptive Networks, Feed Forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks, Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks.

UNIT-III

Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making. Neuro-Fuzzy Modelling: Adaptive Neuro-Fuzzy Inference Systems, Coactive Neuro-Fuzzy Modelling, Classification and Regression Trees, Data Clustering Algorithms, Rule base Structure Identification, Neuro-Fuzzy Control – Case Studies

UNIT-IV

Genetic Algorithms: Introduction, Building block hypothesis, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modelling: Significance of Genetic operators, Inheritance operator, crossover, inversion & deletion, mutation operator, Bitwise operator, GA optimization problems.

Books Recommended:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI India
2. Kwang H.Lee, “First course on Fuzzy Theory and Applications”, Springer–Verlag Berlin Heidelberg

MCA-306 : Lab on DBMS

1. To create and select a database
2. Create the following tables
 - a. employee (emp_no, emp_name, DOB, address, doj, mobile_no, dept_no, salary)
 - b. department (dept_no, dept_name, location)
3. Include the necessary constraint in the created table
4. Display the structure of the employee table and Add a new column Designation to the employee table
5. Drop the column location from Dept table, Drop the tables and Delete the database
6. Consider the database for an organisation and write the queries for the following
 - b. Add 5 rows in the employee and dept tables

- c. Display all the records from the above tables
 - d. Display the emp no and name of all the employees from department no2
 - e. Display empno,name,designation,dept no and salary in the descending order of salary
 - f. Display the empno and name of all employees whose salary is between 2000 and 5000
 - g. Display all designations without duplicate values
 - h. Display the dept name and total salary of employees of each department
 - i. Change the salary of employees to 25000 whose designation is 'Clerk'
 - j. Change the mobile no of employee named 'Ram'
 - k. Delete all employees whose salaries are equal to Rs.7000
 - l. Select the department that has total salary paid for its employees more than 2500
7. Consider the database for the organization and Write the queries for the following
 - b. display the empno, name, and salaries for employees whose average salary is higher than the average salary of the organization
 - c. Display the details of employees whose salary is equal to the minimum salary of organisation
 - d. Display all the employees whose designation is same as that of 'Arun'
 - e. Display the empno and name of employees who earn more than any Employee in dept 1.
 - f. Display the empno,name , departments that the departments are same in both the emp and dept
 - g. Display the employee details by implementing left inner join
 - h. Display employee details by implementing a right outer join
 8. Create a view emp from employee such that it contains only emp_no and emp_name and department.
 9. Create a view that contains the details of employees who are managers only and drop the views.
 10. To learn about the aggregate function
 11. To learn about string function
 12. To learn about numeric function
 13. To learn about set function
 14. To learn about oracle transaction

MCA-307 : Lab on WT

HTML

1. Design a simple page.
2. Design a page using different tags using.
3. Design a page using tags and attributes.
4. Design a page using text and font tags.
5. Design a web page using marquee tag
6. Design a page using list tag
7. Design a page using image tag
8. Designing a page using hyper text, hyperlink and hypermedia.
9. Creating a table
10. Creation of frame

DHTML

1. Design of page using window object.
2. Design a page using event object.
3. Design a page using frame object.
4. Designing page using history object.
5. Designing page using location object.

JAVASCRIPT

1. Design a simple page using java script statements.
2. Design a page to add two numbers and give a condition to result
3. Design a page to illustrate switch-case statement.

MCA-308 : Minor Project

Fourth semester

MCA-401 : Project Work

MCA-402 : Comprehensive Viva-Voce