UNIVERSITY CENTRE FOR DISTANCE LEARNING
CHAUDHARY DEVI LAL UNIVERSITY, SIRSA

Scheme of Examination for Master of Computer Applications (MCA)

under Choice Based Credit System

MCA SEMESTER-I

Course No.	Course Title	Credit	Int.	Ext.	Total
MCA-11	Fundamentals of Computer	4	30	70	100
MCA-12	C Programming	4	30	70	100
MCA-13	Computer Organisation	4	30	70	100
MCA-14	Software Engineering	4	30	70	100
MCA-15	Computer Oriented Numerical Methods	4	30	70	100
MCA-16	Software Laboratory (Based on MCA-12)	3	25	50	75
MCA-17	Software Laboratory (Productivity Tools)	3	25	50	75
MCA-18	Seminar	2	50	-	50
Total		**28**			**700**

MCA SEMESTER –II

Course No.	Course Title	Credit	Int.	Ext.	Total
MCA-21	C++ Programming	4	30	70	100
MCA-22	Data Structures Using C++	4	30	70	100
MCA-23	Database Systems	4	30	70	100
MCA-24	Operating Systems	4	30	70	100
MCA-25	Discrete Mathematical Structures	4	30	70	100
MCA-26	Software Laboratory (Based on MCA-22)	3	25	50	75
MCA-27	Software Laboratory (Based on MCA-23)	3	25	50	75
MCA-28	Seminar	2	50	-	50
Total		28			**700**

Note: During the first 5 semesters (semester I to semester V), students have to earn a total of 17 credits from Open Elective courses offered by various departments of the university. In each of the first five semesters of MCA the students will have register for and earn a minimum of 2 credits and a maximum of 6 credits.

Total Course Credits   -   160

Total Core Courses Credits - **115**
Total Elective Courses Credits - **45**
Open Elective Course Credits - **16**

MCA SEMESTER-III

Course No.	Course Title	Credit	Int.	Ext.	Total
MCA-31	System Simulation	4	30	70	100
MCA-32	Computer Networks	4	30	70	100
MCA-33	Elective-I	4	30	70	100
MCA-34	Elective-II	4	30	70	100
MCA-35	Elective-III	4	30	70	100
MCA-36	Software Laboratory Based on Elective-I	3	25	50	75
MCA-37	Software Laboratory Based on - 31	3	25	50	75
MCA-38	Seminar	2	50	-	50
Total		**28**			**700**

Elective-I
   i.   Core Java
   ii.   VB.Net
   iii. Fuzzy Logic

Elective-II
   i.   Computer Architecture and Parallel Processing
   ii.   Principles of Programming Languages
   iii. Management Information System

Elective-III
   i.   High Speed Network
   ii.   Data Mining and Warehousing
   iii. Microprocessor & Interfaces

MCA SEMESTER –IV

Course No.	Course Title	Credit	Int.	Ext.	Total
MCA-41	Computer Graphics and Multimedia	4	30	70	100
MCA-42	Theory of Computation	4	30	70	100
MCA-43	Elective-I	4	30	70	100
MCA-44	Elective-II	4	30	70	100
MCA-45	Elective-III	4	30	70	100
MCA-46	Software Laboratory Based on Elective-I	3	25	50	75
MCA-47	Software Laboratory (Based on 41)	3	25	50	75
MCA-48	Seminar	2	50	-	50
Total		28			**700**

Elective-I

1. Advanced Java-I
2. Programming in C#
3. Neural Network

Elective-II

1. Computer Oriented Optimization Techniques
2. Linux and Shell Programming
3. Software Project Management

Elective-III

1. Wireless Network
2. Digital Image Processing
3. E-Commerce

MCA SEMESTER-V

Course No.	Course Title	Credit	Int.	Ext.	Total
MCA-51	Web Engineering	4	30	70	100
MCA-52	Information Security	4	30	70	100
MCA-53	Elective-I	4	30	70	100
MCA-54	Elective-II	4	30	70	100
MCA-55	Elective-III	4	30	70	100
MCA-56	Software Lab-I Based on Elective-I	3	25	50	75
MCA-57	Software Lab-II (Based on 51)	3	25	50	75
MCA-58	Seminar	2	50	-	50
Total		**28**			**700**

Elective-I

i. Advanced Java-II
ii. ASP.Net
iii. Genetic Algorithm

Elective-II

i. Digital Electronics
ii. Artificial Intelligence
iii. Software Testing & Quality Assurance

Elective-III

i. Embedded System
ii. Compiler Construction
iii. Cloud Computing

MCA SEMESTER - VI

MCA-61	L/T	P	Credit	Int	Ext	Total
Project	**02**	**-**	**20**	**100**	**400**	**500**

SYLLABUS

MCA-11: Fundamentals of Computer

L/T - 4

Total Credits – 4
Internal - 30 Marks
External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Introduction: Characteristics of Computers, The Evolution of Computers, The Computer's generations, Basic Computer Organization: Input Unit, Output unit, Storage unit, Arithmetic unit, Control unit, Central processing unit, The System concept, Number Systems: Non positional number system, positional number system, number system conversion, fractional number, Computer Codes: BCD Code, EBCDIC code, ASCII, Collating Sequence, Binary Arithmetic: Addition, Subtraction, Multiplication, Division.

Unit-II

Boolean Algebra and Logic Circuits: Boolean Algebra, Boolean Function. Logic Gates, Logic Circuits, Design of Combinational Circuit, processor and memory, Secondary Storage Devices: Sequential and Direct Access Devices, Punched Paper Tape, Magnetic Tape, Magnetic Disk, Floppy Disk, Winchester Disk, Magnetic Drum, Mass Storage, Optical Disk, Magnetic Bubble Memory, Storage Hierarchy, Input-Output Devices: Punched Hole Devices, Magnetic media devices, printers, keyboard devices, Scanners, Other devices, Offline Data Entry Devices.

Unit-III

Computer Software: Introduction, Relationship between Hardware and Software, Types of Software, Acquiring Software, Planning the Computer Program: Purpose of Program Planning, Algorithm, Flowcharts, Decision Tables, Pseudocodes, Application Software Packages, Data Communications and Computer Networks: Introduction, Data Transmission Modes, Data Transmission Speed, Transmission Media, Digital and Analog Transmission, Communication Processors, The Internet, Multimedia.

Unit-IV

Computer Languages: Analogy with Natural Language, Machine Language, Assembly Language, High Level Language, Compilers, Interpreters, Characteristics of good Language, Subroutine. System Implementation and Operation: Testing and Debugging, Documentation, Changeover to new system, System Evaluation, System Maintenance, Operating Systems: Introduction, Functions, Evolution, Batch Processing, Job Control Language, Spooling, Multiprogramming, Time Sharing, On-Line Processing, Real-Time Processing, Virtual Storage.

References:

Pradeep k. Sinha&PritiSinha, Computer Fundamentals, BPB Publications

- Rajaraman V, Fundamentals of Computers, PHI

MCA – 12   C Programming
L/T - 4   **Total Credits – 4**

Internal - 30 Marks

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Elements of C: C character set, identifiers & keywords, data types: declaration & definition.
Operators: Arithmetic relational, logical, bitwise, unary, assignment and conditional operators &their hierarchy & associativity, Data input/output.

Unit-II
Control statements: Sequencing, Selection: if and switch statement; iteration, Repetition: for, while, and do-while loop; break, continue, goto

Unit-III
Functions: Definition, prototype, passing parameters, recursion, Data structure: arrays, structures, union, string, data files.

Unit-IV
Pointers:Delectation, operations on pointers, array of pointers, pointers to arrays.
References:
- Jeri R. Hanly&ElliotP.Koffman, Problem Solving &Program Design in .C. 3rd Ed., Addison Wesley, 2000.
- All Kelley, Ira Pohl, A Book on C, Programing in C, 4th Ed.,AddisonWestley, 2000.
- YashwantKanetker, Let us C, BPV Publications.
- Gottfried, Programming with C, Tata McGraw Hill.

MCA -13   Computer Organisation
L/T - 4   **Total Credits – 4**

Internal - 30 Marks

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Information Representation: Number systems, BCD codes, character codes, error detecting and correcting codes, fixed-point and floating point representation, Binary arithmetic operation, Booths multiplication.

Unit-II
Binary logic: Boolean algebra, Boolean functions, truth table, canonical and standard forms, simplification of Boolean functions, digital logic gates.Combinational logic: Design procedure, adders, subtractors, encoder,decoder, multiplexer, demultiplexer& comparators.

Unit-III

Memory system: Memory parameters, semiconductor RAMs, ROMs, magnetic & optical storage devices.

CPU organisation: Processor organisation, Machine instructions, instruction cycles, instruction formats and addressing modes, microprogramming concepts, microprocessor sequence

Unit-IV

Sequential logic: Flip flops, shift registers and counters.

I/O Oraganisation: I/O interface, interrupt structure, transfer of information between CPU/memory & I/O devices, and IOPs.

References:

- Mano. M. Morris Digital Logic & Computer systems Design, Prentice hall of India Pvt. Ltd., 2000.
- Rajaraman, V., Radhakrishanan, T., An Introduction to digital computer design , Prentice hall of India Pvt. Ltd.,4th Ed.
- Hayes. J.P., Computer architecture and oragination, McGraw Hill 1998,Third Ed..
- Heuring, V.P., Jorden, H.F., Computer Systems Design & Architecture, Addition Wesley, 2000.

MCA-14   Software Engineering

L/T - 4   **Total Credits – 4**

Internal - 30 Marks

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Software and software engineering, Software characteristics, software crisis, software engineering paradigms, Planning and software project, Software cost estimation , project scheduling, personnel planning, team structure.

Unit-II

Software configuration management, quality assurance, project monitoring, risk management.

Software requirement analysis - structured analysis, object oriented analysis and data modeling, software requirement specification, validation.

Unit-III

Design and implementation of software - software design fundamentals, design methodology (structured design and object oriented design), design verification, monitoring and control, coding.

Software Reliability - metric and specification, fault avoidance and tolerance, exception handling, defensive programming.

Unit-IV

Testing - Testing fundamentals, white box and black box testing, software testing strategies: unit testing, integration testing, validation testing, system testing, debugging.

Software maintenance - maintenance characteristics, maintainability, maintenance tasks, maintenance side effects. CASE tools.

References:

- Pressman S. Roger, Software Engineering, Tata McGraw-Hill.
- JalotePankaj, An integrated Approach to software, Engineering, NarosaPublishing House.
- Sommerville Ian, Software Engineering, 5th Ed., Addison Wesley-2000.
- Fairley Richard, Software Engineering Concept, Tata McGraw - Hill.

MCA-15 Computer Oriented Numerical and Statistical Methods Using C

L/T - 4   **Total Credits – 4**

Internal - 30 Marks

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question. **Unit-I**

Computer Arithmetic: Floating point representation of numbers, arithmetic operations with normalized floating point numbers and their consequences, Error in number representation - pitfalls in computing. Iterative Methods: Bisection, False position, Newton-Raphson methods, Discussion of convergence, Polynomial evaluation, Solving polynomial equations (Bairstow's Method)

Unit-II

Solving of Simultaneous Linear Equations and ordinary Differential Equation, Gauss elimination method, ILL - conditioned equations, Gauss-Seidal iterative method, Taylors series and Euler methods, Runge-kutta methods, Predicator methods.

Unit-III

Numerical Differentiation and Integration: Differentiation formulae based on polynomial fit, Pitfalls in differentiation, Trapezoidal, Simpson rules and Gaussian Quadrature.

Interpolation and Approximation: Polynomial interpolation, Difference tables, Inverse interpolation, Polynomial fitting and other curve fitting, Approximation of function by Taylor series and Chebyshev polynomials.

Unit-IV

Statistical methods: Sample distributions, Test of Significance, chi square, t and f test.

Analysis of Variance: Definition, Assumptions, Cochran's Theorem, One way classification, ANOVA Table, Two-way classification (with one observation per cell).

Time Series Analysis: Components and Analysis of Time Series, Measurement of Trend, Seasonal fluctuations and cyclic movement.

Reference:

- Gupta S.P. and Kapoor, V.K., Fundamentals of Applied station statistics, Sultan Chand & Sons, 1966.
- Gupta S.P. and Kapoor, V.K., Fundamentals of mathmatical statistics, Sultan Chand &Sons.
- Rajaraman V., Computer Oriented Numerical Methods, Prentice Hall, India.
- Graybill, Introduction to Statistics, McGraw.
- Anderson, Statistical Modeling, McGraw.

<p style="text-align:center">**MCA-21**   **Object Oriented Programming Using C++**</p>

L/T - 4   **Total Credits – 4**

    Internal - 30 Marks
    External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

<p style="text-align:center">**Unit-I**</p>

Object oriented concept: Data abstraction, encapsulation, classes and objects modularity, hierarchy, typing, concurrency, persistence, object oriented methodology: advantages and disadvantages of OO Methodologies, Modeling, domain analysis.

<p style="text-align:center">**Unit-II**</p>

OMT Methodology- object model, links and association, multiplicity, link attributes, role names, ordering qualification, aggregation, generalization and inheritance, abstract class, meta data, object diagram, dynamic model – events, states, scenarios, event traces, state diagram, functional model- data flow diagram, analysis, system design and object design.

<p style="text-align:center">**Unit-III**</p>

Programming in C++ : Data types, structuresvs classes, static data and member function, constant parameters and destruction, dynamic objects, operator overloading, function overloading, abstract class, virtual class.

<p style="text-align:center">**Unit-IV**</p>

Inheritance, virtual functions, Template functions & template classes, exception handling file stream classes, ASCII & Binary files, sequential & random access to a file.
References :

- Rumbaugh. J.et. al., Object oriented modeling and design, Prentice hall of India 1998.
- Booch Grady, object oriented analysis &design,addition Wesley 1994.
- Stroustrup, B., The C++ programming language, Addison –Wesley1993.
- Lippman, C++ primer 3e, Addison–Wesley.
- Balaguruswami, object oriented programming in C++ : Tata McGraw
- Schiltz, Herbert, C++: the complete reference 2e, Tata McGraw – hill 1998.

<p style="text-align:center">**MCA-22**   **Data Structural Using C++**</p>

L/T - 4   **Total Credits – 4**

    Internal - 30 Marks
    External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

<p style="text-align:center">**Unit-I**</p>

Introduction to Data Structure, Primitive and Composite, Arrays, Matrices, Sparse Matrices, String representation and manipulation.

Unit-II

Stack, Queue, Dequeue, Linked Lists, Dynamic memory management.

Unit-III

Trees, Binary trees,Threaded Binary tree, balanced tree, Different tree traversal algorithms.

Unit-IV

Representation of Graphs and Applications, searching and sorting techniques, Hashing.

References:

- Tanenbaum A.M., Langsam Y, Augenstien M.J., Data Structures using C & C++, Prentice Hall of India, 2002.
- Trembley, J.P. and Sorenson P.G., An Introduction to Data Structures with Applications, McGraw-Hill International Student Edition, New York (1984).
- Seymour Lipschutz, Data Structures, McGraw-Hill Book Company, Schaum's Outline series, New York (1986).

MCA-23   Database   Systems

L/T - 4   Total Credits – 4

Internal - 30 Marks
External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Basic Concepts: A Historical perspective, File System vs. DBMS, characteristics of the Data Base Approach, Abstraction and Data Integration, Database users, Advantages and Disadvantages of a DBMS, Implication of Data Base approach.Data Base System concepts and Architecture: Data Models, Schemas and Instances, DBMS architecture and Data Independence Data Base languages & Interfaces, DBMS functions and component modules.

Unit-II

Entity Relationship Model: Entity Types, Entity Sets, Attributes & Keys, Relationships, Relationships Types, Roles and Structural Constraints, Design issues, weak entity types, E-R Diagrams. Design of an E-R Data Base Schema, Reduction of an E-R Schema to Tables, The Unified Modeling Language (UML), Relational Data Model: Relational Model concepts, Integrity constraints over Relations, Relational Algebra – Basic operations.

Unit-III

SQL: Data Definition, constraints, & Schema changes in SQL, Insert, Delete & update statements in SQL, view in SQL, specifying constraints and Indexes in SQL, Queries in SQL.A Relational Data Base Management System : ORACLE – A Historical perspective, Basic Structure, Data Base Structure and its manipulation in ORACLE, Storage Organization in ORACLE Programming ORACLE Applications.

Conventional Data Models: An overview of Network and Hierarchical Data Models.Relational Data Base Design: Functional Dependencies, Decomposition, Desirable properties of decomposition, normal forms based on primary keys (1 NF, 2 NF, 3 NF and BC NF), Practical Data Base Design: Role of Information systems in organizations, Data Base Design process, physical Data Base Design in Relational Data bases.

Unit-IV

Transaction Processing concepts : Introduction to Transaction Processing, Transaction & System Concepts, Properties of Transaction, Schemes and Recoverability, Serializability of Schedules, Concurrency Control Techniques: Locking Techniques, Time stamp ordering, Multiversion Techniques, Optimistic Techniques Granularity of Data Items, Recovery Techniques: Recovery concepts, recovery Techniques in centralized DBMS, Data Base Security: Introduction to Data Base Security issues.

Reference:

- Elmasri&Navathe : Fundamentals of Database System, 3rd Edition, Addison Wesley, New Delhi.
- Korth&Silberschatz: Database System Concept, 4th Edition, McGraw Hill International Edition.
- Raghu Ramakrishnan& Johannes Gohrke: Database Management system, 2nd Edition, McGraw Hill International Edition.
- C.J.Date: An Introduction to Database System 7th Edition, Addison Western New Delhi.
- Abbey Abramson & Cory: ORACLE SI-A Beginner's Guide Tata McGraw Hill Publishing Company Ltd.

MCA-24 Operating Systems

L/T - 4   **Total Credits – 4**

Internal - 30 Marks

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Introductory Concepts: Operating system functions and characteristics historical evolution of operating systems, Real time systems, Distributed systems, Mythologies for implementation of O/S service system calls, system programs, interrupt mechanisms, File Systems: Function of the systems, File access and allocation methods, Directory systems: Structured Organizations, directory and file protection mechanisms, implementation issues: hierarchy of file and device management.

Unit-II

CPU scheduling: Levels of scheduling, comparative study of scheduling algorithms, Multiple processor scheduling, Case studies: Comparative study of DOS, WINDOW, UNIX & LINUX System, Protection: Goals of protection, mechanisms & policies implementation dynamic protection structures, revocation protection schemes in UNIX/MULTICS.

Unit-III

Storage Management: Storage allocation Methods: Single contiguous allocation, multiple contiguous allocations, Paging: Segmentation combination of Paging and segmentation, Virtual memory concepts, Demand Paging, Page Replacement Algorithms, Thrashing, Hardware Management: Hardware organization, Device Schedule Policies.

Unit-IV

Deadlocks: Deadlock characterization, Deadlock Prevention and avoidance, Deadlock detection and recovery, practical considerations, Concurrent Processes: Critical section problem, Semaphores, classical process co-ordination problems and their solutions, Inter process communication.

Reference:

- Peterson, J.L. &Silberschatz, A, Operating System concept, Addison Wesley reading.
- Brinsh, Hansen, Operating System Principles, Prentice Hall of Indio a.
- Hageman, A.N., Introducing to Operation System Design Galgotia Publication, New Delhi.
- Tanenbaum, A.S., Operating system.
- Hansen P.B., Architecture Concurrent Programs, PHI.
- Shaw, A.C., Logic design of Operating Systems, PHI.
- Deitel, H.M., Operating System, John Wiley/Addison Wesley.

<center>

MCA-25   Discrete Mathematical Structures

L/T - 4   Total Credits – 4
</center>

Internal - 30 Marks
External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Group And Subgroups: Group axioms, Permutation groups, Subgroups, Co-sets, Normal subgroups,Semigroups, FREE Semi-groups, Applications, modular arithmetic, error correcting codes, grammars , language, Finite State Machine.

Unit-II

Graphs: Directed and undirected graphs, chains , Circuits , Paths, Cycles, connectivity, Adjacency &incidence matrices, Minima's path Application (Flow charts and state transition graphs, algorithms for determining cycle and minimal paths, polish notations and trees, flows in network).

Unit-III

Lattice; and Boolean algebra: Relational to Partial ordering, Lattices andHasse diagram, Axiomatic definition of boolean algebra as algebraic structures with two operations basic results truth values and truth tables. Algebra of propositional function. The Boolean algebra of truth values, Application (Switching circuits, Gate circuits).

Unit-IV

Finite Fields: Definition Representation, Structure, Internal domain Irreducible polynomial, Polynomial roots, splitting field.

References:

- Alan Doerr, Kenneth Levaseur, Applied Discrete Structures for Computer Science,Galgotia publication pvt.ltd.

- Seymour Lipschutz, Marc Lars Lipson, Discrete mathematics, McGraw-Hill international editions, Schaum's series.
- Bernard Kolman, Robert C.Busbym, Discrete Mathematical structures for computer science, Prentice-Hall of India pvt. ltd.
- KennechG.Rosen: Discretemathematics and its applications, McGraw-Hill internal editions, Mathematics series.

MCA-31 SYSTEM SIMULATION

L/T - 4   **Total Credits – 4**
  Internal - 30 Marks
  External – 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT - 1
Systems, modeling, general systems theory, Concept of simulation, Simulation as a decision making tool, types of simulation, steps in simulation study, advantages/disadvantages of a simulation study.

UNIT - 2
Selecting input probability distribution, pseudo random numbers, methods of generating random variables, discrete and continuous distributions, testing of random numbers, simulation software,simulation of single server system, simulation of two server system.

UNIT - 3
Problem formulation, data collection and reduction, assessing sample independence, time flow mechanism, key variables, logic flow chart, starting condition, run size, experimental design consideration, output analysis and validation, Basic concept of queuing theory, general queuing systems

UNIT - 4
Comparison and selection of simulation languages,.GPSS, SIMSCRIPT, SIMULA, Factors in selection of discrete system simulation languages.Simulation of computer systems

References:
1. Geoffrey Gordon, "System Simulation", 2nd Edition, Prentice Hall, India, 2002.
2. NarsinghDeo, "System Simulation with Digital Computer, "Prentice Hall, India, 2001.
3. Jerry Banks and John S.Carson, Barry L. Nelson, David M.Nicol, "Discrete Event System Simulation", 3rd Edition, Prentice Hall, India, 2002.
4. Shannon, R.E. Systems simulation, The art and science, Prentice Hall, 1975.
5. Thomas J. Schriber, Simulation using GPSS, John Wiley, 1991.

L/T - 4   **Total Credits – 4**
      Internal - 30 Marks
      External – 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Network Concepts : Goals and applications of computer Networks; Topologies; Categories of Networks - LAN, MAN, WAN Internet works; point-to point, and broadcast networks.
Networks architecture: Concepts of protocols & services; OSI model and functions of its layers; TCP/IP reference model. TCP/IP: Elements of Transport Protocols; Transmission Control Protocol (TCP); user datagram protocol (UDP); Internet Protocol (IP).

Unit-II
Data communication concepts: Components of a data communication system; transmission modes; transmission media – guided and wireless media; introduction to switching (circuit, message and packet) and multiplexing (frequency division and time division); concept of Modems. Introduction to SMDS, X:25, Networks ISDN, frame relay and ATM networks.

Unit III
Framing and Error control: Framing techniques; Error control-error detection & correction.
Data Link Control: Acknowledgments, sliding Window protocols. Multiple Access Control, Flow and Error Control, , token bus, token ring, DQDB

Unit-IV
Routing: Deterministic and Adaptive routing; Centralized and distributed routing; shortest-path; flooding; flow based; optimal; distance vector, link-state, hierarchical; routing for mobile hosts; broadcast and multicast routing.
Congestion Control: Principles of congestion control; Traffic Shaping; Choke packets; load shading; RSVP.

Reference:
- Andrews, Tananbaum,*Computer Networks*– PHI.
- Fred Halsall, Addison Wesley, *Data Communications, Computer Networks and Open Systems*, fourth edition.
- Behrouz, Frozen, *Introduction to Data Communications and Networking*- Tata MC-Graw Hill.
- William Stalling, *Data and Computer Communications*, 5ᵗʰ edition-, PHI.

MCA-33(i) Core Java
L/T - 4   **Total Credits – 4**
      Internal - 30 Marks
      External – 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus.

A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
JAVA and the Internet; The Java Programming Language and its characteristics, Java compiler, JVM, JRE,JDK, running Java applications, Java on Linux platform. Data types, scalar data types, operators & expressions, control structures.

Unit-II
Class, Command line arguments, Static initializer, objects & methods, constructors, finalizer, polymorphism, inner classes, garbage collection, visibility controls, Array, String & Vectors, Inheritance, interfaces, package(Introduction to packages provided by JVM) .

Unit-III
String Handling: Learning String operation, Character Extraction, String comparison, StringBuffer class, StringBuilder class, Immutable class. Exception handling: defining and throwing exceptions, creating your own exceptions.

Unit-IV
Input/Output: streams, byte and character stream, the class Print stream, data streams String Tokenizes class, stream tokenizes. Delegation event model, Event classes, Event Listeners, AWT classes, AWT controls Layout Managers. Applet Basic, Architecture, HTML Applet Tags.

Reference:
- Dongles E.Comet, *Compiler Networks &Internet*, 2nd edition, Addison Wesley.
- Darrel Ince& Adam Freeman, *Programming the Internet with Java*, revised edition-, Addison Wesley.
- E.Balaguruswamy,*Programming with Java –2nd Edition, TNH
- Herbert Schildt, *The complete reference Java 2*
- Mug Hal K.A., Rasmussen R.W., Addison Wesley, *A Programmer's guide to Java certification*

MCA-33(ii)VB.NET

L/T - 4   **Total Credits – 4**
        Internal - 30 Marks
        External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Visual Basic .NET and the .NET Framework.
Introduction to .net framework -Features, Common Language Runtime (CLR) ,Framework Class Library(FCL).Visual Studio.Net – IDE, Languages Supported, Components.Visual Programming, VB.net- Features, Toolbars,Code Designer,Toolbox, Class View Window, Properties Window, Output Window, Command Window.
Elements of Visual Basic .net

Properties, Events and Methods of Form, Label, TextBox, ListBox, Combo Box, RadioButton, Button, Check Box, Progress Bar, Date Time Picker, Calendar, Picture Box, HScrollbar, VScrollBar, Group Box, ToolTip, Timer.

Unit-II
Programming in Visual basic .net
Data Types, Keywords, Declaring Variables and Constants, Operators, Understanding Scope and accessibility of variables, Conditional Statements- If- Then, If-Then-Else, Nested If, Select Case, Looping Statement- Do loop, For Loop, For Each-Next Loop, While Loop, Arrays- Static and Dynamic.

Unit-III
Functions, Built-In Dialog Boxes, Menus and Toolbar
Menus and toolbars- Menu Strip, Tool Strip, Status Strip, Built-In Dialog Boxes –Open File Dialogs, Save File Dialogs, Font Dialogs, Color Dialogs, Print Dialogs, InputBox, Msg Box, Interfacing With End user- Creating MDI Parent and Child, Functionsand Procedures- Built-In Functions- Mathematical and String Functions, User DefinedFunctions and Procedures.

Unit-IV
Advanced Concepts in VB.Net
Object Oriented Programming- Creating Classes , Objects, Fields, Properties,Methods, Events , Constructors and destructors, Exception Handling- Models,Statements, File Handling- Using File Stream Class, File Mode, File Share, FileAccess Enumerations, Opening or Creating Files with File Stream Class, Reading andWriting Text using StreamReader and StreamWriter Classes, Data Access withADO.Net – What are Databases?

Text Books:
- Steven Holzner, *Visual Basic.Net Black Book* by Dreamtech Press
- Jeffery R. Shapiro Tata McGraw Hills, *The Complete Reference Visual Basic .NET*
- Anne Bohem, Murach's Beginning Visual basic .Net

MCA-33 (iii)
Fuzzy Logic
L/T - 4   **Total Credits – 4**
    Internal - 30 Marks
    External – 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Introduction to Fuzzy Logic, Classical and fuzzy sets : Overview of classical sets, Membership function,
Fuzzy rule generation. Operations on Fuzzy sets : compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Unit-II
Fuzzy systems and applications: fuzzy sets; fuzzy reasoning; fuzzy inference systems; fuzzy control;

fuzzy clustering; applications of fuzzy systems. Neuro-fuzzy systems: neuro-fuzzy modeling; neuro-fuzzy control.

Unit-III

Fuzzy Arithmetic : Fuzzy Number Linguistic variables, Arithmetic Operations on intervals &Numbers, Lattice on Fuzzy Numbers, Fuzzy equations.

Fuzzy Logic : Classical logic, Multivalued logic, Fuzzy propositions, Fuzzy qualifiers, linguistic hedges.

Uncertainty based information : Information & Uncertainty, Non-specificity of Fuzzy & crisp sets, Fuzziness of Fuzzy sets.

Unit-IV

Fuzzy logic and Boolean logic: Definition, Difference between Boolean and Fuzzy logic; fuzzy expert system, Inference process for fuzzy expert system, fuzzy controller.

Uncertainty based information: Information & Uncertainty, Non-specificity of Fuzzy & crisp sets, Fuzziness of Fuzzy sets, Probability in Fuzzy system

Fuzzy deductions in fuzzy modelling,generalised modus ponens and modus tollens. Mamdani inference method and composition rule.

Refrences:

- J.Klir and George *"Fuzzy sets and Fuzzy logic"*, PHI
- M. Mitchell: *An Introduction to Genetic Algorithms*, Prentice-Hall.
- J.S.R.Jang, C.T.Sun and E.Mizutani: *Neuro-Fuzzy and Soft Computing*, PHI, Pearson Education.
- Timothy J.Ross*: Fuzzy Logic with Engineering Applications*, McGraw-Hill.
- Davis E.Goldberg: *Genetic Algorithms: Search, Optimization and Machine Learning*, AddisonWesley.
- S. Rajasekaran and G.A.V.Pai: *Neural Networks, Fuzzy Logic and Genetic Algorithms*, PHI.
- David E Goldberg: *Genetic Algorithms in Search, Optimization & Machine Learning*, Addison Wesley.

MCA -34(i)COMPUTER ARCHITECTURE & PARALLEL PROCESSING

L/T - 4   **Total Credits – 4**
Internal - 30 Marks
External - 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Fundamentals: Computational model, Evolution of computer architecture, process thread, concurrent and parallel execution, types and levels of parallelism, classifications of parallel architectures, Relationships between languages and parallel architectures.

Unit-II

Instruction-Level, Parallel Processors: Dependencies between instructions. Principles of Pipelined instruction processing, synchronous & asynchronous pipelining. Linear Pipeline-

clocking and timing control, speedup efficiency & throughput. Non linear pipeline- reservation table, latency analysis: collision free scheduling, internal data forwarding.

Unit-III
Superscalar pipeline design- structure data dependencies pipeline stalling, in order issue, out of order issue VLIW architecture. Branch handling delayed handling, branch processing multiway branching, guarded execution, code scheduling basis, block scheduling, loop scheduling, global scheduling.
Memory Hierarchy Technology: Inclusion, coherence and locality, virtual memory models, TLB, paging and segmentation, memory replacement policies, cache addressing models, cache performance issues, interleaved memory organization.

Unit-IV
Shared-memory MIMD architectures: Dynamic interconnection networks-Shared path, switching networks- crossbar & multistage networks. Cache coherence problem, Hardware based cache coherence protocol-Snoopy cache protocol directory scheme, scalable coherent interface, and hierarchical cache coherence protocol. UMA, NUMA, CC-NUMA and COMA multiprocessors.

Reference:
- Sima, D. et al., *Advanced Computer Architecture*, Addison Wesley
- Wang, kai, *Advanced Computer Architecture*, McGraw Hill, International Ed.
- Wang kai, Brings Faye A., *Computer Architecture and Parallel Processing*, McGraw Hill, International Ed.
- Main, Richard Ya, *Advanced Computer Architecture*, PHI,

MCA-34(ii) PRINCIPLES OF PROGRAMMING LANGUAGES
L/T - 4   **Total Credits – 4**
> **Internal - 30 Marks**
> **External – 70 Marks**

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Preliminaries- language paradise, language criteria, language design trade-offs, influences on language design, bindings, type checking, and scopes, variables and data type: primitive data types, variables, structures data types: abstraction, control abstraction, procedural abstraction.

Unit-II
Formal languages and automata- The Chomsky hierarchy of formal languages, regular: grammar: regular expressions, finite automata, context-free grammar: pushdown automata, ambiguous grammars
Imperative programming- structured programming, procedure activation: parameter passing methods, scope rules, activation record.

Unit-III
Object oriented programming- messages methods and encapsulation, classes and polymorphism, inheritance and object orientation, design issues for object oriented languages.
Functional programming- Features of functional languages, implementing functional languages, application of functional languages.

Unit-IV

Logic programming-formal logical systems, implementations and applications.Languages for databases- manipulating relational databases using SQL, Language constructs for parallel processing- the paradigm, multiple processes, synchronization of cooperating processes.

Reference:

- Sebessa W. Robert, *Concepts of programming languages*, Addison Wesley
- Appleby Doris &VandeKopple J. Julius, *Programming language- paradigm and practice,* Addison Wesley.
- Sethi Ravi, *Programming languages,* Addison Wesley
-

MCA-34(iii) MANAGEMENT INFORMATION SYSTEM

L/T - 4 **Total Credits – 4**

Internal - 30 Marks

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Introduction to Management Information System

Background, Meaning, Nature, Need, Role, Importance, Problem, Solutions, Requirements, Myths regarding MIS, Fundamentals of information, Framework of information system, Process of management: Planning, organizing, directing, controlling, staffing, Evolution of Management through information system, Relatedness of MIS with management activities.

Unit-2

Decision Making and MIS

Introduction to decision Making, Classification of managerial decisions, model for decision making, relatedness of MIS and decision Making, Concept of balance, MIS effectiveness and efficiency criteria.

Unit-3

Tools & Development of MIS

Introduction to tools, factors affecting selection of tools, developments tools for MIS, Traditional Tools, Case tools Architecture, principle for information system development, management information system development process, cross lifecycle activities.

Unit-4

Implementation, Evaluation and Maintenance of MIS

Implementation of MIS, methods of implementing MIS, implementations steps of MIS, evaluation of MIS, structure for evaluation of MIS, maintenance of MIS, Problems related to maintenance of MIS, Measure to overcome these problems.

Reference:

- Robess G. Mudrick, Coel E. Ross, James R. Claggett, *Information Systems for Modern Management*.

- James A. O'Brien, *Management Information Systems*.
- Terry Lucey, *Management Information Systems*, Ninth Edition, 2005, Thompson
- McNurlin, Sprague & Bui, *Information Systems Management in Practice*, Prentice Hall

MCA-35(i) High Speed Networks

L/T - 4   **Total Credits – 4**
Internal - 30 Marks
External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT-I
HIGH SPEED LAN
- **Gigabit Ethernet:** overview of fast Ethernet, IEEE 802.3z standard, protocol architecture, network design using Gigabit Ethernet, applications, 10GB Ethernet.
- **Wireless Networks:** Existing &Emerging standards, Wireless LAN (802.11), Broadband Wireless (802.16), Bluetooth (802.15) their architecture, protocol stack and frame format. Mobile Networks
- **Fiber Channel:** Fiber channel characteristics, topology, ports, layered model, session management, flow control, addressing, SAN.
- **Ad-hoc networks.**

UNIT-II
HIGH SPEED WAN
- **Frame Relay:** Protocol architecture, frame format, routing.
- **ISDN & B-ISDN:** Channels, interfaces, addressing, protocol architecture, services.
- **ATM:** Virtual circuits, cell switching, reference model, traffic management.

UNIT-III
PERFORMANCE ANALYSIS &QoS IN COMPUTER NETWORKS
- **N/W analysis & modeling:** Probability and network queuing models (Little's theorem, M/M/1, M/M/m, M/M/∞, M/G/1), modeling network as a graph.
- Open queuing network (Jackson's Theorem) and closed queuing networks, managing network performance.
- **QOS Protocols:** Overview of QoS protocols (RSVP, RTP).

UNIT-IV
INTERNET SUITE OF PROTOCOLS
- **Internet Layer:** IPV4 and IPV6, IP addressing, ARP, IP routing (OSPF & BGP), internet multicasting, mobile IP.
- **Transport Layer:** UDP/TCP protocols & architecture, TCP connection management, wireless TCP.
- **Application Layer:** DNS, FTP, Voice over IP, audio & video compression.

References :
- TereParnell,*"Building high speed Networks",* TMH.
- William stalling *"High Speed Networks and Internets",* Pearson Education

MCA-35(ii) DATA MINING AND WAREHOUSING

L/T - 4   **Total Credits – 4**

Internal - 30 Marks

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Data Mining:Introduction: Motivation, Importance, data mining, kind of data, Functionalities, interesting patterns, classification of data mining system, Major issues, Data Mining Primitives.
Data Preparation: Preprocess, Data cleaning, Data Integration and transformation, Data reduction, Discritization and concept hierarchy generation.

Unit-II

Data warehouse and OLAP Technology for data mining: data warehouse, difference between operational data base systems and data warehouse, A Multidimensional Data Model, Architecture, Implementation, data warehousing to data mining, Data warehouse usage.

Unit-III

Association Rule Mining: Mining single-dimensional Boolean association rules from transactional databases, mining multilevel association rules from transaction databases, Mining multidimensional association rules from relational databases and data warehouses, From association mining to correlation analysis, constraint-based association Mining.

Unit-IV

Classification and prediction, issues, classification by decision induction, Bayesian classification, classification by back propagation, classification based on concepts from association rule mining other classification methods.Cluster Analysis: What is Cluster Analysis, Types of Data in Cluster Analysis, Applications and Trends in Data Mining.

Reference:
- Ale Berson, Stephen Smith, KorthTheorling, *Data Mining*,TMH.
- Adruaans, Longman,Addison-wesley*Data Mining,*
- Addison-wesley Longman, *Data Warehousing in the Real World.*
- Chanchal Singh, *Data Mining and Warehousing*, Wiley.
- John E, Herbert P,*Data Mining*.

MCA-35(iii) MICROPROCESSORS AND INTERFACES

L/T - 4   **Total Credits – 4**

Internal - 30 Marks
External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-1

Introduction to Microprocessor and Microcomputer: Historical Background, modern Microprocessors and Microcomputers, architectures of Pentium Processor, real and protected modes of operations, addressing modes and instruction set of Pentium processor, concept of RISC and CISC Microcomputer.

Unit-II

Input-Output Interfaces: Introduction to I/O interfaces, I/O mapped I/O and memory mapped I/O, basic Input interface and basic output interface, I/O port address decoding, 8/16/32-birt wide I/O ports, 82c55 PPI.

Unit-III

Memory Interface: Memory devices, address decoding, 8/16/32/64- bit memory interfaces.Interrupt: Structure: Basic Interrupt Processing, interrupt instructions of Pentium, operations of real and protected mode interrupts, 8259 PIC and its programming, expanding interrupt structure by ransacking 8259's.

Unit-IV

Direct Memory Access: DMA data transfer and basic DMA operations, 8237 DMA Controller, its programming.Bus Interface: The 8/16 – bit ISA bus and its interfacing with Input & Output Ports, PCI Bus, Parallel Printer Interface, USB. Accelerated Graphics Port (AGP)

Reference:
- Berry B. Brey, *The Intel Microprocessors: Architecture, Programming, and Interface*. (PHI).
- Liu and Gabson, *Microcomputer Systems: Architecture, Programming and Design,* (PHI).
- DV Hall, Microprocessors

MCA SEMESTER –IV

Course No.	Course Title	Credit	Int.	Ext.	Total
MCA-41	Computer Graphics and Multimedia	4	30	70	100
MCA-42	Theory of Computation	4	30	70	100
MCA-43	Elective-I	4	30	70	100
MCA-44	Elective-II	4	30	70	100
MCA-45	Elective-III	4	30	70	100
MCA-46	Software Laboratory Based on Elective-I	2.5	30	45	75
MCA-47	Software Laboratory (Based on 41)	2.5	30	45	75

MCA-48	Seminar	2	50	-	50
Total		27			**700**

Elective-I
1. Advanced Java-I
2. Programming in C#
3. Neural Network

Elective-II
1. Computer Oriented Optimization Techniques
2. Linux and Shell Programming
3. Software Project Management

Elective-III
1. Wireless Network
2. Digital Image Processing
3. E-Commerce

MCA-41 COMPUTER GRAPHICS AND MULTIMEDIA

L/T - 4   **Total Credits – 4**
        Internal - 30 Marks
        External – 70 Marks

Note: - Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Introduction: Survey of computer Graphics and its applications; Interactive and passive graphics; Introduction to GKS Primitives; display processors;
Graphic Devices: Display system-refresh CRTs, raster scan and random scan monitors Grey shades, Interlacing, beam penetration shadow mask monitors, lock up tables, plasma panel, LED and LCD Monitors, LCD Monitors, VGA and SVGA resolution; Hard copy Devices-printers, plotters

Unit-II
Drawing Geometry: Coordinate system; resolution; use of homogeneous coordinate system; scan conversion: symmetrical DDA, simple DDA, Bresenhams line drawing algorithm, generation of ellipse.
2-D Transformations: Translation; rotation; scaling; mirror reflection; shearing: Zooming; panning; input techniques-pointing, positioning, rubber and methods and dragging; tweezing.

Unit-III
Graphic operations: Clipping-line clipping using Sutherland-Cohen and midpoint: sub-division algorithm, polygon clipping; window and view port; windowing transformation; Filling-stack based fill algorithm
Multimedia: concepts of Hypertext/Hypermedia; multimedia applications; multimedia authoring; multimedia hardware; images; bitmaps; windows paint brush.

Unit-IV

3-D Graphics: 3D modeling of objects; 3D display techniques; coordinate system; 3D transformation matrices for translation, scaling and rotation; parallel projection; perspective projection; Hidden-surface removal – z- buffer, back face, scan-line, depth-sorting, area subdivision; shading- modeling light intensities, gourad shading, phong shading.

Reference:
- Donald Hearn, *Computer Graphics*, M.Pauline Baker, PHI.
- Newman &Sproull,*Principles of Interactive Computer Graphics*, McGraw Hill.
- John F. KoegelBufore, *Multimedia systems*, Addison Wesley.
- Foley, *Computer Graphics Principles & Practice*, Addison Wesley.
- Rogers, *Procedural elements of Computer Graphics*, McGraw Hill.
- D.P. Mukherjee, *Fundamentals of computer Graphics and Multimedia,* PHI.

MCA-42 THEORY OF COMPUTATION

L/T - 4   **Total Credits – 4**
          Internal - 30 Marks
External – 70 Marks
Note:- Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit- I

Regular sets and regular expressions; Deterministic and Non-Deterministic finite automata, equivalence of deterministic and non-deterministic finite acceptors, Kleen's characterization theory for sets accepted by finite automata, finite state machines, Regular grammar, State equivalence and state minimization of finite automata, Mealy and Moore Machine, Problem based on pumping lemma.

Unit-II

Pushdown Automata-Deterministic push-down and Non-deterministic push-down automata. Equivalence of Pushdown automata and CFL. Ambiguity, Introduction to compiler and phases. Closure properties of push-down automata.

Unit -III

Context Free Grammars and Languages, Derivations, Relationship between derivation and derivation trees, Simplification of CFG, Elimination of Useless symbols, Unit productions, Null productions, Chomsky normal form (CNF), Greibach normal form(GNF), Problems related to CNF and GNF.

Unit -IV

Linear bounded automata, Turing machine, Construction of Turing machine, other models of Turing machine-Multi tape Turing machine, Multidimensional Turing Machines, Halting problem, Chomsky hierarchy of languages.

Reference:
- KLP Mishra & N Chandrasekaran, *Theory of Computer Science: Automata, Languages and Automata*, PHI.
- Peter Linz, *An Introduction to Formal Languages and Automata*, Jones & Bartlett.

- Hop croft, J.E. & Ullman, J.D,*Formal Language and their relation to Automata*, Addison-Wesley.
- Zoha Mauna , *Mathematical theory of computation,* Wiley.
- John Minsky,*Mathematical theory of computation*, PHI.
- M.Greenberg, *Introduction to Automata Theory*, Addison Wesley.

MCA-43(i) Advance Java-I

L/T - 4   **Total Credits – 4**
Internal - 30 Marks
External – 70 Marks

Note:- Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Multi Thread Programming: Java Thread model, Creating a thread, Extended Thread and Implementing Runnable, Creating multiple thread and context switching, Synchronization: methods and statements, Inter thread communication, Dead lock.

Unit-II
Collection Framework: Collection Interface (list, set, Sorted set), Collection classes (Array List, Linked List, Hash set, Tree set), Access collection via Iterator, working with maps, comparators, collection algorithm, Date and time handling, i18n.

Unit-III
Networking: URL, Internet Address, Socket and Server Socket, Datagram Socket, Generics, Annotation, Static Import, For each, Multiple Exception handling, RMI: RMI architecture, Implementation, File uploading/ File downloading , Security.

Unit-IV
Database Programming: Queries, functions, stored procedures, view, JDBC drivers, Statements, Metadata, Result set, Batch updates, Row Sets, Transactions (commit, rollback, save point), getting data from excel, log file.

Reference:
- Dongles , *Compiler Networks & Internet*, 2nd edition , Addison Wesley.
- Darrel Ince& Adam Freeman, *Programming the Internet with Java*, Addison Wesley, 2000.
- E.Balaguruswami*, Programming with Java*, Tata MacGraw Hill.
- Herbert Schildt, *The complete reference Java,* Tata MacGraw Hill.
- K.A. Mug Hal, R.W. Rasmussen, *Programmer's guide to Java certification*, Addison Wesley.

MCA-43(ii) PROGRAMMING IN C

L/T - 4   **Total Credits – 4**
   Internal - 30 Marks
External – 70 Marks
Note: - Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Introduction: C # environment, characteristics of C #.
Data types: Data types, value types, reference types, default value, constants variables, scope of variables, boxing and unboxing.

Unit-II
Operators and expressions: Arithmetic, relational, logical, bitwise, special operators, evolution of expressions, operator precedence & associativity. Control constructs: Decision making, loops. Array, Structure, Enums

Unit-III
Classes & methods: class, methods, constructors, destructors, overloading of operators & functions.
Inheritance & polymorphism: Visibility control, overriding, abstract class & methods, sealed classes & methods, interfaces.

Unit-IV
Advanced features of C #, Exception handling & error handling, File Input Output, Multi-threading.
Reference:
- E. Balaguruswamy, Programming *in C #*, Tata McGraw Hill.
- Herbert Schildt*, C #: A Beginner's Guide*, Tata McGraw Hill.

MCA-43(iii) Neural Network

L/T - 4   **Total Credits – 4**
   Internal - 30 Marks
   External – 70 Marks
Note:- Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Introduction: Concept of Neural Networks, Characteristics of Neural Networks, Historical perspective and application of Neural Networks.
Fundamental of Neural Networks: The Biological prototype, Neuron concept, Single layer Neural Networks, Multi-Layer Neural Networks, Terminology, Notation and representation of

Neural Networks, Training of Artificial Neural Networks, Representation of perceptron and issues, perceptron learning and training, classification, liner reparability.

Unit-II
Hopfield nets: Structure, training, and applications, stability
Back propagation: Concept, Applications, and Back Propagation Training Algorithms:
Counter Propagation Networks: Kohonan Network, Grossberg Layer & Training, application of counter propagation, Image classification.

Unit-III
Bi-directional Associated for the Memories: Structure, retrieving a stored association, encoding associations, memory capacity.
ART: ART architecture, ART classification operation, ART implementation, and characteristics of ART.

Unit-IV
Optical Neural Networks: Vector Matrix Multipliers, Hop field net using Electro optical matrix multipliers, Holographic correlated, Optical Hopfield net using Volume Holograms.
The Cognitions and Neo-cognitrons: their structure and training.
Genetic Algorithms: Elements, a simple genetic algorithm, working of genetic algorithms evolving neural networks.

References:
- Alan C. Shaw, *Real-Time Systems and software*, Wiley & Sons Inc.

MCA-44 (i) COMPUTER ORIENTED OPTIMIZATION TECHNIQUES
L/T - 4   **Total Credits – 4**
      Internal - 30 Marks
      External – 70 Marks
Note:- Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Introduction : The historical development , Nature, meaning and management, Application of Operation Research, Modeling, It's principle and approximation of O.R.Models , Main characteristic and phases , Generation method of solving models , Scientific methods , scope , rule on decision making and development of operation research in India.

Unit-II
Linear Programming: Formulation, graphical solution, standard and matrix forms of linear programming problems, simplex method and its flow chart.

Duality: Introduction, definition, General rule for converting any primary into its dual, dual simplex method and its flow chart.

Unit-III

Integer Programming: Importance and application, Gomorg's all integer programming problem techniques, branch and bound method.

Queuing models: Introduction, Application, Characteristics waiting and idle time costs, transient and steady state, Notations, M/M/C, M/Ek/1 and deterministic models. (No mathematical derivations included).

Unit-IV

PERT & CPM: Basic steps in PERT &CPM, Forward and backward computations, Representation in Tabular forms, Slack and Critical path, difference between CPM & PERT , Float.

References:

- P.K.Gupta , Hira and D.S., *Operation Research* , Sultan Chand and Sons .
- KantiSwarup , P.K.Gupta&Man Mohan, *Operation research*, Sultan Chand and Sons .
- K.V. Mittal , *Optimization methods in operation research and system analysis* , New age international   LTD..
- S.S. Rao , *Optimization theory and application* , Wiley Eastern LTD..
- S.D.Sharma*, Operation research* , Kadar nath and ram nath , meerut,1996.
- H.A. Taha, *Operational research – An introduction,* McMillan Publishing Co..
- Baza*, Operational research & networking*, Wiley.
- Avieoal*, Optimization Techniques*.

MCA-44(ii) LINUX & SHELL PROGRAMMING

L/T - 4   **Total Credits – 4**

     Internal - 30 Marks

     External – 70 Marks

Note:- Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Linux Startup, Accounts, accessing Linux – starting and shutting processes, logging in and lagging out, command line, simple commands.

Unit-II

Linux file system: Linux/Unix files, inodes and structure and file system dated commands, shell as command processor, shell variables, creating command substitution, scripts, functions, conditionals, loops, customizing environment.

Unit-III

Registrar Expressions and Filters, Introducing regular expressions patterns, syntax, character classes, quantifiers, introduction to egrep, sed, programming with awk and perl.

Unit-IV

Processes in Linux: Process, starting and stopping processes, initialization Processes, to processes re and init files, job control – at, batch, cron, time, network files, security/. Privileges,

authentication, password administration, archiving, signals and signal handlers, Linux I/O system.

Reference:

- John Goerzen,*Linux Programming Bible*, IDG Books, New Delhi.
- Sumitabhadass,*Your Unix – The Ultimate Guide*, TMH.
- Aho, Hopcoft and Ullman, the *Design and Analysis of Computer Algorithms,* Addison Wesley.
- YaswantKanitkar, "*Unix Shell Programming", BPB Publication.*

MCA-44(iii) SOFTWARE PROJECT MANAGEMENT

L/T - 4   **Total Credits – 4**   **Internal - 30 Marks**

                                                 External – 70 Marks

Note: - Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Conventional Software Management. Evolution of software economics. Improving software economics: reducing product size, software processes, team effectiveness, automation through software environments.

Unit-II

Principles of modern software management, a software management process framework: Life cycle phases- inception, elaboration, construction and training phase. Artifacts of the process the artifact sets, management artifacts, engineering artifacts pragmatics artifacts model based software architectures.

Unit-III

Workflows of the process, Checkpoints of the process, Software management disciplines: Iterative process planning. Project organizations and responsibilities.

Unit-IV

Process automation. Project control and process instrumentation – core metrics, management indicators, life cycle expectations. Process discriminants.

Reference:

- Walker Royce, *Software Project management*, Addison Wesley.
- Maylor, *Project Management*, 2/e.
- Humphrey, *Managing the Software Process*.
- Ramesh, *Managing Global Software Projects*, THM.

MCA-45(i) Wireless Network

L/T - 4   **Total Credits – 4**

Internal - 30 Marks
External – 70 Marks
Note: - Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8

more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I

MULTIPLE RADIO ACCESS

Medium Access Alternatives: Fixed-Assignment for Voice Oriented Networks RandomAccess for Data Oriented Networks , Handoff and Roaming Support, Security andPrivacy.

UNIT II

WIRELESS WANS

First Generation Analog, Second Generation TDMA – GSM, Short Messaging Service inGSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems(WCDMA/CDMA 2000)

UNIT III

WIRELESS LANS

Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services,Physical Layer- MAC sublayer- MAC Management Sublayer, Other IEEE 802.11standards, HIPERLAN, WiMax standard

UNIT IV

ADHOC AND SENSOR NETWORKS

Characteristics of MANETs, Table-driven and Source-initiated On Demand routingprotocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routingprotocols. PERIODS Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture ofBluetooth Systems, Physical and MAC layer details, Standards.

Refrence:

- Vijay. K. Garg, *Wireless Communication and Networking*, Morgan KaufmannPublishers.
- KavethPahlavan, Prashant Krishnamurthy, *Principles of WirelessNetworks*,Pearson Education
- Gary. S. Rogers & John Edwards, *An Introduction to Wireless Technology*, PearsonEducation.
- Clint Smith, P.E. & Daniel Collins, *3G Wireless Networks*, Tata McGraw Hill, 2nd Ed.
- William Stallings, *Wireless Communications and networks*, Pearson / Prentice Hallof India.
- Dharma PrakashAgrawal& Qing-AnZeng, *Introduction to Wireless and MobileSystems*, Thomson India Edition.

MCA-45 (ii) Digital Image Processing

L/T - 4   **Total Credits – 4**
Internal - 30 Marks
External – 70 Marks
Note: - Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Introduction to Digital Image Processing:

Origin of DIP, examples of fields that use DIP,Applications of digital image processing, Steps in

digital image processing, Components of DIP, Spatial & Gray level resolution, , Relationships between pixels.Image sampling and Quantization

Image Enhancement:
Intensity transformations and spatial filtering, Fundamentals of spatial filtering, Smoothing and sharpening Point and Mask based techniques, Histogram processing, Histogram equalization, Histogram specification, image averaging

UNIT – II
Filtering in frequency domain: Fourier series and Transform, Discrete Fourier Transform, Frequency Domain Filtering Fundamentals, Homomorphic Filtering.
Color Image Processing: Color Fundamentals, Color characteristics, Color models, RGB, CYK, CMYK, HIS, YIQ models, Pseudo color image processing, full color image processing, color transformations, Smoothening and sharpening of images.

UNIT – III
Image Restoration: Model of Image Degradation/Restoration process, Noise models, Linear, Inverse filtering, Mean Square Error Restoration, Least Square Restoration.
Image Compression Fundamentals: Fundamentals, Lossless and Lossy Compression, Basic Compression Methods: Huffman Coding, Run-Length Coding, LZW Coding, Arithmetic Coding, symbol based coding ,Bit-Plane Coding, Predictive Coding, Transform Coding, loss less predictive coding, lossy predictive coding, image Compression standards, , watermarking

UNIT – IV
Image Segmentation: Fundamentals, Point, Line and Edge Detection, Thresholding, Region-Based Segmentation,segmentation using Morphological watersheds.
Image Representation, descriptors and recognition: Boundary Representation, Chain Codes, Polygonal Approximations, Signatures, Boundary Descriptors, Simple Descriptors, Shape Numbers, Regional Descriptors, Topological Descriptors, Texture. Recognition based on decisiontheoretic & structural methods

Refrence:
- R.C.Gonzalez, R.E.Woods, *Digital Image Processing*, Pearson Education.
- Vipula Singh, *Digital Image Processing with MATLAB and LABVIEW*, Elsevier India.
- R.C.Ganzalez, "*Digital Image Processing with MATLAB*", Tata McGraw Hill.
- Sonka Milan, "*Image Processing Analysis and Machine vision*", Cengage Learning.
- K.Pratt William, *Digital Image Processing*, Wiley India Pvt. Ltd.
- B.Chanda, Majumder D. Dutta, *Digital Image Processing and Analysis*, PHI Learning.

MCA-45 (iii) E-COMMERCE
L/T - 4   **Total Credits –**   **Internal - 30 Marks**
External – 70 Marks
Note: - Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus.

A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I
Electronic Commerce Framework, Electronic Commerce and media Convergence, The Anatomy of E-commerce Applications. Architectural Framework for Electronic Commerce, World Wide Web as the Architecture, Web Background: Hypertext publishing, Security and the Web.

Unit-II
Client-Server Network Security, Emerging Client-Server Security Threats, Firewalls and Network Security, Data and Message Security, Digital signatures, Encrypted Documents and Electronic Mail: PGP and PEM. Legal Ethical and other public policy issues related to Electronics Commerce: Protecting privacy, protecting Intellectual property, Copyright, trademarks and patents, Taxation and encryption policies.

Unit-III
Consumer oriented Electronic commerce: Consumer oriented applications, Mercantile process models, Mercantile Process models, Mercantile process models, Mercantile models from the Consumer's perspective-Mercantile models from the Merchant perspective.

Unit-IV
Types of Electronic Payment Systems, Digital Token based Electronic Payment Systems, Smart cards and Electronic Payment Systems, Credit Card Based Electronic Payment Systems, Risk and Electronic payment Systems, Designing Electronic Payment Systems.
Electronic Data Interchange, EDI Applications in Business, EDI: Legal, Security and Privacy Issue, EDI and Electronic Commerce

Reference:

- RaviKalakota, Andrew B. Whinston, *Frontiers of Electronic Commerce*, Addison Wesley.
- EfraimTurbon, Jae Lee, David King, Chung*, Electronic Commerce. A managerial perspective*, Prentice-Hall International.
- Greenstein, Feinnman, *Electronic Commerce*, Tata McGraw Hill.
- Jeffrey F. Rayport, Bernard J. Jaworski*, E-commerce*, Tata McGraw Hill.
- David Whiteley, *E-commerce*, Tata McGraw Hill.
- Pete Loshin, Paul A. Murphy, *Electronic Commerce*, Jaico Publishing House.

MCA SEMESTER-V

Course No.	Course Title	Credit	Int.	Ext.	Total
MCA-51	Web Engineering	4	30	70	100
MCA-52	Information Security	4	30	70	100
MCA-53	Elective-I	4	30	70	100
MCA-54	Elective-II	4	30	70	100
MCA-55	Elective-III	4	30	70	100
MCA-56	Software Lab-I Based on Elective-I	2.5	30	45	75
MCA-57	Software Lab-II (Based on 51)	2.5	30	45	75
MCA-58	Seminar	2	50	-	50
Total		**27**			**700**

Elective-I

iv. Advanced Java-II
v. ASP.Net
vi. Genetic Algorithm

Elective-II
iv. Digital Electronics
v. Artificial Intelligence
vi. Software Testing & Quality Assurance

Elective-III
iv. Embedded System
v. Compiler Construction
vi. Cloud Computing

MCA-51 WEB ENGINEERING

L/T -   **Total Credits – 4**   **Internal - 30 Marks**

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT-1

Information Architecture

The Role of Information Architect, Collaboration and Communication, Organization information, Organizational challenges, organizing Web Sites and Intranets, Creating Cohesive Organization Systems, Designing Navigation Systems, Types of Navigation Systems, Integrated Navigation Elements, Remote Navigation Elements, Designing Elegant Navigation Systems, Searching your Web Site, Designing the search Interface, Indexing the Fight Stu, To Search or Not to Search, Grouping Content, Conceptual Design; High-Level Architecture Blueprints, Architectural Page Markups, Design Sketches.

UNIT-2

Dynamic HTML and web Designing HTML

Basic Concept, Good Web Design, Process of Web Publishing, Phases of Web Site Development, Structure of HTML documents, HTML Elements – Core attributes, Language attributes, Core Events, Block Level Events. Text Level Events, Linking Basics, Linking in HTML, Images and Anchors, Anchor Attributes, Image Maps, Semantic Linking Meta Information.

UNIT-3

IMAGES & HTML

Image Preliminaries, Image Download issues, Images as Buttons, Introduction to Layout: Backgrounds, Colors and Text, Fonts, Layout with tables, Advanced Layout: Frames and Layers, HTML and other media types. Audio Support in Browsers, Video Support, Other binary Format.Style Sheets, Positioning with Style sheets. Basic Interactivity and HTML: FORMS, forms control, New and emerging Form Elements.

UNIT-4

XML

XML Relationship between HTML, SGML, and XML, Basic XML, valid Documents. Ways to use XML, XML for Data Files, Embedding XML into HTML documents, Converting XML to HTML as XML, The future of XML.

Reference:

- Thomas A Powell, *HTML-The Complete Reference*, Tata McGraw Hill.
- ScoteGuelich, ShishirGundavaram, Gunther Birzniek; *CGI Programming with Perl* 2/e. O'Reilly.
- Doug Tidwell, James snell, PavelKulchenko; *Programming Web Services with SOAP*, O'Reilly.
- Pardi, *XML in Action*, Web Technology, PHI.
- Yong. *XML Step by Step*, PHI.
- Aaron weiss, Rebecca Taply, Kim Daniels, Stuven Mulder, Jeff Kaneshki, *Web Authoring Desk Reference*, Techmedia Publication.

MCA-52 INFORMATION SECURITY

L/T - 4   **Total Credits – 4**   **Internal - 30 Marks**   **External – 70 Marks**

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT –I

Information Security Concepts

Background and Current Scenario, Types of Attacks, Goals for Security.
Security Threats and Vulnerabilities: Overview of Security threats, Weak / Strong Passwords and Password
Cracking, Insecure Network connections, Malicious Code, Programming Bugs. Wireless Networks and
Security: Components of wireless networks, Security issues in wireless

UNIT – II

Encryption and decryption

Basics of encryption and decryption, Applications of Cryptography, Encryption techniques, Characteristics ofgood encryption systems, Secret key cryptography, Digital Signatures, Data Encryption Standard, International Data Encryption Algorithm, Advanced Encryption Standard, Hash and MAC algorithms.

UNIT – III

IP Security

Secure sockets, IPsec overview, IP security architecture, IPSec-Internet Key, Exchanging(IKE), IKE phases

encoding, Internet security, Threats to privacy, Packet sniffing, Spoofing , Web security requirements, Real Time communication security, Security standards– Kerberos.X.509,AuthenticationService.

UNIT – IV

Security protocols

Transport layer protocols, Electronic mail security, PEM and S/MIME security protocol,

Pretty Good Privacy, Web Security, Firewalls design principle, Trusted systems, Electronic payment protocols. Intrusion Detection, Password Management, Viruses and related Threats – Virus Counter measures, Virtual Private Networks.

Reference Books:

1. William Stallings, *"Cryptography and Network Security: Principles and Standards"*, Prentice Hall India.
2. Edward Amoroso, *"Fundamentals of Computer Security Technology"*, Prentice-Hall
3. William Stallings, *"Network Security Essentials",* 3rd Edition, Pearson Education.
4. Bruce Schneier, *Applied Cryptography: Protocols, Algorithms, and Source Code in C,* Wiley India Pvt.Ltd.

MCA-53(i) Advance Java II

L/T -   **Total Credits – 4**   **Internal**
- 30 Marks   **External –**
70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

HTML Introduction, Basic Tags in HTML, Introduction to J2EE (Tier Architecture: Single Tier, Two Tier, Three Tier, N Tier), Static Web Pages, Dynamic Web Pages, Java Script Fundamental (Variables, Array, Conditional Statement Looping).

Unit-II

Web Server, Application server, CSS, XML, Java Servlet: Introduction, Advantage, Servlet Life cycle, Request dispatching, Session, Event Listener.

Unit-III

Java Server Pages Basics, Integrating Scripts in JSPs, JSP Objects and Components, configuring and troubleshooting, JSP: Request and response objects, Retrieving the Contents of a HTML form, Retrieving a Query string, working with Beans, Cookies, Creating and Reading Cookies.

Unit-IV

Introduction to Advance Technologies: Ajax, EJB, Web Services, Struts, Spring, Hibernate.

Reference:

- Dongles E.Comet, *Compiler Networks & Internet*, Addison Wesley.
- Darrel Ince& Adam Freeman *, Programming the Internet with Java*, Addison Wesley.
- E.Balaguruswami, *Programming with Java*, TNH.
- Herbert Schildt, *The complete reference Java 2*, (TMH).

- Mug Hal K.A., Rasmussen R.W, *A Programmer's guide to Java certification*, Addison Wesley.

MCA-53(ii) ASP.NET

L/T - 4   **Total Credits – 4**   **Internal - 30 Marks**

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Web technology: Introduction to Client / Server Technology, Server Side Technology, DNS, Web Server IIS, **JavaScript:** Introduction to JavaScript, Basic Syntax, Operators and Expressions Popup boxes Data type conversion Functions in JavaScript Validation Using JavaScript Working with Arrays. Events in JavaScript

Unit-II

ASP.NET 4.0: .NET Framework Architecture , Common Language Runtime, The Framework Class Library, Garbage Collection ,MSIL Types of Websites, Intrinsic Objects in ASP.net

Web Form: Web Control Class Hierarchy Life cycle of a web form Creating Web Forms Application, Navigating between Pages, Managing Server Controls, Server Control Events, Using HTML Controls and Its Events

ASP.NET Server Controls: Standard Controls, Navigation Controls, Login Controls, Web Parts Controls

Validation Controls: Overview of User Input Validation, Using Validation Controls, Page Validation

Unit-III

Working with ADO.NET: Overview of ADO.NET , ADO.NET Architecture, Connection and Command Objects, Data Reader**,** Data Adapter and DataSet, Data Relations and DataSet, Using Stored Procedures

Databound Controls: SqlDataSource, Data List, Details View, Form View, Repeater, Grid View

State Management: Need for state management, Managing Session and Application, View State, Query Strings, Managing Cookies, Cache

Unit-IV

Master Pages in ASP.NET: Simple and Nested Master Page, Implementation of Master Page, Creating Themes and Style Sheets**,** Applying Themes and Style sheet

File Handling: Working with Directories and Files, Read and write file, Using File Upload Control, Transfer of File to a Folder, Restricting the type and size of the Files

Three Tier Architecture: Introduction to Tier Architecture, Application Layer, Business Logic Layer, Data Link Layer

WCF: Introduction to WCF, Creating WCF Service.

Deployment: Publishing Web Applications., Create Web Setup Project.

Silverlight: Introduction, ASP.NET Application with Silverlight, Using Silverlight Control

MVC Framework: Introduction to MVC, Implementing MVC Controllers, Implementing MVC Views

References:

- Steven Holzner, *Visual Basic.Net Black Book*, Dreamtech Press
- Jeffery R. Shapiro, *The Complete Reference Visual Basic .NET*, Tata McGraw Hill
- E. Ealaguruswamy , *Programming in C #* , Tata McGraw Hill.
- V.P. Jain , *The Complete Guide to C # Programming* .
- Herbert Schildt, *C #: A Beginner's Guide*, Tata McGraw Hill
- Anne Bohem*, Murach's Beginning Visual basic .Net*

MCA-53(iii) GENETIC ALGORITHM

L/T - 4   **Total Credits – 4**

Internal - 30 Marks

External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit1

INTRODUCTION: Introduction to Evolutionary Computation: Biological and artificial evolution, evolutionary computation and AI, Optimization of a simple function, Introduction, Building block hypothesis, Basic operators and Terminologies like individual, gene, alleles, phenotype,encoding, fitness function and reproduction.

Unit-2

Genetic modeling: Simple genetic algorithm, its representation , different types of operators: selection,crossover, mutation, replacement and crossover rate mutation rates, Crossover for real-valued representations, mutation for real-valued representations, Significance of Genetic operators, Differences & similarities between GA & other traditional methods, Applications of GA.

Unit-3

Theoretical Analysis of Evolutionary Algorithms:

Schema theorems, convergence of the algorithms, computational time complexity of the algorithms. Search Operators and Representations: Mixing different search operators, adaptive representations.

Niching and Speciation: Fitness sharing, crowding and mating restriction. Constraint Handling: Common techniques, penalty methods, repair methods,

Unit-4

Multi-objective evolutionary optimization: Pareto optimality, multi-objective evolutionary algorithms: MOGA, NSGA-II, etc.

References:

- D.E.Goldberg, *Genetic Algorithms in Search, Optimization and Machine Learning*. Pearson Education Asia.
- K. Deb, *Multi-Objective Optimization Using Evolutionary Algorithms*, Wiley and Sons.
- M. Mitchell, *An introduction to genetic algorithms*, MIT Press.
- L. D. Davis, *Evolutionary algorithms*, Springer-Verlag.

- K. SrinivasaRaju and D. Nagesh Kumar, *Multi-criterion Analysis in Engineering and Managemet,* PHI Learning Pvt. Ltd., New Delhi, India.
- S.N.Sivanandam, S.N.Deepa, *Introduction to Genetic Algorithms*, Springer.
- Eiben And Smith, *Introduction To Evolutionary Computing*, Springer

MCA-54 (i) DIGITAL ELECTRONICS
L/T - 4   **Total Credits – 4**
Internal - 30 Marks
External – 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I
MINIMIZATION TECHNIQUES AND LOGIC GATES
Boolean laws - De-Morgan's Theorem, Principle of Duality, Boolean expression - Minimization of Boolean expressions, Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), Karnaugh map Minimization - Don't care conditions
Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR-Implementations of Logic Functions using gates, NAND-NOR implementations, TTL and CMOS Logic.

UNIT II
COMBINATIONAL CIRCUITS
Design procedure - Half adder, Full Adder, Half subtractor, Full subtractor , Parallel binary adder, parallel binary Subtractor, Fast Adder, Carry Look Ahead adder, Serial Adder/Subtractor, BCD adder, Binary Multiplier, Binary Divider, Multiplexer/ De-multiplexer, decoder, encoder, parity checker, parity generators, code converters.

UNIT III
SEQUENTIAL CIRCUITS
Latches, Flip-flops - SR, JK, D, T, and Master-Slave - Characteristic table and equation, Application table, Edge triggering, Level Triggering, Realization of one flip-flop using other flip-flops, serial adder/subtractor, Asynchronous Ripple or serial counter, Asynchronous Up/Down counter, Synchronous counters, Synchronous Up/Down counters, Programmable counters, Design of Synchronous counters: state diagram, State table, State minimization, State assignment, Excitation table and maps-Circuit implementation, Modulo-n counter, Registers - shift registers, Universal shift registers, Shift register counters, Ring counter, Shift counters, Sequence generators.

UNIT IV
MEMORY DEVICES
Classification of memories - ROM: ROM organization, PROM, EPROM, EEPROM, EAPROM, RAM: - RAM organization - Write operation, Read operation, Static RAM Cell, Dynamic RAM cell structure, Programmable Logic Devices - Programmable Logic Array (PLA), Programmable Array Logic (PAL), Implementation of PLA, PAL using ROM. Introduction to Field Programmable Gate Arrays (FPGA).

REFERENCES:
1. Donald P. Leach and Albert Paul Malvino, *Digital Principles and Applications*, TMH.
2. Morris Mano, *Digital Design*, Prentice Hall of India Pvt. Ltd., Pearson Education (Singapore) Pvt. Ltd., New Delhi.
3. A.K. Maini, *Digital Electronics*, Wiley India
4. John F. Wakerly, *Digital Design, Fourth Edition*, Pearson/PHI
5. John. M Yarbrough, *Digital Logic Applications and Design*, Thomson Learning.
6. S. Salivahanan and S. Arivazhagan, *Digital Circuits and Design*, Vikas Publishing House Pvt. Ltd, New Delhi
7. William H. Gothmann, *Digital Electronics*, PHI.
8. Thomas L. Floyd, *Digital Fundamentals*, Pearson Education Inc, New Delhi
9. Donald D. Givone, *Digital Principles and Design*, TMH.

MCA-54(ii) ARTIFICAL INTELLIGENCE

L/T - 4   **Total Credits – 4**
Internal - 30 Marks
External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT-1

The predicate calculus

Syntax and semantic for propositional logic and FCPL, Censual form, inference rules, resolution and unification.

Knowledge: representation: Network representation-Associative network & concept of naphs, structured representation: Frames & Scripts.

UNIT-2

Search strategies& Production Systems

Strategies for state space search-data driven and goal driven search; search algorithms-uninformed search (depth first, breadth first, depth first with iterative deepening) and informed search (Hill climbing best first, AN algorithm, mini-max etc.), computational complexity, Properties of search algorithms-Admissibility, Monotonicity, Optimality, Dominance, etc.

Types of production system control of search in production system.

UNIT-3

Rule based expert systems

Architecture, development, managing uncertainty in expect systems (Bayesian probability theory, Stanford certainty factor algebra. Non-monotonic logic and reasoning with beliefs, Fuzzy logic, Dempter /Shaffer and other approaches to uncertainty.

UNIT-4

Knowledge acquisition& Prolog

Types of learning, learning automata, genetic algorithms, intelligent editors, learning by induction, Programming with Prolog.

Reference:
- George F. Luger, William A. Stubblefield, *Artificial Intelligence*, The Benjamin/Cummings Publishing Company, Inc.
- Dan W. Patterson, *Introduction to Artificial Intelligence and Expert system,* PHI.
- Eugene Charniak, Drew McDermott, *Introduction to Artificial Intelligence"* Addison Wesley.
- Wils J. Nilsson, *Principles of Artificial Intelligence,*Narosa Publishing house.
- Jackson Peter, *Introduction to Expert systems*, 3rd edition, (Addison Wesley -2000).

MCA-54(iii) SOFTWARE TESTING AND QUALITY ASSURANCE

L/T - 4   **Total Credits – 4**
Internal - 30 Marks
External – 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT-1

Testing and the related concepts
Significance and potential; Testability and features of Test cases; Software Testing techniques; WBT, BBT, Tracking Box testing; static analysis, symbolic testing, program mutation testing. Input space, partitioning, functional program, testing, data flow guided testing;

UNIT-2

Software testing strategies
Approach, Issues, Irrigation, incremental, system, alpha, Beta testing etc., comparative evaluation of techniques: testing tools, Dynamic analysis tools, test data generators, Debuggers, test drivers etc. : Technical Metrics for Software quality factors, framework, Metrics for analysis, design, testing source code etc.

UNIT-3

Object Oriented Testing
OOT Concept, OOT strategies and issues: Test case design, interface testing;

UNIT-4

Quality assurance
 concept, importance and essence; FTR, structured walk through techniques etc.; SW Reliability, validation, safety and Hazard Analysis; Features affecting quality of software; SQA Plan, Quality models; ISO 9000 and SEI-CMM and their relevance.

Reference:
- Boris Beizer,*Software testing*, Academic Press.
- G.J. Myers,*Art of Testing*.
- Robert H. Dunn,*Software Quality*.
- J.D. Musa,*Software Reliability*, Okumota, Jaino, McGraw Hill.
- George J. Keln, Boyuan, *Fuzzy sets and fuzzy logic*, P.H.I.
-

L/T - 4   **Total Credits – 4**
Internal - 30 Marks
External – 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT –I

Introduction to Embedded Systems
Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT –II

Typical Embedded System
Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT –III

Embedded Firmware
Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT -IV

RTOS Based Embedded System Design
Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT –V

Task Communication
Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization, Techniques, Device Drivers, How to Choose an RTOS.

Refrences:
1. ShibuK.V,*Introduction to Embedded Systems*, McGraw Hill.
2. Raj Kamal*, Embedded Systems*, TMH.
3. Frank Vahid, Tony Givargis,*Embedded System Design*, John Wiley.
4. Lyla,*Embedded Systems*, Pearson
5. David E. Simon, *An Embedded Software Primer*, Pearson Education.

L/T - 4   **Total Credits – 4**
Internal - 30 Marks
External – 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question

Unit-1

Introduction to Compilation
Introduction to Compilers, Interpreters, Assemblers, phases of compilation, analysis synthesis model of translation, compiler construction tools.
Lexical Analysis: Process of lexical analysis, finite state automata, DFA and NFA recognition of regular expressions, LEX.

Unit-2

Syntax Analysis
 Process of syntax analysis, types of grammars, top-down and bottom-up parsing techniques, Parser generator.

Unit-3

Intermediate Code Generation
Intermediate Languages, generating intermediate code for declarative statement, Assignment statement, Boolean expression, and case statement.
Code Optimization: Introduction to code optimization, potential cases of code optimization, optimization of basic blocks, loops in flow graphs, code improving transformation.

Unit-4

Code Generation
Issues in the design of a code generation the target machine, dynamic storage management, translating basic blocks, a simple code generator, peephole optimization, directed acyclic graphs and basic blocks code generation from directed acyclic graphs.
Overview of syntax directed translation scheme.

Reference:
- Aho, Ullman, &Sethi , *Compilers: Principles, Techniques & Tools*, Addison Wesley
- Aho& Ullman, *Principles of Compiler Design*, Narosa Publications.
- HenkAlblas *, Practice & Principles of Compiler Building with C*.
- Trembley& Sorenson, *Principles of Compiler Design*, McGraw Hill.

MCA-55(iii) CLOUD COMPUTING

L/T - 4   **Total Credits – 4**

Internal - 30 Marks
External – 70 Marks
Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT – I

Introduction: Essentials, Benefits and need for Cloud Computing - Business and IT Perspective - Cloud and Virtualization - Cloud Services Requirements - Cloud and Dynamic Infrastructure - Cloud Computing Characteristics Cloud Adoption.
Cloud Models: Cloud Characteristics - Measured Service - Cloud Models - Security in a Public Cloud Public versus Private Clouds - Cloud Infrastructure Self Service
Cloud as a Service: Gamut of Cloud Solutions - Principal Technologies - Cloud Strategy Cloud Design and Implementation using SOA - Conceptual Cloud Model - Cloud Service Defined

UNIT – II

Cloud Solutions: Cloud Ecosystem - Cloud Business Process Management - Cloud Service Management - Cloud Stack - Computing on Demand (CoD) – Cloud sourcing.
Cloud Offerings: Information Storage, Retrieval, Archive and Protection - Cloud Analytics Testing under Cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud.
Cloud Management: Resiliency – Provisioning - Asset Management - Cloud Governance - High Availability and Disaster Recovery - Charging Models, Usage Reporting, Billing and Metering.

UNIT – III

Cloud Virtualization Technology: Virtualization Defined - Virtualization Benefits - Server Virtualization - Virtualization for x86 Architecture - Hypervisor Management Software - Logical Partitioning (LPAR) - VIO Server - Virtual Infrastructure Requirements.
Cloud Virtualization: Storage virtualization - Storage Area Networks - Network-Attached storage - Cloud Server Virtualization - Virtualized Data Center.

UNIT – IV

Cloud and SOA: SOA Journey to Infrastructure - SOA and Cloud - SOA Defined - SOA and IaaS - SOA-based Cloud Infrastructure Steps - SOA Business and IT Services.
Cloud Infrastructure Benchmarking: OLTP Benchmark - Business Intelligence Benchmark - e-Business Benchmark - ISV Benchmarks - Cloud Performance Data Collection and Performance Monitoring Commands - Benchmark Tools.

Reference Books:
1. Roger Jennings, *Cloud Computing,* Wiley India
2. John Rhoton, *Cloud Computing Explained*, Recursive Press
3. BarrySosinsky, *Cloud Computing Bible*,Wiley
4.RajkumarBuyya, James Broberg, *Cloud Computing: Principles and Paradigms*, Wiley
5. Judith Hurwiz, *Cloud Computing for Dummies*,Wiley Publishing.
6. Rosenberg and Matheos, *The Cloud at your service,*Manning Publications
7. Dr. Kumar Saurabh, *Cloud Computing – Insight into New Era Infrastructure* , Wiley India.