SCHEME OF EXAMINATION FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.) w.e.f. Academic Session 2014-15							
Paper Code	**Nomenclature of Paper**	**Exam Time (hrs.)**	**External Marks**		**Internal Marks**		**Total Marks**
			Max	**Pass**	**Max**	**Pass**	
1st Semester							
MCA-14-11	PROGRAMMING IN C	3	80	32	20	8	100
MCA-14-12	COMPUTER ORGANIZATION	3	80	32	20	8	100
MCA-14-13	SOFTWARE ENGINEERING	3	80	32	20	8	100
MCA-14-14	DISCRETE MATHEMATICAL STRUCTURES	3	80	32	20	8	100
MCA-14-15	COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS	3	80	32	20	8	100
MCA-14-16	S/W LAB – I BASED ON MCA-14-11	3	100	40			100
MCA-14-17	S/W LAB – II BASED ON MCA-14-15	3	100	40			100
MCA-14-18	SEMINAR				20	8	20
	TOTAL		**600**		**120**		**720**
2nd Semester							
MCA-14-21	SYSTEM PROGRAMMING	3	80	32	20	8	100
MCA-14-22	OBJECT ORIENTED PROGRAMMING USING C++	3	80	32	20	8	100
MCA-14-23	PRINCIPLES OF PROGRAMMING LANGUAGES	3	80	32	20	8	100
MCA-14-24	DATA STRUCTURES	3	80	32	20	8	100
MCA-14-25	WEB TECHNOLOGIES	3	80	32	20	8	100
MCA-14-26	S/W LAB–III BASED ON MCA-14-22 & MCA-14-24	3	100	40			100
MCA-14-27	S/W LAB–IV BASED ON MCA-14-25	3	100	40			100
MCA-14-28	SEMINAR				20	8	20
	TOTAL		**600**		**120**		**720**
3rd Semester							
MCA-14-31	OBJECT ORIENTED ANALYSIS AND DESIGN USING UML	3	80	32	20	8	100
MCA-14-32	COMPUTER NETWORKS AND DATA COMMUNICATION	3	80	32	20	8	100
MCA-14-33	DESIGN AND ANALYSIS OF ALGORITHMS	3	80	32	20	8	100
MCA-14-34	DATABASE MANAGEMENT SYSTEMS	3	80	32	20	8	100
MCA-14-35	OPERATING SYSTEMS	3	80	32	20	8	100
MCA-14-36	S/W LAB – V BASED ON MCA-14-31	3	100	40			100
MCA-14-37	S/W LAB – VI BASED ON MCA-14-34	3	100	40			100
MCA-14-38	SEMINAR				20	8	20
	TOTAL		**600**		**120**		**720**
4th Semester							
MCA-14-41	PROGRAMMING IN JAVA	3	80	32	20	8	100
MCA-14-42	ADVANCED COMPUTER ARCHITECTURE	3	80	32	20	8	100
MCA-14-43	DATA WAREHOUSING AND MINING	3	80	32	20	8	100
MCA-14-44	COMPUTER GRAPHICS	3	80	32	20	8	100
MCA-14-45	ELECTIVE	3	80	32	20	8	100

MCA-14-46	S/W LAB–VII BASED ON MCA-14-41	3	100	40			100
MCA-14-47	S/W LAB-VIII BASED ON MCA-14-44	3	100	40			100
MCA-14-48	SEMINAR				20	8	20
	TOTAL		**600**		**120**		**720**
ELECTIVE: - I. INFORMATION SECURITY							
	II. ARTIFICIAL INTELLIGENCE						
	III. INFORMATION SYSTEMS						
	IV. SECURITY IN COMPUTING						

MCA-14-31 OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

UML: Principles of modeling, UML Things – Structural, Behavioral, Grouping, Annotational. Relationships in UML – Dependency, Association, Generalization, Realization. Overview of diagrams in UML – Class diagram, Object diagram, Use-Case diagram, Sequence diagram, Collaboration diagram, Statechart diagram, Activity diagram, Component diagram, Deployment diagram. UML Semantic Rules – Names, Scope, Visibility, Integrity, Execution. Mechanisms in the UML – Specifications, Adornments, Common Divisions, Extensibility Mechanisms.

UNIT – II

Modeling as a Design Technique: Abstraction, Encapsulation, Modularity, Hierarchy, Typing, Concurrency, Persistence of objects. Purpose of modeling,

Class Model – Object & Class, Links & Associations, Generalization & Inheritance, Association Ends - Multiplicity, Role names, Ordering, Qualification, Aggregation, Link attributes & Link class, Abstract class, Metadata, Constraints. Constructing class diagram.

UNIT – III

State Modeling: Event, State, Activity, Action, Transitions & Conditions, State diagrams, Nested state diagrams, signal generalization, concurrency, relationships between class and state models.

Interaction Modeling: use case models, use case relationships, sequence models, procedural sequence models, activity models, special constructs for activity models.

UNIT – IV

System Analysis & design: System development stages, system conception, analysis, domain class model, domain state model, iterating the analysis.

Application interaction model, application class model, application state model, adding operations

System Design: estimating performance, make a reuse plan, organize the system into subsystem, identifying concurrency, allocating subsystems to processors and tasks, management of data stores, handling global resources, choosing software control strategies, handling boundary conditions, setting trade-off priorities, selecting an architect style.

Class Design: bridging gap, realize use cases with operations, designing algorithms, design optimization, adjustment of inheritance, organize classes & associations.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson, The Unified Modeling Language User Guide, Pearson education, 2007
2. M. Blaha, J. Rumbaugh, Object-Oriented Modeling and Design with UML, Pearson Education-2007

Reference Books:

1. J. Rumbaugh, M. Blaha, W. Premerlani, F. Eddy, W. Lorensen, Object-Oriented Modeling and Design, Prentice Hall of India-1998
2. Satzinger, Jackson, Burd, Object-Oriented Analysis & Design with the Unified Process, Thomson-2007
3. Grady Booch, Object Oriented Analysis & Design, Addison Wesley-1994

MCA-14-32 COMPUTER NETWORKS AND DATA COMMUNICATION

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Computer Networks and its uses; Network categorization and Hardware; Topologies; Network Software: Protocols, Services, Network Architecture, Design issues for the layers, OSI Reference model, TCP/IP Reference model, Comparison of OSI and TCP/IP Models. Introduction to Example Networks: Internet, ISDN, X.25, Frame Relay, ATM.

UNIT – II

Data Communication Model, Digital and Analog data and signals, Asynchronous and Synchronous transmission; bit rate, baud, bandwidth, Transmission impairment; Channel Capacity; Guided Transmission Media; Wireless transmission; Satellite communication.

Switching; Multiplexing; Spread Spectrum; local loop; Modems and ADSL; Encoding: NRZ, NRZ-I, Manchester and Differential Manchester encoding; Internet over Cable; ADSL Versus Cable; The Mobile Telephone System;

UNIT – III

Data Link Layer Design issues; Framing, Error Detection and Correction; Flow Control: Sliding Window Protocols; Medium Access Control: Aloha, CSMA protocols, Collision free protocols, Limited Contention Protocols; Wavelength Division Multiple access protocol, Wireless LAN Protocol: MACA; High Speed LANs; Ethernet LAN, Fast Ethernet, Gigabit Ethernet; Binary Exponential Backoff algorithm; Token Ring and FDDI; Introduction to Wireless LANs;

UNIT – IV

Network Layer Design issues , Virtual Circuit and Datagram Subnet, Routing Algorithms: Optimality principle, Shortest path Routing, Flooding , Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast and Multi Cast Routing, Routing for Mobile hosts, Congestion Control Algorithms: General Principals; Congestion control in Virtual – Circuit Subnets; Congestion Control in Datagram Subnets: Choke packets, Load Shedding; Random Early Detection, Jitter Control; Quality of Service: Over provisioning, Buffering, Traffic Shaping, Leaky bucket, token bucket, Resource Reservation, Admission Control, Packet Scheduling;

Text Books:

1. Andrew S. Tanenbaum, Computer Networks, 4th Edition - PHI.
2. Behrouz A Forouzan, Data Communications and Networking , 5th Edition- Tata Mc-Graw Hill.

Reference Books:

1. Michael A. Gallo, William M. Hancock, Computer Communications and Networking Technologies – CENGAGE learning.
2. William Stallings, Data and Computer Communications, 5th Edition – PHI.

MCA-14-33 DESIGN AND ANALYSIS OF ALGORITHMS

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction: Algorithms, Role of algorithms in computing, Complexity of algorithms, Analyzing algorithms, designing algorithms, asymptotic notations.

Divide and Conquer: Complexity of iterative programs and recursive programs, solving recurrence equations: back substitution method, recursion tree method, masters theorem.

Analysis of heap sort and quick sort; Counting sort, Radix sort, Bucket sort, Lower bounds for sorting.

UNIT – II

Hash Tables, Hash functions, Collision handling in hashing, analyzing various operations on Binary search tree. Introduction to Red-black trees.

Dynamic Programming (DP): Elements of DP, Matrix chain multiplication, Longest common subsequence, optimal binary search trees.

UNIT – III

Greedy Techniques (GT): Elements of GT, Activity selection problem, Huffman codes, Knapsack Problem.

Graph Algorithms: Single source shortest path: Analysis of Dijkstra's Algorithm, Limitations of Dijkstra's Algorithm, Negative weight cycle, Bellman-Ford algorithm. All Pairs Shortest Path: Relation of Shortest path and matrix multiplication, Analysis of Floyd Warshall algorithm. Maximum Flow: Flow network, Ford-Fulkerson method.

UNIT – IV

Strings: Storage of strings, naive string-matching algorithm, Rabin-Karp string matching algorithm.

Computational complexity: Notion of Polynomial time algorithms, Complexity classes: P, NP, NP-Hard and NP-Complete, Polynomial time verification, Reducibility, NP-Completeness, Examples of NP-Complete and NP-Hard problems: Traveling Salesman Problem, Knapsack, Bin Packing, Satisfiability, Vertex Cover, Clique, Independent Set. Introduction to approximation algorithms.

Text Books:

1. Cormen, Leiserson, Rivest, "Introduction to Algorithms", PHI India.
2. Neapolitan R., "Foundations of Algorithms", Jones and Bartlett Learning.

Reference Books:

1. Cooper A., "Computability Theory", Chapman and Hall/ CRC Press.
2. Robert Sedgewick, "Algorithms in C", Pearson Education India.
3. Steven Skiena, "The Algorithm Design Manual", Springer India.
4. Reiter, Johnson, "Limits of Computation", Chapman and Hall/ CRC Press.

MCA-14-34 DATABASE MANAGEMENT SYSTEMS

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Basic Concepts: File Systems vs. DMBS, Characteristics of the Data Base Approach, Abstraction and Data Integration, Database users, Advantages and Disadvantages of a DBMS.

Data Base Systems Concepts and Architecture: Schema and Instances, DBMS architecture and Data Independence, Data Base languages and Interfaces, DBMS functions and component modules.

Entity Relationship Model: Entity Types, Entity Sets, Attributes & keys, Relationships, Relationships Types, Roles and Structural Constraints, Design issues, E-R Diagrams, Design of an E-R Database Schema, Reduction of an E-R schema to Tables.

Relational Data Model: Relational model concepts, Integrity constraints over Relations, Relational Algebra – Basic Operations.

UNIT – II

SQL: Data Definition and Data Types, Components of SQL: DDL, DML, and DCL, Schema Change Statement in SQL, Views& Queries in SQL, Specifying Constraints & Indexes in SQL, Additional Features of SQL.

Relational Data Base Management System: ORACLE/MySQL, Basic structure, Date Base Structure & its manipulation in ORACLE/MySQL, Storage Organization in ORACLE/MySQL.

Conventional Data Models: An overview of Network and Hierarchical Data Models.

UNIT – III

Relational Data Base Design: Functional Dependencies, Decomposition, Normal forms based on primary keys (1 NF, 2 NF, 3 NF, & BCNF), Multi-valued Dependencies, 4 NF, Join dependencies, 5 NF, Domain key normal form.

Practical Data Base Design: Role of Information systems in Organizations, Database design process, physical database design in Relational Database.

UNIT – IV

Transaction Processing Concepts: Introduction to Transaction Processing, Transaction & System Concepts, Properties of Transaction, Schedules and Recoverability, Serializability of Schedules.

Concurrency Control Techniques: Locking Techniques, Time stamp ordering, Multi-version 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.

Text Books:

1. Elmasri & Navathe: Fundamentals of Database systems, 5th edition, Pearson Education.
2. Thomas Connolly Carolyn Begg: Database Systems, 3/e, Pearson Education.

Reference Books:

1. Korth & Silberschatz: Database System Concept, 4th Edition, McGraw Hill International Edition.
2. Raghu Ramakrishnan & Johannes Gehrke: Database Management Systems, 2nd edition, Mcgraw Hill International Edition.
3. Peter Rob, Carlos Colonel: Database system Design, Implementation, and Measurement, Cengage Learning, 2nd Ed.
4. Database Systems: A practical Approach to Design, Implementation and Management, Pearson Education- 3e
5. C.J. Date: An Introduction to Data Bases Systems 7th Edition, Addison Wesley N. Delhi.
6. Bipin C. Desai: An Introduction to Database System, Galgotia Publication, N. Delhi.
7. Abbey, Abramson & Corey: Oracle 8i-A Beginner's Guide, Tata McGraw Hill.
8. Ivan Bayross: SQL, PL/SQL- The Program Language of ORACLE, BPB Publication.
9. RUSSELL DYER, MYSQL IN A NUTSHELL

MCA-14-35 OPERATING SYSTEMS

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introductory Concepts: Operating system functions, structure, types viz. distributed systems, special-purpose systems, open-source operating systems; Operating system services, system calls, system programs.

CPU Scheduling: Process concepts, process operations, inter-process communication, scheduling criteria, scheduling algorithms, Comparative study of scheduling algorithms, Multiple processor scheduling.

UNIT – II

Concurrent Processes: Critical section problem, Semaphores, Classical process co-ordination problems and their solutions, monitors, synchronization examples.

Deadlocks: Deadlock characterization, Deadlock prevention and avoidance, Deadlock detection and recovery.

UNIT – III

Memory Management: Swapping, Paging, Segmentation, Virtual memory concepts: Demand Paging, Page replacement Algorithms, Thrashing.

Storage Management: File concepts, File access and allocation methods, File-system mounting, sharing, protection, structure and implementation. Directory Systems: Structured Organizations, directory protection mechanisms, recovery. Disk scheduling.

UNIT – IV

Protection & Security: Goals & principles of protection, domains of protection, access matrix, access controls. Security: Security problem, threats, security tools, classification.

Distributed Systems: Types of network-based OS, Network structure and topologies, Communication structure & Protocol, design issues. Distributed File-system: Remote file access, File replication, examples. Distributed synchronization: Mutual exclusion, Concurrency control, deadlock handling.

Text Books:

1. Silberschatz A., Galvin P.B.,and Gagne G., Operating System Concepts, Wiley India Pvt. Ltd.
2. Godbole, A.S. Operating Systems, Tata McGraw-Hill, New Delhi.
3. Tanenbaum, A.S., Operating System- Design and Implementation, Prentice Hall of India.

Reference Books:

1. Deitel, H.M., Operating Systems, Addison- Wesley Publishing Company, New York.
2. Stalings William, Operating System, Prentice Hall of India, New Delhi.

MCA-14-41 PROGRAMMING IN JAVA

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Features of Java, Data types, operators & expressions, control structures, arrays, Classes, objects & methods, constructors, garbage collection, access qualifiers, string handling – string operations, character extraction, string comparison, searching and modifying strings, StringBuffer, packages and interfaces, Wrapper classes.

UNIT – II

Inheritance: single and multilevel inheritance, method overriding, abstract class, use of super and final keywords.

Exception Handling: Exception types, uncaught exceptions, multiple catch clauses, nested try statements, built-in exceptions, creating your own exceptions.

Multithreading: Java thread model, creating multiple threads, thread priorities, synchronization, interthread communication, suspending, resuming and stopping threads.

UNIT – III

Applets: Local & Remote Applets, Applet Architecture, Passing Parameters to Applets, Applet Graphics, Adapter Class.

I/O Streams: Console I/O – reading console input, writing console output, Files I/O – Byte Streams, Character Streams, Collection Interfaces & Classes, Delegation Event Model

UNIT – IV

AWT Classes: Window fundamentals, working with graphics, working with color & fonts. AWT controls, layout managers & working with menus, JFrames.

Swing Classes, Java Beans, Servlet classes & Life Cycle.

Text Books:

1. Herbert Schildt, The Complete Reference Java 2, Fourth Edition, Tata McGraw Hill-2001
2. Liang Y.Daniel, Introduction to Java Programming (7^{th} Edition), 2009, Pearson Education.

Reference Books:

1. Steven Holzner, Java 1.2, BPB-1998
2. E. Balaguruswami, Programming with Java - Second Edition, Tata McGraw Hill-1998.
3. Mughal K.A., Rasmussen R.W., A Programmer's Guide to Java Certification, Addison-Wesley, 2000

MCA-14-42 ADVANCED COMPUTER ARCHITECTURE

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Computational Model: Basic computational models, evolution and interpretation of computer architecture, concept of computer architecture as a multilevel hierarchical framework. Classification of parallel architectures, Relationships between programming languages and parallel architectures

Parallel Processing:: Types and levels of parallelism, Instruction Level Parallel (ILP) processors, dependencies between instructions, principle and general structure of pipelines, performance measures of pipeline, pipelined processing of integer, Boolean, load and store instructions, VLIW architecture, Code Scheduling for ILP-Processors - Basic block scheduling, loop scheduling, global scheduling

UNIT – II

Superscalar Processors: Emergence of superscalar processors, Tasks of superscalar processing – parallel decoding, superscalar instruction issue, shelving, register renaming, parallel execution, preserving sequential consistency of instruction execution and exception processing, comparison of VLIW & superscalar processors

Branch Handling: Branch problem, Approaches to branch handling – delayed branching, branch detection and prediction schemes, branch penalties and schemes to reduce them, multiway branches, guarded execution

UNIT – III

MIMD Architectures: Concepts of distributed and shared memory MIMD architectures, UMA, NUMA, CC-NUMA & COMA models, problems of scalable computers.

Direct Interconnection Networks: Linear array, ring, chordal rings, star, tree, 2D mesh, barrel shifter, hypercubes.

UNIT – IV

Dynamic interconnection networks: single shared buses, comparison of bandwidths of locked, pended & split transaction buses, arbiter logics, crossbar, multistage networks – omega, butterfly

Cache coherence problem, hardware based protocols – snoopy cache protocol, directory schemes, hierarchical cache coherence protocols, software based protocols.

Text Books:

1. Sima, Fountain, Kacsuk, Advanced Computer Architecture, Pearson Education, 2006.
2. D. A. Patterson and J. L. Hennessey, Computer Architecture – A Quantitative Approach, Fifth Edition, Morgan Kaufmann, 2012.

Reference Books:

1. Kai Hwang, Advanced Computer Architecture, Tata McGraw Hill, 2005
2. Nicholas Carter, Computer Architecture, McGraw Hill, 2006
3. Harry F. Jordan, Gita Alaghband, Fundamentals of Parallel Processing, Pearson Education, 2003.

MCA-14-43 DATA WAREHOUSING AND MINING

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Data Warehouse: Basic concepts, The Data Warehouse - A Brief History, Characteristics, Difference between Operational Database Systems and Data Warehouse, Architecture for a Data Warehouse, Fact and Dimension Tables, Data Warehouse Schemas, Data Cube : A Multidimensional Data Model, Data Cube Computation Methods, Typical OLAP Operations, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute Oriented Induction.

UNIT – II

Data Mining: Introduction: Motivation, Importance, Knowledge Discovery Process, Data Mining Functionalities, Interesting Patterns, Classification of Data Mining Systems, Major issues, Data Objects and Attribute Types. Data Preprocessing: Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization. Data Mining Models: Directed Data Mining Models, Directed Data Mining Methodology. Data Visualization. Outliers, Types of Outliers and Challenges of Outlier Detection.

UNIT – III

Data Mining Classical Techniques: Statistics – Similarity Models, Steps for Designing Similarity Models, Table Lookup Model. Clustering- Requirement for Cluster Analysis, Clustering Methods- Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering. Nearest Neighborhood- Memory Based Reasoning, Challenges of Memory Based Reasoning,

UNIT – IV

Data Mining Next Generation Techniques: Decision Tree- Decision Tree Induction, Attribute Selection Measures, Tree Pruning. Association Rule Mining- Market Basket Analysis, Frequent Itemset Mining using Apriori Algorithm, Improving the Efficiency of Apriori, Neural Network- Bayesian Belief Networks, Classification by Backpropagation. Data Mining Applications, Data Mining Trends and Tools.

Reference Books:

1. J Hanes, M. Kamber, “Data Mining Concepts and Techniques”, Elsevier India.
2. G.S. Linoff, M.J.A. Berry, “Data Mining Techniques”, Wiley India Pvt. Ltd.
3. A. Berson, S.J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw- Hill.

MCA-14-44 COMPUTER GRAPHICS

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Computer Graphics and its applications, Components and working of Interactive Graphics;
Video Display Devices: Raster scan and Random Scan displays, Display Processors; Resolution, Aspect Ratio, Refresh CRT, interlacing; Color CRT monitors, LookUp tables, Plasma Panel and LCD monitors, Interactive Input and Output Devices: keyboard, mouse, trackball, joystick, light pen, digitizers; image scanners, Touch Panels; Voice systems; printers, plotters; Graphics Software; Coordinate Representations;

UNIT – II

Drawing Geometry: Symmetrical and Simple DDA line drawing algorithm, Bresenham's line Algorithm; loading frame buffer; Symmetrical DDA for drawing circle, Polynomial method for circle drawing; circle drawing using polar coordinates, Bresenham's circle drawing; Generation of ellipse; parametric representation of cubic curves, drawing Bezier curves;
Filled-Area Primitives: Flood fill algorithm, Boundary fill algorithm, Scan-line polygon fill algorithm

UNIT – III

2-D Transformations: translation, rotation, scaling, matrix representations and homogeneous coordinates, composite transformations, general pivot point rotation, general fixed point scaling, Shearing; Reflection ; Reflection about an arbitrary line;
2-D Viewing: window, viewport; 2-D viewing transformation, zooming, panning; Clipping operations: point and line clipping, Cohen-Sutherland line clipping, mid-point subdivision line clipping, Liang-Barsky line clipping, Sutherland-Hodgman polygon clipping; Weiler-Atherton polygon Clipping
Pointing and positioning techniques; rubber band technique; dragging;

UNIT – IV

3-D Graphics: 3-D modeling of objects, 3D transformation matrices for translation, scaling and rotation, parallel projection: Orthographic and oblique projection; perspective projection; Hidden surface removal: Z-buffer, depth-sorting, area subdivision, BSP-Tree method; Ray casting;
Shading: Modelling light intensities, Gouraud shading, Phong shading;
Introduction to Animation, Tweening, Morphing, Fractals;

Text Books:

1. Donald Hearn, M. Pauline Baker, Computer Graphics, Pearson Education.
2. Foley etc., Computer Graphics Principles & Practice, Pearson Education.

Reference Books:

1. D.P. Mukherjee, Fundamentals of Computer Graphics and Multimedia, PHI.
2. Newmann & Sproull, Principles of Interactive Computer Graphics, McGraw Hill.
3. Rogers, Procedural Elements of Computer Graphics, McGraw Hill.
4. Anirban Mukhopadhyay, Arup Chattopadhyay, Introduction to Computer Graphics and Multimedia, Vikas Publications.
5. Zhigang Xiang, Roy Plastock, Computer Graphics, Tata McGraw Hill.
6. Apurva A. Desai, Computer Graphics, PHI.
7. Malay K. Pakhira, Computer Graphics, Multimedia and Animation, PHI

MCA-14-45(I) INFORMATION SECURITY

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

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

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

UNIT – III

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.509AuthenticationService.

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, 1999
3. William Stallings, "Network Security Essentials", 3rd Edition, Pearson Education, 2006.
4. Bruce Schneier, “Applied Cryptography: Protocols, Algorithms, and Source Code in C”, Wiley India Pvt. Ltd.

MCA-14-45(II) ARTIFICIAL INTELLIGENCE

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT-I

Introduction: Background and history, Overview of AI applications areas.

The predicate calculus: Syntax and semantic for propositional logic and FOPL, Clausal form, inference rules, resolution and unification.

Knowledge representation: Network representation-Associative network & conceptual graphs, Structured representation- Frames & Scripts.

UNIT-II

Search strategies: 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, A* algorithm, mini-max etc.), computational complexity, Properties of search algorithms - Admissibility, Monotonicity, Optimality, Dominance.

UNIT-III

Production system: Types of production system-commutative and non-commutative production systems, Decomposable and non-decomposable production systems, Control of search in production systems.

Rule based expert systems: Architecture, development, managing uncertainty in expert systems - Bayesian probability theory, Stanford certainty factor algebra, Nonmonotonic logic and reasoning with beliefs, Fuzzy logic, Dempster/Shaffer and other approaches to uncertainty.

UNIT-IV

Knowledge acquisition: Types of learning, learning by automata, genetic algorithms, intelligent editors, learning by induction.

Natural Language Processing (NLP): Problems in understanding natural languages, Different stages of language analysis, Chomsky Hierarchy of formal languages, Transition network parsers (TNP), Augmented Transition network parsers (ATNP).

Text Books:

1. George F. Luger, Artificial Intelligence, Pearson Education.
2. Dan W. Patterson Introduction to Artificial Intelligence and Expert system, PHI.

Reference Books:

1. Ben Coppin, Artificial Intelligence Illuminated, Narosa Publishing House.
2. Eugene Charniak, Drew McDermott Introduction to Artificial Intelligence, Pearson Education.
3. Nils J. Nilsson Principles of Artificial Intelligence, Narosa Publishing House.
4. Jackson Peter, Introduction to Expert systems, 3rd ed., Pearson-Education.

MCA-14-45(III) INFORMATION SYSTEMS

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Fundamental of Management Information systems: The Fundamental Roles of Information System in business, Trends in Information Systems, Types of Information Systems, Managerial Challenges of Information Technology.

The Components of Information Systems: System Concept, Components of an Information System, Information System Resources, Information System Activities, Recognizing Information Systems

UNIT – II

IT Infrastructure and Emerging Technologies: - IT Infrastructure, Infrastructure Components, Software/Hardware Platform Trends and Emerging Technologies, Management Issues.

Foundation of Business Intelligence: Databases and Information Management: Organizing Data in a Traditional File Environment, The Database Approach to Data Management, Using Database to Improve Business Performance and Decision Making, Managing Data Resources.

UNIT – III

Securing Information Systems: - System Vulnerability and Abuse, Business Value of Security and Control, Establishing a Framework for Security and Control, Technologies and Tools for Security.

Key System Applications for the Digital Age

Enterprise Applications: - Enterprise Systems, Supply Chain Management Systems, Customer Relationship Management Systems, Enterprise Applications: New Opportunities and Challenges.

UNIT – IV

Managing Knowledge: - The Knowledge Management Landscape, Enterprises-Wide Knowledge Management Systems, Knowledge Work Systems, Intelligent Techniques.

Enhancing Decision Making: - Decision Making and Information Systems, Systems for Decision Support, Executive Support Systems (ESS), Group Decision-Support Systems (GDSS).

Text Books:

1. Kenneth C.Laudon, Jane P.Laudon, Management Information Systems Managing the Digital Firm, 10th Edition, Pearson Education.
2. James A O'Brien, George M Marakas, Management Information Systems, 7th Edition, Tata McGraw-Hill.

Reference Books:

1. Laudon & Laudon, Essentials of Management Information Systems, 8/e Pearson Education.
2. McLeod & Schell, Management Information Systems, 10/e, Pearson Education.
3. Rahmatian, Management Information Systems: Learning Exercises and Applications, 1/e Pearson Education.
4. Jawadekar, W.S., Management Information Systems, 2/e, Tata McGraw-Hill.
5. Robert G.Mudrick, Coel E.Ross, James R.Claggett,Information Systems for Modern Management.
6. James A.O'Brien, Management Information Systems.

MCA-14-45(IV) SECURITY IN COMPUTING

Maximum marks: 100 (External: 80, Internal: 20) Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Computer Security Concepts, Threats, Attacks and Assets, Security Functional Requirements, Security Architecture and Scope of Computer Security, Computer Security Trends, Computer Security Strategies. Program Security: Secure Program, Non-malicious Program Error, Viruses and other Malicious Code, Targeted Malicious Code, Control against Program Threats.

UNIT – II

Database Security: Database Management System, Relational Databases, Database Access Control, Inference, Security Requirements, Reliability and Integrity, Sensitive Data, Database Encryption.

Network Security: Threats in Network, Network Security Controls, Firewall- Need for firewall, Characteristics, Types of firewall, Firewall Basing, Intrusion Detection System- Types, Goals of IDS, IDS strengths and Limitations.

UNIT – III

Internet Security Protocols and Standards: Secure Socket Layer (SSL) and Transport Layer Security (TLS), IPv4 and IPv6 Security, Kerberos 672, X.509 678, Public Key Infrastructure.

Linux Security Model, File System Security, Linux Vulnerability, Linux System Hardening, Application Security.

Window Security Architecture, Windows Vulnerability, Windows Security Defense, Browser Defenses.

UNIT – IV

Physical Security Threats, Physical Security Prevention and Mitigation Measures, Recovery form Physical Security Breaches, Security Auditing Architecture, Security Audit Trail, Security Risk assessment, Security Controls or Safeguard, IT Security Plan, Cybercrime and Computer Crime, Intellectual Property, Privacy, Ethical Issues.

Reference Books:

1. Charles. P. Pfleeger & Shari Lawrence Pfleeger, Security in Computing, fourth edition, Pearson Education, 2006.ISBN: 978-81-317-2725-6.
2. William Stalling, Lawrie Brown, “Computer Security Principles and Practice”, First edition, Pearson Education, 2010. ISBN: 978-81-317-3351-6.