NETAJI SUBHAS UNIVERSITY

SCHEME AND SYLLABUS

MCA

(Master of Computer Application)

(Effective from academic session: 2021-22)

SEMESTER-I

MCA Year 1- Semester I								
Theory								
S. No.	**Course Code**	**Course Title**	**Hours**		**Marks**			**Credits**
			L	**P**	**IA**	**ETE**	**Total**	
1	MCA-101	Mathematical Foundation Computer Science	3	0	30	70	100	3
2	MCA-102	Programming in C	3	0	30	70	100	3
3	MCA-103	Operating System	3	0	30	70	100	3
4	MCA-104	Computer System & Architecture	3	0	30	70	100	3
5	MCA-105	Database Management System	3	0	30	70	100	3
6	MCA-106	Internet Programming	3	0	30	70	100	3
Practical								
1	MCA-151	C Programming Lab	0	2	30	70	100	01
2	MCA-152	SQL & PL/SQL Lab	0	2	30	70	100	01
3	MCA-153	Internet Programming Lab	0	2	30	70	100	01
4		SODECA						02
Total					**270**	**630**	**900**	**23**

L= Lecture, **P** = Practical, **IA** = Internal Assessment, **ETE** = End Term Exam
SODECA: Social Outreach Development & Extra Curricular Activities

Guidelines for SODECA [Anandam] in 2 Year MCA Program

Maximum Marks 100; Credits: 08

The following activities are categorized as SODECA [Anandam]:

Part I: Discipline (25 marks)

Minimum 25 marks shall be awarded unless is involved in indiscipline.

The marks shall be deducted from this component for those who shall involve themselves in indiscipline/ undesirable activities/ Detained from departments or in case of penalty of marks imposed by Chief Proctor/ Standing Disciplinary Committee (SDC), such deduction should be preferably approved by Head of the Institution/Principal/Director and subject to a maximum of 25 marks.

Part II: Extra Curricular Activities (75 marks)

A. **Games and Sports / Field Based Activities:**
   Sports Activities or any other field related activity.

B. **Cultural/ Literary Activities/ Social Outreach / Personality Development Based Activities:**

   Activities under the Celebration of recognized National Days/ Birth Anniversary of great personalities, Hostel Day/ Annual Day/ Fresher's

   Day or any other related activity. Contribution towards social up-gradation based activities, Activities by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs, activities under different clubs (if not covered under above heads) like, photography etc., NGO activities, Plantation/ cleanliness activities etc.

C. **Academic/Technical/ Professional Development Activities:**

   Attending workshops, seminars, FDPs for reasonable duration/numbers. Attending/ paper presentation in conferences.

D. **Research Contribution to Social Applications:**

   Student is desired to perform his research applications to social problems.

Awarding Marks:

Effective contribution and active participation may be judged for awarding the marks. Additionally, following levels may be defined in Category A, B, C, D & E:

Category	Level wise Marks			
	Level-1	Level-2	Level-3	Level-4
A. Games and Sports / Field Based Activities	-	-	40	50
B. A. Cultural/ Literary Activities/ Social Outreach / Personality Development Based Activities	20	30	40	50
C. Academic/Technical/ Professional Development Activities	20	30	40	50
D. Research Contribution to Social Applications	30	40	50	60
E. Anandam Program Activities	30	40	50	60
Maximum Marks	100			

MCA 101- Mathematical Foundations in Computer Science

UNIT I

Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers. Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT II

Relations: Properties of binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram. Functions: Inverse Function, Composition of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

UNIT III

Elementary Combinatorics: Basics of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial and Multinomial theorem, the principles of Inclusion – Exclusion.

UNIT IV

Recurrence Relations: Generating Functions, Function of Sequences, Calculating Coefficients of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, solution of non-homogeneous Recurrence Relations.

UNIT V

Graph Theory: Representation of Graphs, DFS, BFS, Spanning Trees, Planar Graphs. Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

TEXT BOOKS:
1. Mathematical Foundation of Computer Science – ShahnazBathul, PHI.
2. Elements of Discrete Mathematics- A Computer Oriented Approach,C.L.Liu, D.P. Mohapatra,3rd edition,TMH.
3. Discrete Mathematics for Computer Scientists & Mathematicians, second edition, J.L.Mott, A. Kandel, T.P. Baker, PHI
4. Discrete and Combinatorial Mathematics- An Applied Introduction-5th Edition– Ralph. P.Grimaldi, Pearson Education.

REFERENCE BOOKS:
1. Discrete Mathematics and its applications, 6th edition, K.H.Rosen, TMH.
2. Discrete Mathematical Structures, Mallik and Sen, Cengage Learning.
3. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI/ Pearson Education
4. Discrete Mathematics with Applications, Thomas Koshy, Elsevier
5. Logic and Discrete Mathematics, Grass Man and Tremblay, Pearson Education.

MCA 102- PROGRAMMING IN C

UNIT – I

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.

UNIT-II

C Statements – selection statements – if nested if's, the if-else –if ladder the conditional expressions, switch statement nested switch statements, iteration statements – the for loop, for loop variations, the while loop, the do-while loop, declaring variable with in selection and iteration statements, jump statement, the return statement, the go to submit, break statement, exit ( ) function, the continue statement, expression statement. Block statements.

UNIT – III

Arrays – Array what is an array? – Array Declaration, Array Initialization – Accessing individual elements of an array – Two Dimensional Arrays – Multi Dimensional Array, Passing an array element to a function – Rules of using an array. What are strings? String I/O, string Manipulation.

UNIT – IV

Functions – The General Form of a Function, Math functions, elements of function, function categories, types of functions, Function Arguments Call by value, Call by Reference, return statement. Uses of functions. C pre – processor, storage classes – Automatic – Register, Static and external. **Pointers** – definition, pointer variables, pointer expressions, arithmetic pointers, pointers and arrays, initializing pointers and functions and problems with pointers.

UNIT – V

Structures – definition, accessing structure members, structure assignments, array of structures, passing structures, structure pointers, uses of structures **Unions** – definitions, difference between structure and union, type def. **Files** – introduction to streams and files, basics of files – file pointer, opening and closing files, writing and reading character, file functions.

Text Books:
1. Let Us C by Yashwanth Kanethar.
2. "Programming in ANSI C" by E. Balaguruswamy.

REFERENCE BOOKS:
  1. Complete Reference of C++ by Herbert Schilde.

MCA 103- OPERATING SYSTEM

UNIT -I

Operating system concepts: OS definition and services; Types and features : batch systems, multiprogramming, multitasking, parallel systems, distributed systems, real-time systems, time-sharing systems, PC systems; System Calls types, System Programs

UNIT- II

Process vs. Thread: process states, process control block; inter-process communication; Process Synchronization:, Classical problems of synchronization; CPU Scheduling: Criteria; Algorithms: FCFS, SJF, Priority, Round- Critical section problem and solution criteria, Semaphores Robin, Real-time.

UNIT -III

Memory Management: Paging and Segmentation approaches, virtual memory, Demand Paging and Page Replacement algorithms; Deadlocks: necessary conditions, pr evention, avoidance and recovery, banker's algorithm.

UNIT- IV

File Management: File System Structure, allocation methods: Contiguous allocation, Linked allocation, indexed allocation: free space management: Bit vector, linked-list, grouping, counting: Directory implementation: Linear List, Hash table.
Device Management: Disk structure, Disk scheduling:, Selecting Disk Scheduling algorithm.

UNIT -V

UNIX: Essential commands and utilities, Unix files, directory structure, file security, pipe, filter, Bourne shell programming features, systems calls classification and basics (reg. file manipulation, process, signal and IPC); Linux: System components, Process management, scheduling, memory management, Networking software layers, Security, various editors, I/O devices, IPC .

TEXT BOOKS:

1. Andrew S Tanenbaum , " Distributed Operating Systems " , Pearson Education India, 2001.

REFERENCES:

1. Mukesh Singhal, Niranjan G Shivratri , " Advanced Concepts in Operating Systems", McGraw Hill International, 1994.
2. Pradeep K Sinha , " Distributed Operating Systems Concepts and Design ",PHI, 2002.

MCA 104- COMPUTER SYSTEM & ARCHITECTURE

UNIT -I

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip Flops, Sequential Circuits. Digital Components: Integrated Circuits, Decoder, Multiplexers, 'Registers, Shift Registers, Binary counter, Memory unit. Data Representation: Data types, Complements, Fixed and Floating Point Representation, Other binary codes and error Detection codes.

UNIT –II

Register Transfer and Micro operations:. Register Transfer language, Register transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations and Arithmetic logic shift unit. Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycles, Memory Reference Instructions, Input, Output and Interrupts, Design of Accumulator logic.

UNIT –III

Programming the Basic Computer: Introduction, Machine Language, Assembly Language, The Assembler, Programming Arithmetic and Logic Operations, Subroutines and input -output ,Programming. Micro programmed Control: Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

UNIT –IV

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation,
Program Control, RISC. Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline. Computer Arithmetic: Addition and Subtraction, Multiplication algorithms, Division Algorithms, Floating point arithmetic operations, decimal arithmetic unit, and decimal arithmetic operations.

UNIT –V

Input -Output organization: Peripheral Devices, I/O output interface, Asynchronous data transfer, Modes of transfer, Priority Interrupt, DMA, Input output Processor, Serial Communication. Memory Organization: Memory Hierarchy, Main Memory, Cache Memory.

TEXT BOOKS:
1. M. Morris Mano, "Computer System Architecture", Pearson Asia / Prentice Hall, Third edition, 1993. ⍰

REFERENCES:
1. Sivarama P Dandamudi "Fundamentals of Computer Organization and Design", Springer/ Dream tech Publishers, 2003.
2. William Stallings, "Computer Organization & Architecture", Pearson Education, Sixth: Edition, 2003.

MCA 105- DATABASE MANAGEMENT SYSTEM

UNIT-I

Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS .Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.

UNIT-II

Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

UNIT-III

Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

UNIT-IV

SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures and SQL /PSM.

UNIT-V

Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form. The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery.

TEXT BOOKS:
1. Fundamentals of Database Systems, Ramez A. Elmasri, Shamkant Navathe,5th Ed(Pearson)
2. Database System Concepts By Korth, Silberschatz, Sudarshan (Mcgraw Hill)
3. An Introduction to Database Systems By Bipin C. Desai (Galgotia Publication.)

4. SQL, PL/SQL Programming By Ivan Bayross (BPB)
5. Commercial Application Development Using Oracle Developer 2000 By Ivan Bayross (BPB)

REFERENCES:
1. SQL, PL/SQL Programming By Ivan Bayross (BPB)
2. Commercial Application Development Using Oracle Developer 2000 By Ivan Bayross (BPB)

MCA 106- WEB TECHNOLOGY

UNIT- I

Internet Basics: Evolution of Internet, Basic internet terms and applications. ISP, Anatomy of an e-mail Message, basic of sending and receiving, E-mail Protocol; Mailing List- Subscribing, Unsubscribing.

UNIT- II

Introduction to World Wide Web and its work, Web Browsers, Search Engine, Downloading, Hyper Text Transfer Protocol (HTTP), URL, Web Servers, FTP, Web publishing- Domain Name Registration, Space on Host Server for Web Site, Maintain and Updating.

UNIT- III

HTML: Elements of HTML & Syntax, Comments, Headings, Paragraph, Span, Pre Tags, Backgrounds, Formatting tags, Images, Hyperlinks, div tag, List Type and its Tags, Table Layout, div, Use of Forms in Web Pages.

UNIT-IV

CSS: Introduction to Cascading Style Sheets, Types of Style Sheets (Inline, Internal and External), using Id and Classes, CSS properties: Background Properties, Box Model Properties, Margin, Padding, List Properties, Border Properties.

UNIT-V

Java Script: Introduction to Client Side Scripting, Introduction to Java Script, Comments, Variables in JS, Global Variables, Data types, Operators in JS, Conditions Statements (If, If Else, Switch), Java Script Loops (For Loop, While Loop, Do While Loop), JS Popup Boxes (Alert, Prompt, Confirm), JS Events, JS Arrays, JS Objects.

TEXT BOOKS:
1. Internet and Web Page Designing By V.K Jain (BPB)
2. Web Enabled Commercial Application Development Using HTML, DHTML , java script, Perl CGI By Ivan Bayross (BPB)

REFERENCES:
1. Thomas A. Powell , "HTML: The Complete Reference", Osborne/McGraw-Hill
2. Deitel, Deitel and Nieto: Internet & WWW. How to program, 2nd Edition, Pearson Education Asia.
3. Bayross, "Web Enabled Commercial Applications Development Using HTML, DHTML, Java Script, Perl CGI," Third Edition, BPB Publications.

SEMESTER-II

MCA Year 1- Semester II								
Theory								
S. No.	**Course Code**	**Course Title**	**Hours**		**Marks**			**Credits**
			L	**P**	**IA**	**ETE**	**Total**	
1	MCA-201	Object Oriented Programming with C ++	3	0	30	70	100	3
2	MCA-202	Computer Networks	3	0	30	70	100	3
3	MCA-203	Data Structures	3	0	30	70	100	3
4	MCA-204	Software Engineering	3	0	30	70	100	3
5	MCA-205	Java Programming	3	0	30	70	100	3
6	MCA-206	Business Informatics	3	0	30	70	100	3
Practical								
1	MCA-251	Object oriented Programming with C++ Lab	0	2	30	70	100	01
2	MCA-252	Data Structure Lab	0	2	30	70	100	01
3	MCA-253	Java Programming Lab	0	2	30	70	100	01
4		SODECA						02
Total					270	630	900	23

L= Lecture, **P** = Practical, **IA** = Internal Assessment, **ETE** = End Term Exam
SODECA: Social Outreach Development & Extra Curricular Activities

Note:
Mandatory Summer Training: 30 Working Days Summer Training during Semester Break, of 100 Marks. Evaluation will be done in Semester-III Examinations.

MCA 201 – OBJECT ORIENTED PROGRAMMING WITH C++

UNIT- I

Object Oriented System: Difference Between Procedural and Object Oriented Languages, Object Oriented Paradigm, Inheritance, Polymorphism, Abstraction, Encapsulation, Benefits and Application of Oops. Introduction to C++: Character Set, Token, Constants, Variables and Data Types, Enumeration Types, Operators, Expressions, Operator Precedence and Associatively, , Input, Output, Conditional Statements, Scope of Variables, Type Conversion.

UNIT- II

Iteration, Break, Continue, goto; Pointers: Introduction, implementation advantage and disadvantage. Functions - Standard and User-Defined Function, Recursive Function, Passing By Value And Reference, Function Overloading Pointer and Function: Function Returning Pointer, Passing pointer as argument, Reference and Functions. Structures and Pointers.

UNIT-III

Array: introduction, advantage, One, Two and Multidimensional, Passing Array to a Function, Array and Pointers: Pointer to One and Two Dimensional Arrays, Array of Pointers. Dynamic Arrays, String Processing. Class: Introduction to Class and Object, Declaring Members and Methods in a class, declaring objects.

UNIT-IV

Functions and objects, Inline Function, Friend Functions and Its Usage, Abstract Class, Function Overriding. Constructor and Destructor- Needs and Its Usage, Types of Constructors, Destructor, Static Data Members and Methods. Inheritance - Need of Inheritance, Types of Inheritance and its implementation.

UNIT- V

Operator Overloading: Need and Rules of Operator Overloading, Overloading Through Member Function and Friend Function. Compile Time and Run Time Polymorphism- Virtual Function and virtual class.

TEXT BOOKS:
1. Object Oriented Programming With C++ By E. Balagurusamy (Tata Mcgraw Hill)
2. C++ The Complete Reference By Herbert Sehildt (Tata Mcgraw Hill)

REFERENCES:
1. Object Oriented Programming With C++ By Schaum Series (Tata Mcgraw Hill)

MCA 202 – COMPUTER NETWORK

UNIT - I

Data Communication and Networking: Overview, Network Types, LAN Technologies, Topologies, Models- OSI Model, TCP/IP Stack

UNIT - II

Physical Layer: Introduction, Digital Transmission, modes, digital to digital, analog to digital, Analog Transmission, digital to analog, analog to analog, Transmission media, Wireless Transmission, Switching techniques: Circuit Switching, Packet switching, Message switching.

UNIT- III

Data Link Layer: Introduction, Data Link Control: Line Discipline- Enq /Ack, Poll/Select, Flow Control: Stop And Wait, Sliding Window, Error Control: ARQ, Stop and Wait ARQ, Sliding Window ARQ.

UNIT - IV

Network Layer: Introduction, Network Addressing, Routing, Internetworking, Tunneling, Packet Fragmentation, Network Layer Protocols, ARP, ICMP, IPv4, IPv6

UNIT-V

Transport Layer: Introduction, Transmission Control Protocol, User Datagram Protocol Application Layer: Introduction, Client-Server Model, Application Protocols

TEXT BOOKS:
1. Computer Forensics by Marie- Helen Maras
2. Data Communication and Networking By Forozan (Tata McGraw Hill)
3. Data Communication And Computer Networks By Dr. Madhulika Jain, Satish Jain (BPB)
4. William Stallings, "Data and Computer Communications", Pearson Education, 2008.
5. Rajneesh Agrawal and Bharat Bhushan Tiwari, "Data Communication and Computer Networks", Vikas Publishing house Ltd. , 2005.

REFERENCES:
1. S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education.
2. Leon-Gracia and I. Widjaja, "Communication Networks", Tata McGraw Hill, 2004.

MCA 203 – DATA STRUCTURE

UNIT- I

Primitive and Composite Data Types, Time and Space Complexity of Algorithms, Stack and Primitive Operation on Stack. Applications- Infix, Postfix, Prefix and Recursion. Queues, Primitive Operations on Queues, Circular Queue, De Queue and Priority Queue.

UNIT- II

Basic Operation on Linked List, Circular Linked List, Doubly Linked List, Linked Representation of Stack and Queue, Application of Linked List.

UNIT- III

Trees: Basic Terminology, Binary Trees, Tree Representation as Array and Linked List, Basic Operation on Binary Tree, Traversal of Binary Tree – In Order, Preorder, Post Order, Application of Binary Tree, Threaded Binary Tree, B-Tree and Height Balance Tree.

UNIT-IV

Sequential Search, Binary Search, Insertion Sort, Selection Sort, Quick Sort, Bubble Sort, Heap Sort, Radix Sort Comparison of Sorting Methods.

UNIT-V

Hash Table, Collision Resolution Techniques. Introduction to Graphs, Definition, Terminology, Directed, Undirected, Weighted Graph, Representation of Graphs, Graph Traversal – Depth First and Breadth First, Spanning Trees, Minimum Spanning Trees, Shortest Path Algorithm (Kruskal and Prim's Algorithm).

TEXT BOOKS:
1. Expert Data Structure with 'C' By R.B Patel (Khanna Book Publishing Co.(P))
2. Data Structure By Lipschutz (Tata McGraw Hill)
3. Data Structure By Yashvant Kanitkar (BPB)

REFERENCES:
1. An Introduction to Data Structures with Applications, By Jean-Paul Tremblay, Paul G. Sarerson (Tata McGraw Hill)
2. Data Structure Using C and C++ By Yedidyahlangsam, Moshe J. Augenstein, Arora M. Tenenbaum (Prentice- Hall India)

MCA 204– SOFTWARE ENGINEERING

UNIT- I

Software Engineering: Software, Software Process, Process Characteristics, Software Process Model- Linear Sequential Model, Prototyping Model, Spiral Model. Software Quality, McCall's Quality Factors. Software Requirement Analysis and Specification (SRS): Need, Characteristics and Components.

UNIT- II

Cost Estimation: COCOMO Model, Designing Concepts: Design Principles, Module level concepts- Cohesion and Coupling, Design notations and specifications, Verification, Metrics.

UNIT-III

Object Oriented Design: Concepts, Design Notation and Specification, Design methodology, metrics. Debugging Process: Information Gathering, Fault Isolation, Fault Confirmation, Documentation, Fixing fault isolation.

UNIT- IV

Testing: Testing Fundamental, Functional Testing (Black Box), Structural Testing (White Box), Alpha And Beta Testing, Testing Object Oriented Programs, Testing Process: Comparison of Different Testing, Level of Testing. Project management for special classes of software projects: Using CASE tools, CBSE.

UNIT – V

UML: An overview of UML- UML notations, UML Class diagrams- association, multiplicity, generalization, aggregation, interfaces.

TEXT BOOKS:
1. Software Engineering: A Practitioner's Approach by Roger S. Pressman(McGraw Hill)
2. An Integrated Approach to Software Engineering By PankajJalote, (Narosa Publishing House)

REFERENCES:
1. Object-Oriented Software Engineering: Practical Software Development using UML and Java By Timothy C. Lethbridge, Robert Laganière (McGraw Hill)
2. Object-Oriented Software Engineering Using UML, Patterns, and Java By Bernd Bruegge & Allen H. Dutoit (Prentice Hall)

MCA 205– JAVA PROGRAMMING

UNIT-1

Java Evolution and Overview of Java Language: How Java differs from C and C++,Java and Internet, Java and World Wide Web, Introduction, Simple Java Program, More of Java, An Application with Two Classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. **Constants, Variables, and Data Types:** Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values of Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values.

UNIT-1I

Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evolution of Expressions, Precedence of Arithmetic Operators, Type Conversion in Expressions, Operator Precedence and Associativity, Mathematical Functions.

UNIT-1II

Decision Making and Branching: Introduction, Decision Making with if Statement, Simple if Statement, The if... else Statement, Nesting of if ... else Statements, The else if Ladder, The switch Statement, The?: Operator.
Decision Making and Looping: Introduction, The while Statement, The do Statement, The for Statement, Jumps in Loops, Labeled Loops.

UNIT-IV

Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a. Class, Overriding Methods,

final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control.

Arrays, String and Vectors: Arrays, One-Dimensional Arrays, Creating an Array, Two-Dimensional Arrays, Strings, Vectors, Wrapper Classes. Interfaces: Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, implementing Interfaces.
Packages: Putting Classes Together: Introduction, Java API Packages, Using system Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package. Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, and Synchronization.

UNIT-V

Managing Errors and Exceptions: Introduction, Types of Errors, Exceptions, Syntax of Exception, Different classes used to handle the Exception. Applet Programming: Introduction, How Applets Differ from Application, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, More About Applet Tag, different geometrical methods and its implementation. Use of Color and Font class.

Managing Input/output Files in Java: Introduction, Concepts of Streams Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, and Other Useful I/O Classes, using the File Class, Input/output Exceptions, and Creation of Files.

TEXT BOOKS:
1. E. Balagurusamy, Programming with Java, A Primer Second Edition, Tata McGraw Hill, New Delhi.

REFERENCES:
1. H.M.Deitel & P.J.Deitel- JA V A- How to Program, 5th Edn, Pearson Education, New Delhi-2004.
2. P.Naughton and H. Schildt-JAVA: The Complete Reference, TMH, New Delhi 2005.
3. D.Jana- Java and Object Oriented Programming Paradigm, PHI, New Delhi-2005.

MCA 206– BUSINESS INFORMATICS

UNIT-I

Business Environment and Dependence on IT: Introduction to Business Informatics, Organizational Structure and Design, Dependence on Technology, Integrating Technology with Business Environment IT and Corporate Strategy, Sustaining a Competitive Edge through application of IT.

UNIT-II

E-Commerce: Definition, Objectives, components, Advantages and disadvantages, Scope, E-Commerce Models, E-Commerce Opportunities for Industries, Growth of E-Commerce, e-Commerce Applications- E-Marketing, E-Customer Relationship Management, E-Supply Chain Management, E-Governance, E-Buying, E-Selling, E-Banking, E-Retailing.

UNIT-III

E-Payments and Security issues in E-Commerce: Introductions, Special features, Types of E-Payment Systems (EFT, E-Cash, E- Cheque, Credit/Debit Card, Smart Card, Digital Tokens and Electronic Purses/ Wallets), Security risk of E-Commerce, Types of threats, Security Tools, Cyber Laws, Business Ethics.

UNIT-IV

ERP: Introduction, Needs and Evolution of ERP Systems, ERP Domain, ERP Benefits, ERP and Related Technologies, Relevance to Data Warehousing and Data Mining, ERP Drivers, Evaluation Criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement Phases, ERP Units ,ERP Success & Failure Factors.

UNIT-V

Information Systems: Introduction, Categories of System: Open, Closed, Physical, Abstract, Dynamic, Static etc., Types of Information Systems: TPS, MIS, DSS, OLAP, OLTP, Expert System, Internet Based Systems, Learning Management Systems, Business Process

TEXT BOOKS:
1. Ravi Kalakota, "Electronic Commerce: A Manager's Guide", Addison-Wesley Professional, Edition 2012.
2. Henry C. Lucas, Information Technology for Management, McGraw Hill, International Edition, July 2001.
3. Kenneth C. Laudon& Jane P. Laudon, Management Information System, Global Edition, Pearson Education, 2009.

REFERENCES:
1. Dr. K Abirami Devi & Dr. M Alagammai, "E-Commerce Essentials", Margham Publication, 2012.
2. Kenneth C. Laudon, Karol Traver, "E-Commerce 2014", Prentice Hall Publication, 2013.
3. Enterprise Resource Planning Systems System, Lifecycle, Electronic Commerce and Risk by Daniel E.O. Leary, 2011

SEMESTER-III

III-Semester (Second Year) MCA Year 2 - Semester III

Theory

S. No.	Course Code	Course Title	Hours		Marks			Credits
			L	P	IA	ETE	Total	
1	MCA-301	Cloud Computing	3	0	30	70	100	3
2	MCA-302	Windows Programming using c#	3	0	30	70	100	3
3	MCA-303	Cyber Security	3	0	30	70	100	3
4	MCA-304	Python Programming	3	0	30	70	100	3
5	MCA-305	Computer Graphics	3	0	30	70	100	3
6	MCA-306	Elective 1	3	0	30	70	100	3

Practical

1	MCA-351	Windows programming LAB	0	2	30	70	100	01
2	MCA-352	Computer Graphics Lab	0	2	30	70	100	01
3	MCA-353	Summer Industrial Training Present	0	2	30	70	100	01
4		SODECA						02
\multicolumn{5}{c}{**Total**}	270	630	900	23

L= Lecture, **P** = Practical, **IA** = Internal Assessment, **ETE** = End Term Exam
SODECA: Social Outreach Development & Extra Curricular Activities

Elective -1:
   a)   Data Mining and Warehousing
   b)   Search Engine Optimization(SEO)

MCA 301– CLOUD COMPUTING

UNIT- I

Introduction to Client – Server Computing, Peer-to-Peer Computing, Distributed Computing, Collaborative Computing, Cloud Computing

UNIT- II

Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Services – SaaS, IaaS, PaaS, DaaS and VDI etc.

UNIT-III

Cloud as Web-Based Application, Cloud Service Development: Pros and Cons, Types, Software as a Service, Platform as a Service, Web Services, On-Demand computing, Discovering Cloud Services, Development Services and Tools, overview of major Cloud Service providers-Amazon Ec2, Google App Engine, IBM Clouds, and Eucalyptus etc.

UNIT-IV

Application of Cloud Computing for Centralizing Email communications, collaborating on Schedules, Calendars, To-Do Lists, Contact Lists. Cloud for the Community, Group Projects and Events; Cloud Computing for the Corporation. Cloud Computing for Schedules and Task Management, Exploring Online Scheduling Applications and Online Planning and Task Management.

UNIT-V

Cloud Computing Collaborating on Event Management, Contact Management and Collaborating on Project Management. Cloud Collaborating on Word Processing, Databases, Storing and Sharing Files; Evaluating Web Mail Services, Evaluating Web Conference Tools; Cloud computing and Social Networks, Groupware, Blogs and Wikis Data privacy and security Issues and other risks in Cloud Computing

TEXT BOOKS:

1. Cloud Computing Concepts Technology and Architecture by Thomas Erl, Prentice Hall
2. Cloud Computing Principles and Paradigm by Rajkumar Buyya, James Broberg, Andrzej Goscinski, Wiley Publications

REFERENCES:

1. Cloud Computing Theory And Practice by Dan C. Marinescu, Morgan Kaufman Publications

MCA 302– WINDOWS PROGRAMMING USING C#

UNIT-I .

Net Introduction to .Net Technology: Why .Net?, The .Net Framework Class Library, Working with the .Net FCL, Namespaces, Types of a .Net Namespace, Setting up the development environment with Visual Studio, Writing and executing a simple C# program.

UNIT-II

C# Language Fundamentals: Data types, variables, and constants, Operators and expressions., Decision Statements- If..then, If..then..else, Select.. Case, Loop Statements- While, Do .. Loop, For .. Next, For Each ..Next, Arrays, Methods: declaration, parameters, and return types, Implementing Typecasting, Procedures and Functions, Optional arguments, Public and Private variables.

UNIT-III

Object-Oriented Programming (OOP) in C# and Collections and Generics - Classes and objects: creation and usage, Encapsulation: access modifiers and properties, Inheritance: base and derived classes, Polymorphism: method overriding and interfaces, Abstract classes and methods, Arrays: single and multi-dimensional, Error handling in Procedures, Properties, Collections: List, Dictionary, Queue, and Stack, Introduction to generics and generic collections, LINQ (Language Integrated Query) basics for data manipulation.

UNIT-IV

Delegates, Events, and Lambda Expressions: Defining and using delegates, Event handling patterns in C#, Introduction to lambda expressions and their applications.

UNIT-V

Windows Form: Introduction to Class Libraries, Event and Event Handlers, Creating Windows Forms projects in Visual Studio. Windows Application, Windows GUI, First Win Forms Application, Controls, Text controls, Selection List Controls, Some controls with examples. Error handling In Windows Forms: Types of Validations, Types of Errors, Exceptions, and Classified Runtime based Exceptions. SDI and MDI

Applications: SDI and MDI interfaces, Characteristics of MDI components, Creating MDI Forms.

UNIT-VI

Data access with ADO.Net: Introduction to lambda expressions and their applications, Establishing connections to databases using connection strings, Performing CRUD (Create, Read, Update, Delete) operations, Managing connection pooling for efficient resource utilization, Creating and configuring DataAdapters for data retrieval, Populating DataSets and DataTables with data, Binding data to controls like DataGridView, ListBox, and ComboBox.

TEXT BOOKS:
1. Beginning C# Object Oriented Programming by Syed Shanu (C# Corner)
2. Beginning C# 6 Programming with Visual Studio 2015 by Benjamin Perkins, Jacob Vibe Hammer, Jon D. Reid (Wrox)
3. C# 6.0 in a Nutshell: The Definitive Reference 6th Edition by Joseph Albahari and Ben Albahari

REFERENCES:
1. Pro C# 5.0 and the .NET 4.5 Framework (Expert's Voice in .NET) 6th Edition by Andrew Troelsen
2. Programming C# for Beginners (Mahesh Chand)

MCA 303– CYBER SECURITY

UNIT- I

Cyber Security: definition, cybercrime and information security, cybercriminals, classification of cybercrime, cybercrime Era. Cyber offences: categories of cybercrime, how criminals plan the attack, cyber stalking, cyber and cybercrime, botnets and cybercrime, Cloud Computing and cybercrime.

UNIT-II

Tools and methods used in cybercrime: phishing and Identity theft; methods of phishing, spear phishing, types of phishing scams, phishing toolkits, and spy phishing, Personally Identifiable Information, types and techniques of ID theft, password cracking, key loggers and spywares, backdoors, steganography, DoS and DoS attacks, SQL Injection, Buffer Overflow.

Cybercrime on mobile and wireless devices: Security challenges posed by mobile devices, attacks on wireless networks, credit card frauds mobile and wireless era. Authentication security service, attacks on mobile phones; mobile phone theft, mobile virus, mishing, vishing, smishing, hacking Bluetooth.

UNIT-IV

Cybercrime and Cyber Security: Cyber Law, The Indian IT Act, Digital Signatures and IT Act, Cyber security and organizational implications, Cyber crisis management, Anti- Cybercrime Strategies, Cybercrime and Cyber terrorism. Cybercrime and Indian ITA 2000.

UNIT-V

Computer forensics: introduction, computer forensics and digital evidence, digital forensics life cycle, computer forensics and steganography, Relevance of the OSI 7 Layer model to computer forensics, Anti forensics.

TEXT BOOKS:
1. Cyber Security by Nina Godbole & sunit Belapure
2. Computer Forensics by Marie- Helen Maras

REFRENCES:
1. Paul van Oorschot, Computer Security and the Internet: Tools and Jewels (2020, Springer)
2. Bruce Schneier. Secrets and Lies: Digital Security in a Networked World (2000, Wiley)

MCA 304– PYTHON PROGRAMMING

UNIT- I

Overview of Programming: Structure of a Python Program, 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- II

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

UNIT- III

Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, The while statement, Implementing 2-D matrices.

UNIT- IV

Strings and Lists: String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists .

UNIT- V

Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries. Overview of stacks and queues. Overview of packages: networkx, matplotlib.pyplot, numpy.

TEXT BOOKS:
1. Introduction to computation and programming python, by John Guttag, MIT Press.
2. Learning Python, Lutz and Ascher, O'Reilly publications

REFERENCES:
1. T. Budd, Exploring Python, TMH, 1st Ed, 2011

MCA 305– COMPUTER GRAPHICS

UNIT-I

Computer Graphics: Picture analysis, Overview of programmer's model of interactive graphics, Fundamental problems in geometry. Scan Conversion: point, line, circle, ellipse polygon, Aliasing, and introduction to Anti Aliasing (No antialiasing algorithm).

UNIT-II

2D & 3D Co-ordinate system: Homogeneous Co-ordinates, Translation, Rotation, Scaling, Reflection, Inverse transformation, Composite transformation. Polygon Representation, Flood Filling, Boundary filling. Point Clipping, Cohen-Sutherland Line Clipping Algorithm, Polygon Clipping algorithms.

UNIT-III

Hidden Lines & Surfaces: Image and Object space, Depth Buffer Methods, Hidden Facets removal, Scan line algorithm, Area based algorithms. Curves and Splines & Rendering: Parametric and Non parametric Representations, Bezier curve, B Spline, Basic illumination model, diffuse reflection, specular reflection, shading, Ground shading, ray tracing, color models like RGB, YIQ, CMY, HSV.

UNIT-IV

Multimedia: Multimedia components, Multimedia Input/output Technologies: Storage and retrieval technologies, Architectural considerations, file formats.

UNIT-V
Animation: Introduction, Rules, problems and Animation techniques

TEXT BOOKS:
2. Multimedia Systems Design, Prabhat Andleigh and Thakkar, PHI.
3. Multimedia Information Networking, N.K.Sharda, PHI

REFERENCES:
1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice,   Pearson
2. Hearn and Baker: Computer Graphics, PHI

MCA 306– DATA MINING AND WAREHOUSING   (Elective-1)

UNIT-I

Data Mining – Motivation, Importance of DM Functionalities, Basic Data Mining Tasks, DM Applications, and Social Implications

UNIT- II

Differences between Operational Database and Data Warehouse – Multi-dimensional Data Model - From Tables to Data Cubes. Schemas, Measures, DW Implementation – Efficient Computation of Data Cubes.

UNIT-III

Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept of Hierarchy Generation, Task relevant Data, Background Knowledge, Presentation and Visualization of Discovered Patterns.

UNIT- IV

Association Rule Mining, Classification and Prediction – Decision Tree, Baysian Classification Back Propagation, Cluster Analysis, Outlier Analysis.

UNIT-V

Web Content Mining, Web Structure Mining, Web Usages Mining, Spatial Mining, Generalization and specialization, Spatial Rules, Spatial Classification and Clustering Algorithms, Temporal Mining, Modeling Temporal Events, Times Series, Pattern Detection, Sequences.

TEXT BOOKS:
1. Margaret H. Dunham, "Data Mining : Introduction and Advance Topics", Pearson Education, First Indian Reprint, 2003
2. Arun K. Pujari, "Data Mining Techniques", University Press (India) Limited, First edition, 2001

REFERENCES:
1. Efrem O, Mallach, "Decision Support and Data Warehousing Systems", Mcgraw-Hill International Edition, 2000

MCA 306– SEARCH ENGINE OPTIMIZATION (Elective-2)

UNIT – I

Basics for SEO: What is Domain, Basic Knowledge of World Wide Web, Difference between Portal and Search Engines, What are SEO, Types of SEO Techniques, Black hat techniques, White Hat techniques, and How Search Engine works?

UNIT - II

SEO Research & Analysis: Market Research, Keyword Research and Analysis, Keyword opportunity, Competitors Website Analysis, SWOT Analysis of Website, How to Choose Best Keywords, Tools available for Keyword Research.
Website Design SEO Guidelines: Content Research, Content Guidelines, Content Optimization, Design & Layout, XML Sitemap / URL List Sitemap.

UNIT- III

On-page Optimization: The Page Title, Meta Descriptions & Meta Keywords, Headings, Bold Text, Domain Names & Suggestions, Canonical Tag, Meta Tags, Images and Alt Text, Internal Link Building, The Sitemap, Invisible Text, Server and Hosting Check, Robots Meta Tag, Doorway Pages, 301 Redirects, 404 Error, Duplicate content.

UNIT – IV

Off-page Optimization: Page   Rank, Link Popularity, Link Building in Detail, Directory Submission, Social Bookmark Submission,Blog   Submission,   Articles, Links Exchange, Reciprocal Linking, Posting to Forums, Submission to Search Engine, RSS Feeds Submissions, Press Release Submissions, Forum Link Building, Competitor Link Analysis.

UNIT-V

Analytics: Google Analytics, Installing Google Analytics, How to Study Google Analytics, Interpreting Bars & Figures, How Google Analytics can Help SEO, Advanced Reporting, Webmaster Central & Bing/Yahoo, Open Site Explorer, Website Analysis using various SEO

Tools available. SEO Tools: Keyword Density Analyzer Tools, Google Tools, Yahoo / Bing Tools, Rich Snippet Text Tools, Comparison Tools, Link Popularity Tools, Search Engines Tools, Site Tools, Miscellaneous Tools.

SEO Reporting: Google analysis, Tracking and Reporting, Reports Submission, Securing Ranks

TEXT BOOKS:
1. The Art of SEO (Theory in Practice) - Eric Enge, Stephen Spencer, Jessie Stricchiola, and Rand Fishkin (O'REILLY)
2. Search Engine Optimization All-in-One For Dummies by Bruce Clay

REFERENCES:
1. SEO Step-by-Step by Caimin Jones

SEMESTER-IV

		MCA Year 2 - Semester IV						
Theory								
S. No.	**Course Code**	**Course Title**	**Hours**		**Marks**			**Credits**
			L	**P**	**IA**	**ETE**	**Total**	
1	MCA-401	Software Quality Assurance & Engineering	3	0	30	70	100	3
2	MCA-402	Elective 2	3	0	30	70	100	3
Practical								
3	MCA-451	Industrial Project	0	12	30	70	100	06
4		SODECA						02
Total					90	210	300	14

L= Lecture, **P** = Practical, **IA** = Internal Assessment, **ETE** = End Term Exam

Note: The industrial project is part of the curriculum will be held in the institute as one of the laboratories. This may be in continuations to the project under taken by the student during industrial training and/or of industrial nature and/or have good industrial significance and/or may be done in collaboration with industry (as per suitability at the institute level).
The evaluation will be done in the institute by one internal examiner and one external examiner (from outside the institute) appointed by University.

Elective 2:
   a)   Artificial Intelligence
   b)   Network Security and Cryptography

MCA 401- SOFTWARE QUALITY ASSURANCE AND ENGINEERING

UNIT- I

SOFTWARE QUALITY AND ENGINEERING: Quality concepts and productivity relationship, software quality factors, software quality costs, Total Quality Management (TQM), continuous improvement cycle: Plan, Do, Check and Act (PDCA), quality policy, cost of quality, quality engineering, quality planning: goal setting and strategy formation, assessment and improvement.

UNIT- II

SOFTWARE QUALITY ASSURANCE (SQA): Components of SQA, classification, defect detection, defect prevention, defect reduction, defect containment, QA activities in software processes, verification and validation, software review, inspection, formal verification, statistical software quality approach.

UNIT- III

COMPONENTS MEASUREMENT WITH REFERENCE TO SQA: Metrics, product quality metrics, process quality metrics, metrics for software maintenance, quality tools for quality control, test management and organizational structures, Capability Maturity Model (CMM), Capability Maturity Model Integration (CMMI), ISO 9000, quality and quality management metrics, Deming"s Principle, SQA team formation

UNIT- IV

QUALITY MANAGEMENT MODEL: Integrating quality activities in project life cycle, reviews, software testing, strategies and implementation, Computer-Aided Software Engineering (CASE) tools, The Rayleigh model framework, code integration pattern, Problem Tracking Report (PTR), reliability growth model, Service Quality, Kano Model, Customer retention, continuous process improvement, Juran"s Trilogy, TQM principles, Kaizen Technique, Statistical Quality Assurance, Mc call quality factors

UNIT –V

SOFTWARE QUALITY ASSURANCE BEYOND TESTING: Defect prevention and process improvement, root cause analysis for defect prevention, software inspection, inspection related activities, fault tolerance and failure containment, comparing quality assurance techniques and activities.

TEXT BOOKS:

1. An Integrated Approach to Software Engineering, Pankej Jalote, Narosa Publishing House, New Delhi 1997.

REFERENCES:

1. Metrics and Models in Software Quality Engineering, Stephan H. Kan, Pearson Education, 2007.
2. Making Sense of Software Quality Assurance, Raghav J. Nandyal, Tata McGRAW Hill, 2007.

MCA 402- ARTIFICIAL INTELLIGENCE (Elective-2)

UNIT- I

AI History and Applications: Defining AI: Acting Humanly (Turing Test Approach), Thinking Humanly (Cognitive Modeling Approach), Thinking Rationally (laws of thought approach), Acting Rationally (Rational Agent Approach); Foundations of Artificial Intelligence; History of AI, AI techniques, Expert Systems.

UNIT –II

Problem Solving by Search: Defining the problem as a State Space Search Strategies: Breadth – first Search, Depth- first search, Depth limited search, Iterative Depending depth first search. Heuristic Search Techniques: Hill Climbing, Simulated Annealing, Best First Search: OR Graphs, Heuristic Functions, A* Algorithm, AND –OR graphs, AO* Algorithm.

UNIT- III

Knowledge Representation: Representations and mappings, Approaches to knowledge Representation, Procedural versus Declarative knowledge; Predictive Logic: Representing Simple facts, Instance and Isa relationships in Logic, Proposition versus Predicate Logic, Computable Functions and Predicates- not, Rules of Inferences and Resolution-not, Forward versus Backward Reasoning, Logic Programming and Horn Clauses. Weak slot and Filler Structure: Semantic Nets, Frames. Strong slot Filler Structures: Conceptual Dependency, scripts.

UNIT –IV

AI Programming Languages (PROLOG): Introduction, How Prolog works, Backtracking, CUT and FAIL operators, Built –in Goals, Lists, Search in Prolog.

UNIT- V

Connectionist Models / ANN: Foundations for Connectionist Networks, Biological Inspiration; Different Architectures and output functions: Feed forward, Feedback, Recurrent Networks, step, Sigmoid and different functions.

TEXT BOOKS:
1. Stuart Russel and Peter Norvig: Artificial Intelligence – A Modern Approach, 2nd Edition Pearson Education
2. N.P. padhy: Artificial Intelligence and Intelligent Systems, Oxford Higher Education, Oxford University Press

REFERENCES:
1. George F Luger: Artificial Intelligence- Structures and Strategies for complex Problem Solving, 4th Ed. Pearson Education
2. Ivan Bratko: PROLOG Programming 2nd Ed., Pearson Education

MCA 402- NETWORK SECURITY & CRYPTOGRAPHY (Elective-2)

UNIT-I

Basics of Cryptography: Terminologies used in Cryptography; Substitution Techniques – The Caesar Cipher, One-Time Pads, The Vernam Cipher, Book Cipher; Transposition Techniques –Encipherment /Decipherment Complexity, Diagrams, Trigrams, and Other Patterns.

UNIT-II

Encryption and Decryption: Characteristics of Good Encryption Technique; Properties of Trustworthy Encryption Systems; Types of Encryption Systems – Based on Key, Based on Block; Confusion and Diffusion; Cryptanalysis.

UNIT-III

Symmetric Key Encryption: Data Encryption Standard (DES) Algorithm – Overview of the DES Algorithm; Double and Triple DES – Double DES, Triple DES; Security of the DES; Advanced Encryption Standard (AES) Algorithm – Overview of Rijndael, Strength of the Algorithm; DES and AES Comparison.

UNIT-IV

Public Key Encryption: Characteristics of Public Key System; RSA Technique – Encryption-Method; Key Exchange; Diffie-Hellman Scheme; Cryptographic Hash Functions; Digital Signature – Properties of Digital Signature, Public Key Protocol; Certificates; Certificate Authorities.

Network Security: Network Concepts; Threats in Networks – Who Attacks Networks? Threats in Transit: Eavesdropping and Wiretapping, Protocol Flaws, Impersonation; Network Security Controls – Architecture, Encryption, Virtual Private Networks, Public Key Infrastructure (PKI) and Certificates.

UNIT-V

Web Security: Web Security Requirements; Secure Socket Layer (SSL) – SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) – Features, Components, Dual Signature, Purchase Request.

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security, 6 th Edition, Pearson Education, March 2013.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002.

REFERENCES:

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill,2007.
2. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications,2003.
3. Charles Pfleeger, "Security in Computing", 4th Edition, Prentice Hall of India,2006.
4. Ulysess Black, "Internet Security Protocols", Pearson Education Asia,2000.