YEAR – II, SEMESTER – III

COURSES OF STUDY

S.NO.	SUBJECT CODE	SUBJECT	CONTACT HRS.	CREDIT
1	MCA-301	Computer Network	3-1-0	4
2	MCA-302	Analysis & Design of Algorithm	3-1-0	4
3	MCA-303	E-Governance	2-0-0	2
4	MCA-304	Enterprise Resource Planning	2-0-0	2
5	MCA-305	Graph Theory	3-1-0	4
6	MCA-306	Data Base management Systems	3-1-0	4
PRACTICALS				
7	MCA-311	Computer Network Lab	0-0-2	2
8	MCA-312	ADA Lab	0-0-2	2
9	MCA-313	DBMS Lab	0-0-2	2
10	MCA-314	Minor Project I	0-0-4	4
Total				30

SCHEME OF EXAMINATION

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
1.	MCA-301	Computer Networks	3	1	0	30	20	50	100	150
2.	MCA-302	Analysis & Design of Algorithm	3	1	0	30	20	50	100	150
3.	MCA-303	E-Governance	2	0	0	15	10	25	50	75
4.	MCA-304	Enterprise Resource Planning	2	0	0	15	10	25	50	75
5.	MCA-305	Graph Theory	3	1	0	30	20	50	100	150
6.	MCA-306	Data Base management Systems	3	1	0	30	20	50	100	150
Total (Theory)										750
PARCTICALS										
7	MCA-311	Computer Network Lab	0	0	2		25	25	25	50
8	MCA-312	ADA Lab	0	0	2		25	25	25	50
9	MCA-313	DBMS Lab	0	0	2		25	25	25	50
10	MCA-314	Minor Project I	0	0	4		50	50	50	100
Total (Practical)										250
Total (Theory + Practical)			**16**	**4**	**10**					**1000**

YEAR – II, SEMESTER – IV

COURSES OF STUDY

S. NO.	SUBJECT CODE	SUBJECT	CONTACT HRS.	CREDIT
1	MCA-401 OR MCA-407	Software Project Management OR .NET Framework & C# Programming	3-1-0	4
2	MCA-402	MICROPROCESSOR AND SYSTEMS SOFTWARE	3-1-0	4
3	MCA-403	Software Engineering	3-1-0	4
4	MCA-404	Computer Graphics & Animation	3-1-0	4
5	**Elective-I**	(any one of the following) *MCA 711/712/713/714/715	2-0-0	2
6	**Elective-II**	(any one of the following) *MCA 721/722/723/724/725	2-0-0	2
PRACTICALS				
7	MCA-411	Computer Graphics Lab	0-0-2	2
8	MCA-412	Microprocessor Lab	0-0-2	2
9	MCA-413 OR MCA-415	Software Engg. Lab OR .NET Lab	0-0-2	2
10	MCA-414	Minor Project II	0-0-4	4
Total				30

Elective-I (Any one of the following)
MCA 711 Computer Architecture
MCA 712 System Analysis & Design
MCA 713 Advanced Database Management System
MCA 714 Probability and Stochastic Processes
MCA 715 Advanced Computer Networks

Elective-II (Any one of the following)
MCA 721 Parallel Computing
MCA 722 Digital Image Processing
MCA 723 Information Security
MCA 724 Artificial Intelligence
MCA 725 Multimedia Systems

3

SCHEME OF EXAMINATION

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
1	MCA-401 OR MCA-407	Software Project Management OR .NET Framework & C# Programming	3	1	0	30	20	50	100	150
2	MCA-402	MICROPROCESSOR AND SYSTEMS SOFTWARE	3	1	0	30	20	50	100	150
3	MCA-403	Software Engineering	3	1	0	30	20	50	100	150
4	MCA-404	Computer Graphics & Animation	3	1	0	30	20	50	100	150
5	**Elective-I**	(any one of the following) *MCA 711/712/713/714/715	2	0	0	15	10	25	50	75
6	**Elective-II**	(any one of the following) *MCA 721/722/723/724/725	2	0	0	15	10	25	50	75
Total (Theory)										**750**
PRACTICALS										
7	MCA-411	Computer Graphics & Animation Lab	0	0	2		25	25	25	50
8	MCA-412	Microprocessor Lab	0	0	2		25	25	25	50
9	MCA-413 OR MCA-415	Software Engg Lab Or .NET Lab	0	0	2		25	25	25	50
10	MCA-414	Minor Project II	0	0	4		50	50	50	100
Total (Practical)										**250**
Total (Theory + Practical)			16	4	10					**1000**

TA – Teacher Assessment   CT – Cumulative Test   ESE – End Semester Examination
Note: Duration of ESE shall be 3 (Three) hours.

YEAR – III, SEMESTER – V

COURSES OF STUDY

S. NO.	SUBJECT CODE	SUBJECT	CONTACT HRS.	CREDIT
1	MCA-501	Advanced Software Engineering	3-1-0	4
2	MCA-502	Web Technologies	2-0-0	2
3	MCA503	Business Communication	2-0-0	2
4	**Elective-III**	(any one of the following) *MCA-731/732/733/734/735	3-1-0	4
5	**Elective-IV**	(any one of the following) *MCA-741/742/743/743/745	3-1-0	4
6	**Elective-V**	(any one of the following) *MCA-751/752/753/754/755	3-1-0	4
PRACTICALS				
7	MCA-511	Advanced Software Engineering / UML Lab	0-0-2	2
8	MCA-512	Web Technologies Lab	0-0-2	2
9	MCA-513	Business Communication Lab	0-0-2	2
10	MCA-515	General Proficiency	0-0-4	4
		Total		30

Elective-III (any one of the following)
MCA 731 Advanced Computer Architecture
MCA 732 Data Warehouse & Data Mining
MCA 733 Advanced Operating Systems
MCA 734 Soft Computing
MCA 735 Mobile & Adhoc Computing

Elective-IV (any one of the following)
MCA 741 Embedded Systems
MCA 742 Pattern Recognition
MCA 743 Cryptography and Network Security
MCA 744 Natural language Processing
MCA 745 Multimedia Communication

Elective-V (any one of the following)
MCA 751 Real Time Systems
MCA 752 Operation Research
MCA 753 Modeling & Simulation
MCA 754 Bio Informatics
MCA 755 Client Server Computing

SCHEME OF EXAMINATION

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total
						SESSIONAL EXAM			ESE	
			L	T	P	CT	TA	Total		
1	MCA-501	Advanced Software Engineering	3	1	0	30	20	50	100	150
2	MCA-502	Web Technologies	2	0	0	15	10	25	50	75
3	MCA503	Business Communication	2	0	0	15	10	25	50	75
4	**Elective-III**	(any one of the following) *MCA-731/732/733/734/735	3	1	0	30	20	50	100	150
5	**Elective-IV**	(any one of the following) *MCA-741/742/743/743/745	3	1	0	30	20	50	100	150
6	**Elective-V**	(any one of the following) *MCA-751/752/753/754/755	3	1	0	30	20	50	100	150
Total (Theory)										**750**
PARCTICALS										
7	MCA-511	Advanced Software Engineering Lab	0	0	2		25	25	25	50
8	MCA-512	Web Technologies Lab	0	0	2		25	25	25	50
9	MCA-513	Business Communication Lab	0	0	2		25	25	25	50
10	MCA-514	General Proficiency	0	0	4		50	50	50	100
Total (Practical)										**250**
Total (Theory + Practical)			**16**	**4**	**10**					**1000**

TA – Teacher Assessment   CT – Cumulative Test   ESE – End Semester Examination

Note: Duration of ESE shall be 3 (Three) hours.

YEAR –III, SEMESTER – VI

COURSES OF STUDY

S.NO.	SUBJECT CODE	SUBJECT	CONTACT HRS.	CREDIT
	MCA601	Industrial Project work for 16 weeks*	30	30

SCHEME OF EXAMINATION

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
1	MCA-671	Industrial Project	0	0	0	-	500	500	500	1000
				Total	**500**					

TA – Teacher Assessment   CT – Cumulative Test   ESE – End Semester Examination

Note: Duration of ESE shall be 3 (Three) Hours

YEAR II, SEMESTER –III

MCA 301 - COMPUTER NETWORKS

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Unit-I

Introductory Concepts: Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer- transmission, switching methods, Integrated services digital networks, terminal handling.

Unit-II

Medium access sub layer: Channel allocations, LAN protocols, ALOHA Protocols- Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, FDDI, Data Link Layer- elementary data link protocols, sliding windows protocols, error handling, High Level Data Link Control

Unit-III
Network Layer: Point-to Point networks, routing algorithms, congestion control algorithms, internetworking, TCP/IP packet, IP addresses, IPv6.

Unit-IV
Transport Layer: Design issues, connection management, TCP window Management, User Datagram Protocol, Transmission Control Protocol.

Unit-V
Application Layer: Network Security, DES, RSA algorithms, Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper   Text Transfer Protocol, Cryptography and compression Techniques.

References
2.   W. Stallings, "Data and Computer Communication", Macmillan Press
3.   Forouzan, "Data Communication and Networking", TMH

MCA 302 - ANALYSIS AND DESIGN OF ALGORITHM	**L T P**
	3 1 0

Unit-I

Introduction:
Algorithms, Analysis of Algorithms, Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences
Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort
Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort
Medians and order statistics

Unit-II

Advanced Data Structure: Red-Black Trees, Augmenting Data Structure. B Trees, Binomial Heaps, Fibonacci Heaps, Data Stricture for Disjoint Sets.

Unit-III

Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis

Unit-IV

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem.

Unit –V

Randomized Algorithms, String Matching, NP-Hard and NP-Completeness, Approximation Algorithms.

Text Books:
1. Coreman, Rivest, Lisserson, : "Algorithm", PHI.

References

1 M T Goodrich etal, "Algorithms Design", John Wiley
2 A V Aho etal, "The Design and analysis of Algorithms", Pearson Education

MCA 303 - E-Governance

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2 1 0

Unit I

Overview of E-Government and E-Governance, Stages of E-Governance, National E- Governance Plan (NeGP), Mission Mode Projects and their implementation status, E-Governance , Introduction to E-governance, Role of ICT's in e-governance, Need, importance of E-governance

Unit II

Categories of E-governance, Key Issues of E-Governance, Technology, Policies,Infrastructure,Training, Copyrights , Consulting Funds, E-governance Models, Model of Digital Governance, Broadcasting /Wider Dissemination Model

Unit III

 Critical Flow Model, Interactive-service model/Government –to-Citizen-to-Government Model (G2C2G), Major areas of E-governance Services, Public Grievances: Telephone, Ration card, transportation, Rural services Land Records, Police: FIR registration, Lost and found, Social services: Death, domicile, school certificates

Unit IV

Public information: employment, hospitals, railway, Agricultural sector: Fertilizers, Seeds, Utility payments Electricity, water, telephone, Commercial: income tax, custom duty, excise duty-Governance Infrastructure, stages in evolution and strategies for success, -Governance Infrastructure, stages in evolution and strategies for success

Unit- V

Human Infrastructural preparedness, Challenges against E-governance, Study of E-governance initiatives in Indian states, E-readiness, Legal Infrastructural preparedness

Reference books

(1) Geo-information international publications
(2) E-governance projects, PHI publication

MCA-304 - Enterprise Resource Planning

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2 1 0

Unit-I
Enterprise wide information system, Custom built and packaged approaches, Needs and Evolution of ERP Systems, Common myths and evolving realities, ERP and Related Technologies, Business Process Reengineering and Information Technology, Supply Chain Management, Relevance to Data Warehousing, Data Mining and OLAP, ERP Drivers, Decision support system

Unit-II
ERP Domain, ERP Benefits classification, Present global and Indian market scenario, milestones and pitfalls,
Forecast, Market players and profiles, Evaluation criterion for ERP product, ERP Life Cycle: Adoption Decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement phases, ERP Modules

Unit- III
Framework for evaluating ERP acquisition, Analytical Hierarchy Processes (AHP), Applications of AHP in Evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation vendor's evaluation criterion, ERP Implementation approaches and methodology, ERP Implementation strategies, ERP Customization, ERP-A manufacturing Perspective

Unit- IV
Critical success and failure factors for implementation, Model for improving ERP effectiveness, ROI of ERP Implementation, Hidden costs, ERP success inhibitors and accelerators, Management concern for ERP success,
Strategic Grid: Useful guidelines for ERP Implementations.

Unit- V
Technologies in ERP Systems and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues discussed in above units through Soft System approaches or Qualitative Analysis tools, Learning and Emerging Issues, ERP and E-Commerce.

References
1. A. Lexis Leon, "Enterprise Resource Planning", TMH
2. Brady, Manu, Wegner, "Enterprise Resource Planning", pearson

MCA-305 – GRAPH THEORY

L T P
3 1 0

Unit 1

Graphs, sub-graphs, some basic properties, Walks, Path & circuits, Connected graphs, Disconnected graphs and component, Euler and Hamiltonian graphs, The traveling sales man problem, Various operation on graphs.

Unit II

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and dijkstra Algorithms.

Cut-sets and cut vertices, some properties, All cut sets in a graph, Fundamental circuit and cut sets, Connectivity and seperatability, Network flows, mincut theorem, Planar graphs, Combinatorial and geometric dual, Kuratowski to graph detection of planarity, Geometric dual, Some more criterion of planarity, Thickness and Crossings.

Unit III

Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set verses subspaces, orthogonal vectors and subspaces, incidence matrix of graph, sub matrices of A(G), circuit matrix, cut set matrix, path matrix and relationships among Af, Bf, and Cf, fundamental circuit matrix and rank of B, adjacency matrices, rank- nullity theorem .

Unit IV

Coloring and covering partitioning of graph, Chromatic number, Chromatic partitioning, Chromatic polynomials, Matching, covering, Four color problem.

Unit V

Directed graph, Types of directed graphs, Directed paths and connectedness, Euler digraph, Trees with directed edges, Fundamental circuit in digraph, Matrices A, B, C of digraph adjacency matrix of digraph, Enumeration and its types, Counting of labeled and unlabeled trees, Polya's theorem, Graph enumeration with polyas theorem, Graph theoretic algorithm.

References
3. Joshi K. D., "Fundamental of discrete mathematics", New Age International
4. John Truss, "Discrete mathematics for computer scientist"
5. C. L. Liu, "Discrete mathematics

MCA 306 - Data Base management Systems

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3 1 0

Unit- I
Introduction: An overview of database management system, Database System Vs File System, Database System concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure
Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping
constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of
An ER diagrams to tables, extended ER model, relationships of higher degree.

Unit- II
Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity,
Referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus
Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL Commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate
Functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL. PL/SQL, Triggers and clusters

Unit- III
Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms,
BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design

Unit- IV
Transaction Processing Concepts: Transaction system, testing of serializability, Serializability of schedules,
Conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery,
Checkpoints, deadlock handling

Unit- V
Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version
Schemes, Recovery with concurrent transaction. Transaction Processing in Distributed system, data fragmentation. Replication and allocation techniques for distributed system, overview of concurrency control
and recovery in distrusted database

References
1 Date C J, "An Introduction To Database System", Addison Wesley
4 Paul Beynon Davies, "Database Systems", Palgrave Macmillan
8 Bharti P.K, "An introduction to Database Systems", JPNP

MCA-311 COMPUTER NETWORK LAB

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0 0 2

The lab is to be conducted in Perl programming language, Perl works on all platforms (including windows)

1. Write few basic programs of Perl.
   a. A Hello World Program
   b. Write a program to add to 10 numbers.
   c. Write a program of reading input from the keyboard and displaying them on monitor. d. Write a program to take two strings as input and compare them
2. To understand advance constructs of Perl
   a. Write a program to create a list of your course (all theory courses in current semester) using array and print them.
   b. Write a program to accept ten number, store it into a hash table (Perl have itself) and when asked by user tell him that number exists or not. (do not store duplicate numbers)
   c. Write a program to compute the number of lines in a file.
3. Find the IP address of a host or turn an IP address into a name.
4. Connect to an FTP server and get or put files. Automate the one-time transfer of many files to download the file everyday, which have changed since yesterday. (use Net:FTP)
5. Write a program to send mail. The programs should monitor system resources like disk space and notify admin by mail when disk space becomes dangerously low. (use Net:mail)
6. Fetch mail from a POP3 server (use Net:pop3)
7. Find out who owns a domain (use Net:whois , Whois is a service provided by domain name registration authorities to identify owners of domain names)
8. Test whether a machine is alive. Machine can be specified using IP address or domain name of machine.
9. Write a program to fetch content of a URL from a perl script, convert it to ASCII text (by stripping html tags) and display it.
10. Write program for TCP Server, TCP Client and create a sample code to show server-client communication over TCP.

OR

The lab is to be conducted in programming language/tools/plateform

11. Study of complete network architecture of your institution (including topology, network devices cabling standards, protocol and security features).
12. Hands on experiment for configuring network interface card for connecting two systems.
13. Test the connectivity between two hosts.
14. Test all options of ping.
15. Write a Program to find the IP address and domain name of your system.
16. Write a Program to establish connection between a TCP client & server for studying nature of client server communication.
17. Write a Program to connect ftp server to get & put file.
18. Study IEEE standards & find out their implementation in networking environment.
19. Write a program to find an IP address of host and turn on IP address into domain name.
20. Make a report on LAN establishment in any of organization including hardware & networking aspects.

MCA-312 ANALYSIS AND DESIGN OF ALGORITHM LAB

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0 0 2

Perform any TEN program in suitable language

1. Write a program to draw a line using DDA algorithm.
2. Write a program for implementing Bresenham's algorithm for line generation
3. Write a program for generation of circle.
4. Write a program to demonstrate Cohen- Sutherland line clipping method.
5. Write a program to implement Sutherland- Hodgeman polygon clipping algorithm.
6. Write a program to rotate a triangle. (By asking the user to input the coordinates of the Triangle and the angle of rotation)
7. Write a program to perform one point perspective projection of an object.
8. Write a program to implement Depth- Buffer method to display the visible surfaces of a given polyhedron.
9. Write a program to implement 3-D rotation of an object.
10. Write a program to draw ployline using any algorithm.
11. Write a program to draw a Bezier curve and surface.
12. Divide and conquer method (quick sort, merge sort,)
13. Greedy method (knapsack problem, job sequencing, optimal merge patterns, minimal spanning trees).
14. Dynamic programming (multistage graphs, OBST, 0/1 knapsack, traveling sales person problem).
15. Implement Back tracking
16. Sorting : Insertion sort, Heap sort, Radix sort
17. Searching : Sequential and Binary Search
18. Selection : Minimum/ Maximum, K th smallest element.
19. Implement Depth First Search and Breadth First Search.
20. Write program to implement Prims algorithm.
21. Write program to implement Prims algorithm.

Note: Students are advised to use C, C++ language for writing program; Use of open GL is desirable.

MCA 313 - DATABASE MANAGEMENT SYSTEM LAB

List of Experiment:

1. Write the queries for Data Definition and Data Manipulation Language.
2. Write SQL queries using logical operations (=,<,>,etc)
3. Write SQL queries using SQL operators
4. Write SQL query using character, number, date and group functions
5. Write SQL queries for relational algebra
6. Write SQL queries for extracting data from more than one table
7. Write SQL queries for sub queries, nested queries
8. Write programme by the use of PL/SQL
9. Concepts for ROLL BACK, COMMIT & CHECK POINTS
10. Create VIEWS, CURSORS and TRGGERS & write ASSERTIONS.
11. Create FORMS and REPORTS
Note:
1. The queries to be implemented on DBMS using SQL 2. Students are advised to use Developer 2000/Oracle9i or other latest version for above experiments. However student may use Power Builder/SQL SERVER or DB2.Mini Projects may also be planned & carried out through out the semester to understand important concepts of database.

YEAR II, SEMESTER –IV

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MCA 401 – SOFTWARE PROJECT MANAGEMENT

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Unit I

Introduction to Software Project Management:

Software development as a project; Stakeholders in software project; Software product, process, resources, quality, and cost; Objectives, issues, and problems relating to software projects.

Overview of Project Planning:

Steps in project planning; Defining scope and objectives; work breakdown structure; Deliverables and other products; time, cost, and resource estimation; Alternatives in Planning

Project Evaluation:

Strategic assessment; Technical assessment; Cost-benefit analysis; Cash flow forecasting; Cost-benefit evaluation techniques; Break-even analysis; Risk evaluation

Unit II

Selection of Appropriate Project Approach:

Choosing development technology and methodology; choice of process model; Rapid application development; Waterfall model; V-process model; Spiral model; Prototyping; Incremental delivery.

Software Effort Estimation

Problem in software estimation; Effort estimation techniques; Expert judgment; Estimation by analogy; Delphi technique; Algorithmic methods; Top-down and bottom-up estimation; Function point analysis; Object points; COCOMO model.

Unit III

Activity Planning

Network planning model; Activity-on-arrow network; Precedence network; Forward pass; Backward pass; Critical path; Slack and float.

Risk Analysis and Management

Nature and categories of risk in software development; risk Identification; Risk assessment; Risk mitigation, monitoring, and management; Evaluating schedule risk using PERT.

Recourse Allocation

Nature of project resources; Identifying resource requirement of activities; Allocating and scheduling resources; cost of resources; Standard, planned, and actual cost; Cost variance; time-cost trade-off. **Unit IV**

Project Tracking and Control

Measurement of physical and financial progress; Earned value analysis; Status reports; Milestone reports; Change control.

Contact Management

Outsourcing of products and services; Types of contracts; Stages in contract placement; Terms of contract; Contract monitoring; Acceptance testing

Unit V

Software Quality Assurance

Planning for quality; Product versus process quality management; Procedural and quantitative approaches; Defect analysis and prevention; Statistical process control; Pareto analysis; Causal analysis; Quality standards; ISO 9000; Capability Maturity Model; Quality audit.

1. Robert T. Futrell, Donald F. Shafer, and Linda I.. Shafer, "Quality Software Project Management" 2002, Pearson Education Asia.
2. Ramesh Gopalaswamy, "Managing Global Software Projects", 2003, Tata McGraw-Hill

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OR

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YEAR II, SEMESTER –IV   **L T P**
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MCA – 407 .Net FRAMEWORK AND C# PROGRAMMING

UNIT I
Introduction to C#, CLR, Visual studio console app, Simple windows forms, C# language fundamentals, Enumerations, structures, Namespaces
UNIT II
C# Object oriented programming: OOPs, Encapsulation, Inheritance, Polymorphism, Object Lifetime, Components, Modules, Windows Forms, Interface, Cloneable objects, Comparable objects, Collections Namepaces

Advanced Class Construction: Custom Indexer, Overloading operators, Delegates, Events
UNIT III
Assemblies, Thread, and AppDomains: C# assemblies, GAC, threads, contexts, Appdomains, Processes concepts, Concurrency and synchronization- Locks, Monitors, ReaderWriterLock, Mutexes, Thread pooling,
UNIT IV
IO, Object serialization and remoting: System.IO, Streams, TextWriter, TextReader, BinaryWirter, BinaryReader, Serialized Object Persistence and formatters, Remoting

ADO.Net, C# windows forms for data control: Grid, Datasource and databinding controls, Connected and disconnected scenarios, ADO.Net system, Data, Dataset, connections, Adapters, commands, datareaders,
UNIT V
ASP.net: Introduction, Architecture, Web forms,Web servers, Server controls, Data connectivity using ASP.net, Introduction of XML, Using XML with ASP.nat

Text Books

1. A Guide to the Project Management Body of Knowledge (PMBOK), Project Management Institute, PA, (2004).

2. Harold Kerzner, Frank P. Saladis, Project Management Workbook and PMP/CAPM Exam Study Guide , Wiley Publishers (2006)

3. Addison Wesley –C# Developers Guide to ASP.Net

4. Wiley," Beginning Visual C# 2008",Wrox

Reference Books

1. Claudia M. Baca, Patti, PMP: Project Management Professional Workbook, Sybex, Workbook (2003).

2. C#.Net Developers Guide- Greg Hack, Jason Werry, Saurabh Nandu. (SyngRess)

3. Wrox Press Professional C# 3rd Edition – Simon Robinson, Jay Glynn

MCA 402 - MICROPROCESSOR AND SYSTEMS SOFTWARE

L T P
3 1 0

Unit-I

Introduction to Microprocessors, microcomputers and Assembly language, Microprocessor architecture and microcomputer systems. 8085 architecture and memory interfacing, Interfacing I/O devices;

Unit II

Programming 8085: Introduction to 8085 Instructions: Programming Techniques, Counters and Time Delays, Stacks and Subroutines, Interrupts, General purpose programmable peripheral devices

Unit-III

Introduction to system software: definition, feature of system programming, system programming vs. application programming and type of system programmes
Assembler: single pass assembler, two-pass assembler, and general design procedure of an assembler.

Unit -IV

Macro processor: macro language and its features, macro instructions, features of macro facility, implementation, one pass macro processor, two pass macro processor, Implementation.
Loaders and linkers: simple linker vs. loaders, and design and implementation of direct linking loader, subroutine linkage & other loader schemes

Unit-V

Compilers: overview of compilation process, lexical analysis, syntax analysis, semantic analysis and intermediate code generation and code optimization techniques, compiler vs. interpreter. Introduction to device driver, functions and structure of text editor.

References:
1. R.S Goankar, "Microprocessor architecture, programming and application with the 8085", Pen Ram International.
2. Aho and Ulman, "Principles of Compilers", Narosa Publishing House, 1986.

MCA 403 - SOFTWARE ENGINEERING

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3 1 0

Unit-I Introduction:
Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes.
Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

Unit-II Software Requirement Specification:
Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS.
Software Quality Assurance (SQA),SEI-CMM Model.

Unit –III Software-Design:
Design principles, problem partitioning, abstraction, top down and bottom up-design, structured approach, functional versus object oriented approach, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures.
Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, and Cyclomatic Complexity Measures: Control Flow Graphs.

Unit-IV Coding:
Top-Down and Bottom –Up programming, structured programming, information hiding, programming style and internal documentation.
Testing: Testing principles, Levels of testing, functional testing, structural testing, test plane, test case specification, reliability assessment, software testing strategies, Verification & validation, Unit testing, Integration Testing, Alpha & Beta testing, system testing and debugging.

Unit-V Software Maintenance and Project Management:
Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering.
The Management spectrum- (The people, the product, the process, the project), cost estimation, project scheduling, staffing, software configuration management, Structured Vs. Unstructured maintenance, quality assurance, project monitoring, risk management.

References
1. Ghezzi, Carlo and Others, "Fundamentals of Software Engineering", PHI
2. Alexis, Leon and Mathews Leon, "Fundamental of Software Engineering", Vikas
3. Pfleerger, S, "Software Engineering", Macmillan, 1987

MCA-404 COMPUTER GRAPHICS & ANIMATION

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3 1 0

Unit – I
Introduction and Line Generation:Types of Computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Mid point circle generating algorithm, and parallel version of these algorithms.

Unit – II
Transformations: Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.

Unit – III
Three Dimensional: 3-D geometric primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.

Unit – IV
Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects, Introductory concepts of Spline, Bspline and Bezier curves and surfaces. Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models – Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows.

Unit – V
Computer Animations : Conventional and computer assisted animation, design of animation sequences, interpolation, simple animation effects, animation languages (Key Frame System, Parameterized systems), motion specifications, methods of controlling animation.

References:
1. Prajapati A. K, "Computer Graphics", PPM Ed 2
2. Rogers and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill

Elective-I (Any one of the following)
MCA 711 Advanced Computer Architecture
MCA 712 System Analysis & Design
MCA 713 Advanced Database Management System
MCA 714 Probability and Stochastic Processes
MCA 715 Advanced Computer Networks

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MCA 711 COMPUTER ARCHITECTURE

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Unit I: Introduction to Computer Architecture
Overview and history; Pentium and power pc evolution; Computer system components; Functions; Inter connection structure; Bus inter connection; Basics of PCI bus; The cost factor; Performance metrics and evaluating computer designs; Memory hierarchy; Assembly / machine language; Von Neumann machine cycle; Microprogramming / firmware; Memory addressing; Classifying instruction set architectures; RISC versus CISC

Unit II: Pipelining
General considerations; Comparison of pipelined and nonpipelined computers; Instruction and arithmetic pipelines, examples; Structural hazards and data dependencies; Branch delay and multicycle instructions
Superscalar computers

Unit III: Memory System Design
Cache memory; Basic cache structure and design; Fully associative, direct, and set associative mapping
Analyzing cache effectiveness; Replacement policies; Writing to a cache; Multiple caches; Upgrading a cache; Cache Coherence; Main Memory; Virtual memory, structure, and design; Paging; Replacement strategies; Secondary memory

Unit IV: Multiprocessors and Multi-Computers
SISD, SIMD, and MIMD architectures; Centralized and distributed shared memory- architectures; superscalar architectures; VLIW; multi-threaded and trace-based architectures.

Books:-
2. Hennessy and Patterson," Computer Architecture: A Quantitative Approach", Elsevier
3. Dezso and Sima, "Advanced Computer Architecture", Pearson

MCA 712 SYSTEM ANALYSIS & DESIGN

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Unit I

Introduction to Information System Development: What is System Analysis and Design? Business System concepts; Categories of Information systems; System development Strategies. Managing the application development portfolio : How system projects have begun; Managing project review and selection; Preliminary investigation; Selecting the project development strategies. System Development Life Cycle, Waterfall Model , Spiral Model, Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, COCOMO model.

Unit II

Tools for determining system requirement : What is requirements determination? Fact
finding techniques; Tools for documenting procedure and decision; Structured Analysis development strategies : Structured Analysis. Developing Data flow diagrams; Data Dictionary; ER Diagram.
Process Organization & Interactions. System Design – Problem Partitioning, Top-Down And Bottom- Up design ; Decision tree, decision table and structured English; Functional vs. Object- Oriented approach. Computer Aided Systems Tools : Role of Tools; Categories of automated Tools; CASE Tools; Benefits of CASE.

Unit III

The Analysis to design transitions : Specifying Application requirements; Objectives in designing Information systems. What features must be designed? Design of computer output : How to identify computer Output needs; How to present information; Designing printed output; Designing visual concerns guide input design; Capturing data for input; Input validation.

Unit IV

Systems Engineering and Quality assurance : Design objectives; Program structure charts; Design of Software; Managing Quality assurance; Managing testing practices. Managing system implementation: Training; Conversion; post implementation review. Managing information systems development : Estimation and management of development time; Estimation; Personnel and development management. Hardware and Software selection : Hardware selection; Software Selection.

REFERENCE BOOK
1. Systems Analysis and Design, Kendall & Kendall, Pearson Education Inc.,
1. *Systems Analysis and Design,* Dennis, Wixom, Roth, 3rd Edition, John Wiley & Son Inc.,

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MCA 713 ADVANCED DATABASE MANAGEMENT SYSTEM

UNIT-1
Distributed DBMS Concepts and design: Introduction, functions and architecture of a DDBMS, distributed relational database design, Transparencies in a DDBMS, Twelve rules for a DDBMS. Advanced concepts: Distributed transaction management, distributed concurrency control, distributed deadlock management, distributed database recovery, X/open distributed Transaction processing model, Replication servers, Distributed query optimization, Mobile databases.

UNIT-2
Object-Oriented DBMS Introduction, advanced database applications, weakness of RDBMS, storing objects in a relational database, next-generation database systems. Concepts and design: OODBMS perspectives, persistence, issues in OODBMS, advantages and disadvantages of OODBMS, Object-oriented database design.

UNIT-3
Standards and systems: object management group, object database standard ODMG 3.0 1999, Object store. Object relational DBMS: Introduction, third generation database manifestos, SQL8, Object oriented extensions in Oracle, Comparison of ORDBMS and OODBMS.

UNIT-4
Web technology and DBMS, Web as a database Application Platform: Requirements for web-DBMS integration, web-DBMS architecture, advantages and disadvantages of web-DBMS approach, approaches to integrating the web and DBMS, Oracle Internet Application Server (IAS).

Books:
1. Adam, Nabil R., Bhargava, Bharat K., "Advanced Database Systems", Springer.
2. Carlo Zaniolo, Stefano Ceri, "Advanced Database Systems", Morgan Kaufmann, 1997

<div align="center">**MCA 714 PROBABILITY AND STOCHASTIC PROCESSES**</div>

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Unit-I
Introduction: Probability models, Algebra of events, probability axioms, conditional probability, Baye's rules, Bernoulli traits.
Discrete Random Variables: Discrete random variables, probability mass functions, discrete distribution functions-Bernoulli, Binomial, geometric, Poisson, hyper geometric & uniform distributions, probability generating function.

Unit-II
Continuous Random variable: Exponential distribution, memory less property, application to reliability, hypo exponential, Erlang, Gamma, hyper exponential & Normal distributions ,order statistics, distribution of sums.
Expectation: Expectation, variance, moments of important distribution, Expectation of functions of more than one random variable, Application to the computation of MTTF of series system parallel system, standby redundancy, TMR & NMR system.

Unit III
Stochastic process: classification of stochastic process, Markov process, Bernoulli process, Poisson process , renewal processes.
Discrete Parameter Markov Chains: Computation of n-step transition probability, state classification
& limiting distribution of times between state changes irreducible finite chains with aperiodic states, discrete parameter birth-death processes, Analysis of program execution time, M|G|1 , Queue, pollackek-khinchin formula.

Unit IV
Continuous parameter Markov chains
Birth & death process, M|M|1 Queue, M|M|m Queue, cyclic Queuing model of a multiprogramming system, Machine repairman model, computation of response time in a terminal oriented system. Queuing system with finite populations.
Networks of queues: Introductory concept of open & closed queuing networks.

References:
1. Hisashi Kobayashi: Modeling and Analysis-An Introduction to system performance Evalution Methodology," Addison Wesley
2. W. Feller-An introduction to probability theory & its application (vol1.)(John Wiley & sons, NY.)
3. U.N.Bhat-Elements of applied stochastic processes, John Wiley & sons, NY.

MCA 715 ADVANCED COMPUTER NETWORKS

Unit I:

Introduction: Overview of computer network, seven-layer architecture, TCP/IP suite of protocol, etc. Mac protocols for high-speed LANS, MANs & WIRELESS LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet etc.) Fast access technologies. (For example, ADSL, Cable Modem, etc.)

Unit II:

IPv6: why IPv6, basic protocol, extension & option, support for QoS, security, etc, neighbor discovery, auto-configuration, routing. Change to other protocols. Application programming interface for IPv6. 6bone.

Unit III:

Mobility in network. Mobile. Security related issues.

IP Multicasting. Multicasting routing protocols, address assignments, session discovery, etc.

TCP extensions for high-speed networks, transaction-oriented application, other new option in TCP.

Unit IV:

Network security at various layers. Secure-HTTP, SSL, ESP, Authentication header, Key distribution protocols. Digital signatures, digital certificates.

References:

1. W. R. Stevens, "TCP/IP illustrated, Volume 1: The protocols", Addison Wesley 1994.
2. G. R. Wright. "TCP/IP illustrated, Volume 2: The implementation", Addison Wesley 1995

Elective-II (Any one of the following)
MCA 721 Parallel Computing
MCA 722 Digital Image Processing
MCA 723 Information Security
MCA 724 Artificial Intelligence
MCA 725 Multimedia Systems

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MCA 721 PARALLEL COMPUTING

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UNIT-I
Introduction: What is parallel and distributed computing, Scope of parallel and distributed computing, Scope of parallel computing. Parallel Programming Platforms: implicit parallelism, Dichotomy of parallel computing platforms, Physical organization for parallel platforms, communication cost in parallel machines, routing mechanism for interconnection networks.

UNIT-II
Basic Communication Operation: One-to-all broadcast; All-to-all broadcast; Reduction and prefix sums; One-to-all personalized communication; All-to-all personalized communication;

UNIT-III
Performance and Scalability of Parallel Systems: Performance matrices for Parallel systems? Run time, Speed up, Efficiency and Cost; The effect of granularity on performance
Sorting: Sorting networks; Bubble sort and its variants; Quick sort and other sorting algorithms

UNIT-IV
Dynamic Programming: Overview of dynamic programming, Serial monadic DP Formulations: The shortest path Problem, the 0/1 Knapsack Problem, Serial Polyadic DP Formulation : all pair shortest paths algorithms.

References:
1. Vipin Kumar, Ananth Grama, Anshul Gupta and George Karypis; Introduction to Parallel Computing, The Benjamin/Cumming Publishing Company, Inc., Masschachusetts
2. George Coulouris, Jean Dollimore and Tim Kindberg; Distributed Systems Concepts and Design, Addison-Wesley, Masschachusetts
3. S G Akl; The Decision and analysis of parallel algorithms, PH Englewood Cliffs, New Jersey.
4. T G Lewis and H El ?Rewini; Introduction to Parallel Computing, Prentice-Hall, Englewood Cliffs, New Jersey.

MCA 722 DIGITAL IMAGE PROCESSING

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UNIT-I Introduction and Fundamentals

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

Image Enhancement in Spatial Domain: Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations, Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

UNIT-II

Image Enhancement in Frequency Domain: Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.
Image Restoration: A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

UNIT-III

Color Image Processing: Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.
Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

UNIT-IV

Registration: Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth.

Segmentation: Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

Books:

1. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
2. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.

MCA 723 INFORMATION SECURITY

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2 0 0

UNIT-I
History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages, Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security
Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles.

UNIT-II
Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards.
Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls,
Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges

UNIT-III
Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies
Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection
Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN

UNIT-IV
Security metrics- Classification and their benefits, Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data mining, Security, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy, Cyber Crime Types & overview of Cyber Crimes

References :

- Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill
- Furnell, "Computer Insecurity", Springer

MCA 724 ARTIFICIAL INTELLIGENCE

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2 0 0

UNIT -I
Introduction
Introduction to Artificial Intelligence, Simulation of sophisticated & Intelligent Behavior in different area problem 3Olving in games, natural language, automated reasoning, visual perception, heuristic algorithm versus solution guaranteed algorithms.

UNIT - II
Understanding Natural Languages. Parsing techniques, Context free and transformational grammars, transition nets, augmented transition nets, Fillmore's grammars, Shanks Conceptual Dependency, grammar free analyzers, sentence generation, and translation.

UNIT III
Knowledge Representation
First order predicate calculus, Horn Clauses, Introduction to PROLOG, Semantic Nets, Partitioned Nets, Minskey frames, Case Grammar Theory, Production Rules Knowledge Base, the Interface System, Forward & Backward Deduction.

UNIT - IV
Expert System
Existing Systems (DENDRAL, MYCIN), Inference Engine, domain exploration Meta Knowledge, Expertise Transfer, Self Explaining System.

UNIT - V
Pattern Recognition
Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception Semantic & Model, Object Identification, Speech Recognition. Programming Language; Introduction to programming Language, LISP, PROLOG.

References:
1. Winston, "LISP", Addision Wesley.
2. Marcellous, "Expert Sys tem Programming", PHI.
3. Elamie, "Artificial Intelligence", Academic Press.

MCA 725 MULTIMEDIA SYSTEMS	L T P
	2 0 0

Unit-I: Introduction

Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products

Stages of Multimedia Projects: Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools.

Unit-II: Multimedia Building Blocks

Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

Unit-III: Speech Compression & Synthesis

Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression, silence compression & Speech Synthesis.

Unit-IV: Images

Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file formatic animations Images standards, JPEG Compression, Zig Zag Coding, Multimedia Database.Content based retrieval for text and images,Video:Video representation, Colors, Video Compression, MPEG standards, MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast Services, Indexing and retrieval of Video Database, recent development in Multimedia.

Books:

1. Buford "Multimedia Systems" Addison Wesley.

2. Agrawal & Tiwari "Multimedia Systems" Excel.

3. Mark Nelson "Data Compression Book" BPB.

4. Sleinreitz "Multimedia System" Addison Wesley.

MCA-411 COMPUTER GRAPHICS & ANIMATION LAB

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1. Implementation of line generation using slope's method, DDA and Bresenham's algorithms.
2. Implementation of circle generation using Mid-point method and Bresenham's algorithm.
3. Implementation of ellipse generation using Mid-point method.
4. Implementation of polygon filling using Flood-fill, Boundary-fill and Scan-line algorithms.
5. Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection and Shearing (write a menu driven program).
6. Implementation of Line Clipping using Cohen-Sutherland algorithm and Bisection Method.
7. Implementation of Polygon Clipping using Sutherland-Hodgman algorithm.
8. Implementation of 3D geometric transformations: Translation, Scalind and rotation.
9. Implementation of Curve generation using Interpolation methods.
10. Implementation of Curve generation using B-spline and Bezier curves.
11. Implementation of any one of Back face removal algorithms such as Depth-Buffer algorithm, Painter's algorithm, Warnock's algorithm, Scan-line algorithm)

MCA-412 MICROPROCESSOR LAB

L T P
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- Study of 8085 or 8086/8088 Kit.
- Assembly Language Programs for 8088 kit

(i) address and data transfer.
(ii) addition, subtraction.
(iii) block transfer.
(iv) find greatest numbers.
(v) find r's and (r-1)'s complements of signed and unsigned number

- Assembly Language Programs for 8086/8088

(i) Multiplication of two decimal/binary/hexadecimal/octal numbers.
(ii) Division of two decimal/binary/hexadecimal/octal numbers.
(iii) Conversion of lower case to upper case character.

- Test the performance of Booth's Algorithm for

(i) Signed numbers.
(ii) Unsigned numbers.

MCA-413 SOFTWARE ENGINEERING LAB **L T P**
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Topics to be covered:

1. Problem Analysis and Project Planning Thorough study of the problem- identify project scope, infrastructure.
2. Software Requirement Analysis- Describe the individual Phases/modules of the project deliverables.
3. Data Modeling Use work products – data dictionary, use case diagrams and activity diagrams,
build and test lass diagrams, sequence diagrams and add interface to class diagrams.
4. Software Developments and Debugging.
5. Software Testing – Prepare test plan, perform validation testing coverage analysis, memory
leaks, develop test case hierarchy, Site check and site monitor.
6. Describe: Relevance of CASE tools, high – end and low – end CASE tools, automated support for data dictionaries, DFD, ER diagrams.

List of Experiments :

1. Course Registration System
2. Online ticket reservation system
3. Students marks analyzing system
4. Platform assignment system for the trains in a railway station
5. Payroll System
6. Hotel management system

OR

MCA- 415 .Net Lab: **L T P**
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a. WAP to implement SET, Get Properties?

b. WAP to implement String Using array's?

c. WAP to print the ARMSTRONG Number?

d. Create a console application to calculate area of circle. Accept radius from user Calculate circle area and print it
   Create a console application to build simple calculator Calculator will have following functions Accept 2
   numbers Perform Add/Sub/Div/Mult Print Result.

e. WAP to Use a Exception (Predefined and User defined).

f. WAP to implement the concept of Abstract and Sealed Classes.

g. WAP to implement ADO.Net Database connectivity.

h. WAP to implement the concept of Data Streams.

i. WAP to implement the Events and Delegates.

j. Design the WEB base Database connectivity Form by using ASP.NET.

k. WAP to implement Indexers.

YEAR – III, SEMESTER – V

COURSES OF STUDY

S. NO.	SUBJECT CODE	SUBJECT	CONTACT HRS.	CREDIT
1	MCA-501	Advanced Software Engineering	3-1-0	4
2	MCA-502	Web Technologies	2-0-0	2
3	MCA503	Business Communication	2-0-0	2
4	**Elective-III**	(any one of the following) *MCA-731/732/733/734/735	3-1-0	4
5	**Elective-IV**	(any one of the following) *MCA-741/742/743/743/745	3-1-0	4
6	**Elective-V**	(any one of the following) *MCA-751/752/753/754/755	3-1-0	4
PRACTICALS				
7	MCA-511	Advanced Software Engineering / UML Lab	0-0-2	2
8	MCA-512	Web Technologies Lab	0-0-2	2
9	MCA-513	Business Communication Lab	0-0-2	2
10	MCA-515	General Proficiency	0-0-4	4
Total				30

Elective-III (any one of the following)
MCA 731 Advanced Computer Architecture
MCA 732 Data Warehouse & Data Mining
MCA 733 Advanced Operating Systems
MCA 734 Soft Computing
MCA 735 Mobile & Adhoc Computing

Elective-IV (any one of the following)
MCA 741 Embedded Systems
MCA 742 Pattern Recognition
MCA 743 Cryptography and Network Security
MCA 744 Natural language Processing
MCA 745 Multimedia Communication

Elective-V (any one of the following)
MCA 751 Real Time Systems
MCA 752 Operation Research
MCA 753 Modeling & Simulation
MCA 754 Bio Informatics
MCA 755 Client Server Computing

SCHEME OF EXAMINATION

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
1	MCA-501	Advanced Software Engineering	3	1	0	30	20	50	100	150
2	MCA-502	Web Technologies	2	0	0	15	10	25	50	75
3	MCA503	Business Communication	2	0	0	15	10	25	50	75
4	**Elective-III**	(any one of the following) *MCA-731/732/733/734/735	3	1	0	30	20	50	100	150
5	**Elective-IV**	(any one of the following) *MCA-741/742/743/743/745	3	1	0	30	20	50	100	150
6	**Elective-V**	(any one of the following) *MCA-751/752/753/754/755	3	1	0	30	20	50	100	150
Total (Theory)										**750**
PARCTICALS										
7	MCA-511	Advanced Software Engineering Lab	0	0	2		25	25	25	50
8	MCA-512	Web Technologies Lab	0	0	2		25	25	25	50
9	MCA-513	Business Communication Lab	0	0	2		25	25	25	50
10	MCA-514	General Proficiency	0	0	4		50	50	50	100
Total (Practical)										**250**
Total (Theory + Practical)			**16**	**4**	**10**					**1000**

TA – Teacher Assessment   CT – Cumulative Test   ESE – End Semester Examination

Note: Duration of ESE shall be 3 (Three) hours.

YEAR –III, SEMESTER – VI

COURSES OF STUDY

S.NO.	SUBJECT CODE	SUBJECT	CONTACT HRS.	CREDIT
	MCA601	Industrial Project work for 16 weeks*	30	30

SCHEME OF EXAMINATION

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
1	MCA-671	Industrial Project	0	0	0	-	500	500	500	1000
		Total		**500**						

TA – Teacher Assessment   CT – Cumulative Test   ESE – End Semester Examination
Note: Duration of ESE shall be 3 (Three) Hours

YEAR III, SEMESTER –V

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MCA-501 ADVANCED SOFTWARE ENGINEERING

UNIT I
Unified Modeling Language, Basic structures and modeling classes, common modeling techniques, relationships, common mechanism, class diagrams

UNIT II
Advanced structured modeling, advanced classes and relationships, interfaces, types and roles, instances and object diagram. Basic idea of behavioral modeling.

UNIT III
Object- oriented concepts and principles. Identifying the elements of an object model. Object oriented projects metrics and estimation.
Design for object – oriented systems. The system design process.
Object – oriented testing – testing OOA and OOD models. The object – oriented testing strategies. Inter class testing.

UNIT IV
Technical metrics for O-O systems. Class oriented metrics and metrics for O-O projects. Advanced topics in software engineering. Component based software engineering and development. Classifying and retrieving components.

MCA-502 WEB TECHNOLOGIES

L T P
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UNIT I: Introduction and Web Development Strategies

History of Web, Protocols governing Web, Creating Websites for individual and Corporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development.

UNIT II: HTML, XML and Scripting

List, Tables, Images, Forms, Frames, CSS Document type definition, XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX, Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script.

UNIT III: Java Beans and Web Servers

Introduction to Java Beans, Advantage, Properties, BDK, Introduction to EJB, Java Beans API Introduction to Servelets, Lifecycle, JSDK, Servlet API, Servlet Packages: HTTP package, Working with Http request and response, Security Issues.

UNIT IV: JSP

Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages- Sharing Session and Application Data.

UNIT V: Database Connectivity

Database Programming using JDBC, Studying Javax.sql.*package, accessing a database from a JSP page, Application-specific Database Action, Developing Java Beans in a JSP page, introduction to Struts framework.

Books:

1. Burdman, "Collaborative Web Development" Addison Wesley.

2. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech

MCA-503 BUSINESS COMMUNICATION **L T P**
2 0 0

Unit -I The Elements of Business Communication
   1.1 patterns of communication in the business world: upward, downward, horizontal, grapevine etc
   1.2 internal and external channels of communication; formal and informal channels
   1.3 cross-cultural communications
   1.4 avoiding gender, racial and other forms of bias in communication
   1.5 common forms of oral and written communication in the business world: Oral presentations, interviews and group discussions Memos, reports, summaries and abstracts, e-mails

Unit-II Reading and writing
   2.1 the importance of developing reading skills
   2.2 the sub-skills of reading :
      a. understanding the main idea and supporting details
      b. reading between the lines : inferential reading
      c. understanding the writer's point of view
      d. making predictions
      e. guessing the meanings of unfamiliar words

Unit-III - Notes-making
   3.1 the importance of writing skills
   3.2 the differences between speech and writing
   3.3 the qualities of effective writing : coherence, cohesion, logical structuring and organization, clarity of language, stylistic variation etc.
   3.3 the writing process : pre-writing, drafting, re-writing

Unit -IV Personality development and soft skills
4.1 personality theories: Carl Rogers, Maslow, Eysenck, Murray
4.2 emotional Intelligence
4.3 skimming and scanning

Unit-V
5.1 lateral thinking: Edward De Bono
5.2 soft skills: becoming a good leader and team-player
5.3 inter-relating soft skills and communication skills

Books recommended

1. Business Communication Today by Bovee et al (Pearson)
2. Business Communication by Meenakshi Raman and Prakash Singh (Oxford)
3. Personality: Classic Theories and Modern Research by H.S.Friedman and M.W.Schustack (Pearson Education)
4. Personality Theories by Barbara Engler (Houghton Mifflin Company)
5. Crash Course in Personal Development by Brian Clegg (Kogan Page)
6. Activities for Developing Emotional Intelligence by Adele B.Lynn (HRDPress)
7. Lateral Thinking by Edward De Bono (Penguin)

Elective-III (any one of the following)
MCA 731 Advanced Computer Architecture
MCA 732 Data Warehouse & Data Mining
MCA 733 Advanced Operating Systems
MCA 734 Soft Computing
MCA 735 Mobile & Adhoc Computing

MCA 731 Advanced Computer Architecture

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Unit - I: Introduction and Pipelining
Parallel Computing, Parallel Computer Model, Program and Network Properties, Parallel Architectural Classification Schemes, Flynn's & Feng's Classification, Performance Metrics and Measures, Speedup Performance Laws: Multiprocessor System and Interconnection Networks; IEEE POSIX Threads: Creating and Exiting Threads, Simultaneous Execution of Threads, Thread Synchronization using Semaphore and Mutex, Canceling the Threads.
Basic and Intermediate Concepts, Instruction Set Principle; ILP: Basics, Exploiting ILP, Limits on ILP; Linear and Nonlinear Pipeline Processors; Super Scalar and Super Pipeline Design;

Unit – II: Memory Hierarchy, Thread and Process Level Parallel Architecture
Memory Hierarchy Design: Advanced Optimization of Cache Performance, Memory Technology and Optimization, Cache Coherence and Synchronization Mechanisms.
Introduction to MIMD Architecture, Multithreaded Architectures, Distributed Memory MIMD Architectures, Shared Memory MIMD Architecture, Clustering, Instruction Level Data Parallel Architecture, SIMD Architecture, Fine Grained and Coarse Grained SIMD Architecture, Associative and Neural Architecture, Data Parallel Pipelined and Systolic Architectures, Vector Architectures.

Unit – III: Parallel Algorithms
PRAM Algorithms: Parallel Reduction, Prefix Sums, Preorder Tree Traversal, Merging two Sorted lists; Matrix Multiplication: Row Column Oriented Algorithms, Block Oriented Algorithms; Parallel Quick sort, Hyper Quicksort; Solving Linear Systems: Gaussian Elimination, Jacobi Algorithm; Parallel Algorithm Design Strategies.

Unit –IV: Developing Parallel Computing Applications
OpenMP Implementation in 'C': Execution Model, Memory Model; Directives: Conditional Compilation, Internal Control Variables, Parallel Construct, Work Sharing Constructs, Combined Parallel Work-Sharing Constructs, Master and Synchronization Constructs;

Books:-
1. Kai Hwang," Advance Computer Architecture", TMH
2. Matthew, "Beginning Linux Programming", SPD/WROX
3. Hennessy and Patterson," Computer Architecture: A Quantitative Approach", Elsevier

MCA 732 DATA WAREHOUSE & DATA MINING

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Unit – I
Dss-Uses, definition, Operational Database. Introduction to DATA Warehousing. Data-Mart, Concept of Data-Warehousing, Multi Dimensional Database Structures. Client/Server Computing Model & Data Warehousing. Parallel Processors & Cluster Systems. Distributed DBMS implementations.

Unit – II

DATA Warehousing. Data Warehousing Components. Building a Data Warehouse. Warehouse Database. Mapping the Data Warehouse to a Multiprocessor Architecture. DBMS Schemas for Decision Support. Data Extraction, Cleanup & Transformation Tools. Metadata.

Unit – III

Business Analysis. Reporting & Query Tools & Applications. On line Analytical Processing(OLAP). Patterns & Models. Statistics. Artificial Intelligence.

Unit – IV

Knowledge Discovery, Data Mining. Introduction to Data-Mining. Techniques of Data-Mining. Decision Trees. Neural Networks. Nearest Neighbor & Clustering. Genetic Algorithms. Rule Introduction. Selecting & Using the Right Technique.

Unit – V

Multimedia Data-Mining, Multimedia-Databases, Mining Multimedia Data, Data-Mining and the World Wide Web, Web Data-Mining, Mining and Meta-Data. Data Visualization & Overall Perspective. Data Visualization. Applications of Data-Mining.

References:

1. Margaret H. Dunham, "Data-Mining. Introductory & Advanced Topics", Pearson Education
2. Pieter Adriaans, Dolf Zantinge, "Data-Mining", Pearson Education

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MCA 733 ADVANCED OPERATING SYSTEMS

UNIT-I

Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks – communication primitives. Theoretical Foundations - inherent limitations of a distributed system – lamp ports logical clocks – vector clocks – casual ordering of messages – global state – cuts of a distributed computation – termination detection. Distributed Mutual Exclusion – introduction – the classification of mutual exclusion and associated algorithms – a comparative performance analysis.

UNIT-II

Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems – issues in deadlock detection and resolution – control organizations for distributed deadlock detection – centralized and distributed deadlock detection algorithms –hierarchical deadlock detection algorithms. Agreement protocols – introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture – mechanism for building distributed file systems – design issues – log structured file systems.

UNIT-III

Distributed shared memory-Architecture– algorithms for implementing DSM – memory coherence and protocols – design issues. Distributed Scheduling – introduction – issues in load distributing – components of a load distributing algorithm – stability – load distributing algorithm – performance comparison – selecting a suitable load sharing algorithm – requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction– basic concepts – classification of failures – backward and forward error recovery, backward error recovery- recovery in concurrent systems – consistent set of check points – synchronous and asynchronous check pointing and recovery – check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT-IV

Protection and security -preliminaries, the access matrix model and its implementations.-safety in matrix model-advanced models of protection. Data security – cryptography: Model of cryptography, conventional cryptography-modern cryptography, private key cryptography, data encryption standard- public key cryptography – multiple encryption – authentication in distributed systems.

UNIT-V

Multiprocessor operating systems - basic multiprocessor system architectures – inter connection networks for multiprocessor systems – caching – hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling
.Database Operating systems :Introduction- requirements of a database operating system Concurrency control :
theoretical aspects – introduction, database systems – a concurrency control model of database systems- the problem of concurrency control – serializability theory- distributed database systems, concurrency control algorithms – introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms – concurrency control algorithms, data replication.

REFERENCES

1. Andrew S.Tanenbaum, "Modern operating system", PHI, 2003
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003

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MCA 734 SOFT COMPUTING   **3 1 0**

Unit –I

Introduction to soft computing. Applications of Artificial Neural Networks, fuzzy logic, genetic algorithms and other soft-computing techniques. Their strengths and weaknesses. Synergy of soft computing techniques.

Artificial neural networks : over view of history, Mathematical Models of Neurons, ANN architecture.

Unit-II

Introduction to artificial neural network; Neural Networks: Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Competitive learning networks, Kohonen self organizing networks, Hebbian learning; Hopfield Networks,

Unit-III

Fuzzy Logic: 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.

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Unit - IV

Genetic algorithms(Gas),Evolution strategies(Ess),Evolutionary programming(EP), Genetic Programming(GP), Selecting, crossover, mutation, schema analysis, analysis of selection algorithms; convergence; Markov & other stochastic models.

Unit - V

Other Soft computing approaches Simulated Annealing, Tabu Search, Ant colony based optimisation, etc.

Reference:

1. "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R.G. Palmer, Addison- Wesley, California, 1991.
2. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
3. "Neural Networks: Algorithms, Applications and Programming Techniques", Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

MCA 735 MOBILE & ADHOC COMPUTING   **L T P**
3 1 0

UNIT-I
Issues in Mobile Computing, Wireless Telephony, Digital Cellular Standards, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit II
Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit III
Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit IV
Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit V
What is Ad-hoc Network? , Problems with Message Routing in Wireless Ad-hoc Mobile Networks, Routing scheme based on signal strength, Dynamic State Routing (DSR), Route Maintenance and Routing error, Fisheye Routing (FSR), Ad-hoc on Demand Distance Vector (AODV)

References:
1. Shambhu Upadhyaya, Abhijeet Chaudhary, Kevin Kwiat, Mark Weises, "Mobile Computing", Kluwer Academic Publishers
2. UWE Hansmann, Lothar Merk, Martin-S-Nickious, Thomas Stohe, "Principles of Mobile Computing", Springer International Edition

Elective-IV (any one of the following)
MCA 741 Embedded Systems
MCA 742 Pattern Recognition
MCA 743 Cryptography and Network Security
MCA 744 Natural language Processing
MCA 745 Multimedia Communication

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MCA 741 Embedded Systems   **L T P**
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Unit-I

Introduction to embedded systems: Classification, Characteristics and requirements

Unit-II

Timing and clocks in Embedded systems, Task Modeling and management, Real time operating system issues.

Unit-III

Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing. Modeling and Characterization of Embedded Computation System.

Unit-IV

Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

Unit-V
Fault-Tolerance
Formal Verification**.**

Books:

1. H.Kopetz, "Real-Time Systems", Kluwer, 1997.

2. R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems", Kluwer 1995.

3. Rajkamal, "Embedded Systems", TMH, 2008

MCA 742 PATTERN RECOGNITION

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3 1 0

Unit – 1 Introduction

Pattern recognition, classification and description, patterns and features extraction, training and learning in PR systems, pattern recognition approaches.

Unit – 2 Pattern Discrimination

Decision regions and functions, feature Space Metrics, The Covariance Matrix, Principal components, feature assessment, dimensionality ratio problem

Data Clustering
Unsupervised classification, Standardization issues, tree clustering, dimensional reduction, K-means clustering, cluster validation

Unit – 3 Statistical Classifications

Linear Discriminants, Bayesian classification, Model free techniques, feature selection, classifier evaluation, tree classifier

Unit – 4 Syntactic pattern recognition

Introduction, quantifying structure in pattern description, grammar based approach and applications, elements of formal grammars, recognition of syntactic descriptions, parsing, CYK parsing algorithm

Unit – 5 Structural pattern recognition

Primitives, structural representations, syntactic analysis, structural matching

Text Books:

1. Pattern Recognition: Statistical, structural and neural approaches, Robert J. Schalkoff, WILEY 1992 .
2. Pattern Recognition: Concepts, Methods and applications, J.P. Marques, Springer 2008 .
3. Pattern Recognition: Techniques and applications, rajjan Shinghal, Oxford University Press, 2006 .

MCA 743 CRYPTOGRAPHY AND NETWORK SECURITY

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3 1 0

Unit-I

Introduction to Cryptography: Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model, And Steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes Of Operation.

Unit-II

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128, RC2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement Of Encryption Function.

Unit-III

Public Key Encryption: Public-Key Cryptography: Principles Of Public-Key Cryptosystems, RSA Algorithm, Key Management, Fermat's & Euler's Theorem, Primality, The Chinese Remainder Theorem.

Unit-IV

Hash Functions: Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm.

Unit-V

Network & System Security: Authentication Applications: Kerberos X.509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.

Reference Books:
1. Johannes A. Buchmann, "Introduction to cryptography", Springer- Verlag.
2. Atul Kahate, "Cryptography and Network Security", TMH

MCA 744 NATURAL LANGUAGE PROCESSING

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3 1 0

Unit-I
Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax.

Unit-II
Introduction to semantics and knowledge representation, Some applications like machine translation, database interface.

Unit-III
Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top-Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

Unit-IV
Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomenon in Language, Handling questions in Context-Free Grammars. Human preferences in Parsing, Encoding uncertainty, Deterministic Parser.

Unit-V
Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of-Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context- Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

Books:
1. James Allen, Natural Language Understanding, 2/e, Pearson Education, 2003
2. L.M. Ivansca, S. C. Shapiro, Natural Language Processing and Language Representation
3. T. Winograd, Language as a Cognitive Process, Addison-Wesley

<div align="center">**MCA 745 Multimedia Communications**</div>

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UNIT I
Multimedia Communication: Multimedia information representation. Multimedia Networks, Multimedia applications, Network QoS and application QoS.

UNIT II
Information Representation: text, image, audio and video, text and image compression, compression principles, text compression, image compression. Audio and Video compression. Audio compression. Video compression. Video compression Principles, video compression standards: H.261. H.263.PI.323, MPEG 1, MPEG 2, Other coding formats for text, speech, image and video.

UNIT III
Detailed study of MPEG 4: coding of audiovisual objects, MPEG 4 systems. MPEG 4 audio and video, profile and levels. MPEG 7 standardization process of multimedia content description, MPEG 21 multimedia framework, Significant features of JPEG 2000, MPEG 4 transport across the internet
Synchronization: notion of synchronization, presentation requirements, reference model for synchronization

UNIT IV
Introduction to SMIL: Multimedia operating System, Resource management and process management techniques.

UNIT V
Multimedia communication across networks: Layered video coding, error relevant video coding techniques, multimedia transport across IP networks and relevant products such as RSVP, RTP, RTCP, DVMRP, multimedia in mobile networks, multimedia broadcast networks, and content based retrieval in digital libraries.

References:
1. J.R. Ohm. "Multimedia Communication Technology", Springer International Edition, 2005.
2. K.Sayood. "Introduction to Data Compressiojn", 2nd Ed, Morgan Kauffman. Indian Edition, 2000.
3. Fred Halsall, "Multimedia communication", Pearson Education, 2001.
4. K.R. Rao, Zoram S. Bojkovic, Dragorad A. Milovanovic, "Multimedia Communication System", Pearson Education, 2004.

Elective-V (any one of the following)
MCA 751 Real Time Systems
MCA 752 Operation Research
MCA 753 Modeling & Simulation
MCA 754 Bio Informatics
MCA 755 Client Server Computing

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MCA 751 REAL TIME SYSTEMS

UNIT-I: Introduction
Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

UNIT-II: Real Time Scheduling
Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

UNIT-III: Resources Access Control
Effect of Resource Contention and Resource Access Control (RAC), Nonpreemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

UNIT-IV: Multiprocessor System Environment
Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Protocol,Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for Endto-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems, Predictability and Validation of Dynamic Multiprocessor Systems, Scheduling of Tasks with Temporal Distance Constraints.

UNIT-V: Real Time Communication
Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols, Real Time Protocols, Communication in Multicomputer System, An Overview of Real Time Operating Systems.

Text Books:
1. Real Time Systems by Jane W. S. Liu, Pearson Education Publication.
2. Real-Time Systems: Scheduling, Analysis, and Verification by Prof. Albert M. K. Cheng, John Wiley and Sons Publications.

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MCA 752 OPERATIONS RESEARCH   **L T P**
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UNIT I

Linear programming : graphical methods for two dimensional problems – central problem of linear programming – various definitions – statements of basic theorems and properties – phase i and phase ii of the simplex method – revised simplex method –primal and dual – dual simplex method – sensitivity analysis – transportation problem and its solution – assignment problem and its solution by Hungarian method.

UNIT II

Integer programming: Gomory cutting plane methods – branch and bound method.Queuing theory: characteristics of queuing systems – steady state m/m/1,m/m/1/k and m/m/c queuing models.Replacement theory : replacement of items that deteriorate – replacement of items that fail group replacement and individual replacement.

UNIT III

Inventory theory : costs involved in inventory problems – single item deterministic models – economic lot size models without shortages and with shortages having partition rate infinite and finite.

UNIT IV

Pert and CP/M : arrow network- time estimates – earliest expected time, latest allowable occurrence time, latest allowable occurrence time and slack – critical path – probability of meeting scheduled date of completion of project – calculation of CP/M network – various floats for activities – critical path – updating project – operation time cost trade off curve – selection of schedule based on cost analysis

UNIT V
Game Theory: The formation of Twoperson, Zerosum games, solving simple games, games with mixed strategies, Graphical solution Procedure, Solving by LP.

Reference Books:

1. Gross D., and Harris, C. M., "Fundamentals of queueing theory ", John Willey and Sons, NY.
2. Hillier F., and Lieberman, G. J. , "Introduction to Operation Research", Holden Day ,NY.
3. Taha, H. A., "Operations Research – An Introduction", McMillan Publishing Company, NY

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MCA 753 MODELING & SIMULATION   L T P
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Unit-I Introduction to Modeling and Simulation Nature of Simulation. Systems , Models and Simulation, Continuous and Discrete Systems, system modeling, concept of simulation, Components of a simulation study, Principles used in modeling ,Static and Dynamic physical models, Static and Dynamic Mathematical models Introduction to Static and Dynamic System simulation , Advantages ,Disadvantages and pitfalls of Simulation.

Unit-II System Simulation and Continuous System Simulation Types of System Simulation, Monte Carlo Method, Comparision of analytical and Simulation methods, Numerical Computation techniques for Continuous and Discrete Models, Distributed Lag Models, Cobweb Model. Continuous System models, Analog and Hybrid computers, Digital-Analog Simulators, Continuous system simulation languages ,Hybrid simulation ,Real Time simulations.

Unit –III System Dynamics & Probability concepts in Simulation Exponential growth and decay models, logistic curves ,Generalization of growth models , System dynamics diagrams, Multi segment models , Representation of Time Delays. Discrete and Continuous probability functions, Continuous Uniformly Distributed Random Numbers, Generation of a Random numbers, Generating Discrete distributions, Non-Uniform Continuously Distributed Random Numbers, Rejection Method.

Unit-IV Simulation of Queueing Systems and Discrete System Simulation Poisson arrival patterns, Exponential distribution, Service times, Normal Distribution Queuing Disciplines, Simulation of single and two server queue. Application of queuing theory in computer system . Discrete Events ,Generation of arrival patterns ,Simulation programming tasks , Gathering statistics, Measuring occupancy and Utilization , Recording Distributions and Transit times .

Unit-V Introduction to Simulation languages and Analysis of Simulation output GPSS: Action times, Succession of events, Choice of paths, Conditional transfers ,program control statements . SIMSCRIPT: Organization of SIMSCRIPT Program, Names & Labels, SIMSCRIPT statements . Estimation methods , Relication of Runs , Batch Means , Regenerative techniques , Time Series Analysis , Spectral Analysis and Autoregressive Processes.

References/ Suggested Reading / Books:

- Seila, Simulation Modeling, Cengage Learning
- Law .,Simulation Modeling And Analysis, McGraw Hill
- Deo, System Simulation with Digital Computer, PHI
- Severance, " System Modeling & Simulation, Willey Pub

MCA 754 BIO INFORMATICS

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3 1 0

Unit I:
Introduction: Bioinformatics objectives and overviews, Interdisciplinary nature of Bioinformatics, Data integration, Data analysis, Major Bioinformatics databases and tools. Metadata: Summary & reference systems, finding new type of data online.
Molecular Biology and Bioinformatics: Systems approach in biology,Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, Overview of the bioinformatics applications.

Unit II:
The Information Molecules and Information Flow: Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, -Transcription, -Translation, Genes- the functional elements in DNA, Analyzing DNA,DNA sequencing. Proteins: Amino acids, Protein structure, Secondary, Tertiary and Quaternary structure, Protein folding and function, Nucleic acid-Protein interaction.

Unit III:
Perl: Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System, Understanding and Using Biological Databases, Java clients, CORBA, Introduction to biostatics.

Unit IV:
Nucleotide sequence data: Genome, Genomic sequencing, expressed sequence tags, gene expression, transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

Unit V:
Biological data types and their special requirements: sequences, macromolecular structures, chemical compounds, generic variability and its connection to clinical data. Representation of patterns and relationships: alignments, regular expressions, hierarchies and graphical models.

Text Book:

1. O'Reilly, " Developing Bio informatics computer skills", Indian Edition's publication.
2. Stephen Misner & Stephen Krawetz, " Bioinformatics- Methods & Protocols, Addison Wesley

MCA 755 CLIENT SERVER COMPUTING   L T P
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UNIT-I

Client/Server Computing: DBMS concept and architecture, Single system image, Client Server architecture, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development tools, advantages of client server computing.

UNIT –II

Components of Client/Server application: The client: services, request for services, RPC, windows services, fax, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), Common Object Request BrokerArchitecture (CORBA).,The server: Detailed server functionality, the network operating system, available platforms, the network operating system, available platform, the server operating system.

UNIT –III

Client/Server Network: connectivity, communication interface technology, Interposes communication, wide area network technologies, network topologies (Token Ring, Ethernet, FDDI, CDDI) network,management, Client-server system development: Software, Client–Server System Hardware: Network,Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware.

UNIT IV

Data Storage: magnetic disk, magnetic tape, CD-ROM, WORM, Optical disk, mirrored disk, fault tolerance, RAID, RAID-Disk network interface cards.Network protection devices, Power Protection Devices, UPS, Surge protectors.

Client Server Systems Development: Services and Support, system administration, Availability, Reliability, Serviceability, Software Distribution, Performance, Network management, Help Disk, Remote Systems Management Security, LAN and Network Management issues.

UNIT –V

Client/Server System Development: Training, Training advantages of GUI Application, SystemAdministrator training, Database Administrator training, End-user training.
The future of client server Computing Enabling Technologies, The transformational system.

Reference Book:
1. Patrick Smith & Steave Guengerich, "Client / Server Computing", PHI

MCA-511 ADVANCED SOFTWARE ENGINEERING / UML LAB

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Students are required to prepare various UML diagrams for any case study like Microwave Oven operation.
Following diagrams should be prepared:

1. Use case static structure diagram
2. Object and Class diagram
3. Sequence Diagram
4. Collaboration Diagram
5. State Chart Diagram
6. Activity Diagram
7. Component Diagram
8. Deployment Diagram

MCA-512 WEB TECHNOLOGIES LAB

MCA- 512

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1. Design a HTML page to display your CV
2. Design a HTML form to reserve a railway ticket.
3. Write a Java Script program that finds the greatest common divisor of two numbers.
4. In the form mentioned in problem 2 to reserve a railway ticket add the following
validations using java Script.
· From city and to city are two different cities.
· Age of passengers should not be greater than 150.
· Name of the passenger should be a string of a maximum length 20.
5. Write a program for illustrating client/server side scripting with help of JSP.
6. Write a piece of code in XML for creating DTD, which specifies set of rules.
7. Create style sheet in CSS/XSL and display the document in Internet Explorer.
8. Mini Project: Develop a web portal for your college.

MCA-513 BUSINESS COMMUNICATION LAB

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Communication Practice

1. Speaking : oral communication in social and 10 hours

    Work-related situations, e.g.: Greeting an acquaintance/ friend, introducing oneself, introducing a friend to another friend, breaking off a conversation politely, leave-taking; making and responding to inquiries; expressing an opinion; expressing agreement/ disagreement, contradicting/ refuting an argument; expressing pleasure, sorrow, regret, anger, surprise, wonder, admiration, disappointment etc. Narrating or reporting an event; Describing people, objects, places, processes etc. Ordering / directing someone to do something; Making requests; accepting / refusing a request; Expressing gratitude; responding to expressions of gratitude; Asking for or offering help; responding to a request for help; Asking for directions (e.g. how to reach a place, how to operate a device etc.) and giving directions; asking for and granting/ refusing permission; prohibiting someone from doing something; suggesting, advising, persuading, dissuading, making a proposal; praising, complimenting, felicitating; expressing sympathy (e.g. condolence etc.); Complaining, criticizing, reprimanding

2. **Reading**

    Students will be given practice in reading and comprehending 6-8 simple passages of 100-300 words each, on topics of general as well as professional interest. The texts will be supported by suitable exercises designed to foster comprehension skills and vocabulary enrichment, together with study skills (note making) and reference skills (using a dictionary). Practice will be provided in the important sub-skills of reading which are introduced in Module 2 of the theory component.

3. **Writing**

    Writing short paragraphs on given topics or topics of one's choice; social and business letters; reports; applications ; resumes ; summaries; The principles of 'Process Writing' should be used to teach writing skills.

    a. pre-writing : generating ideas, brain-storming, idea mapping, outlining b.

    writing : generating a first draft ; reviewing, redrafting, editing

    c. post-writing : making a presentation ; discussion and feedback, preparing the final draft.

4. **Soft skills practice**

    Activities designed to highlight leadership and 'team' skills ; Group discussion