



## **CENTRAL UNIVERSITY OF KARNATAKA, GULBARGA**

### **MASTER OF COMPUTER APPLICATIONS (MCA)**

(Effective from the academic year 2012-2013)

(For CBCS system in Central University of Karnataka, Gulbarga)

#### Eligibility for Admission

Students aged between 20-24 years who have completed undergraduate education from a recognized Indian or foreign university ( foreign recognition to be decided as per AIU foreign equivalence list ) in any discipline and secured a minimum of 50% aggregate marks and having studied Mathematics / Computer Science as an optional subject at undergraduate level and who have secured a minimum of 40% marks in the entrance test conducted by the university

#### Duration of the Course

The course shall be of three years duration spread over six semesters. The maximum duration to complete the course shall be 6 years.

#### Medium

The medium of instruction shall be English.

#### Passing and Classification

The minimum marks for passing and classification for the award of the MCA Degree shall be as per the existing norms of other PG degree courses of Central University of Karnataka, Gulbarga.

#### Other Provisions

All the other provisions relating to attendance, reappearance in examinations, repeal and saving clauses, removal of difficulties, etc., shall be as per the existing norms of other PG degree courses of Central University of Karnataka, Gulbarga.

**CENTRAL UNIVERSITY OF KARNATAKA**  
Credits per paper per semester of MCA Course (w.e.f. 2012-13)

Subjects/ Course	I	II	III	IV	V	VI
Core Subjects						
Course 1	3	3	3	3	3	
Course 2	3	3	3	3	3	-
Course 3	3	3	3	3	3	-
Course 4	3	3	-	-	-	-
Course 5	3	-	-	-	-	-
Practical -1/ Project Seminar	2	2	2	3	3	3
Practical -2/ Project Work & Dissertation	-	2	2	3	3	9
Practical -3/ Project Viva	-	-	-	-	-	3
Elective / Supportive Subjects						
Allied Course/ Others 1	3	3	3	3	3	-
Allied Course/ Others 2	-	-	3	3	3	-
Social Orientation	2	2	2	-	-	-
<b>TOTAL</b>	<b>22</b>	<b>21</b>	<b>21</b>	<b>21</b>	<b>21</b>	<b>15</b>

**TOTAL = 121**

# CENTRAL UNIVERSITY OF KARNATAKA, GULBARGA

The syllabus for M.C.A. (Master of Computer Applications) course w.e.f. 2012,13

Sl. No	COURSE CODE	COURSE TITLE	CORE SUBJECT/ ELECTIVE	CREDITS	CONTACT HOURS
<b>FIRST SEMESTER</b>					
1	MCA-101	Mathematical Foundation of Computer Science	Core	3	3
2	MCA-102	Computer Organization and Assembly Language Programming	Core	3	3
3	MCA-103	Data Structures	Core	3	3
4	MCA-104	Problem Solving and Programming	Core	3	3
5	MCA-105	Communication Skills	Core	3	3
6	MCA-106	Practical – I (DS using C)	Core	2	4
7		Elective - I	Elective	3	3
8		Social Orientation	Common to all PG students	2	2
<b>SECOND SEMESTER</b>					
9	MCA-201	Computer Oriented Numerical and Statistical Methods (CONSM)	Core	3	3
10	MCA-202	Fundamentals of Algorithms	Core	3	3
11	MCA-203	Object Oriented Programming	Core	3	3
12	MCA-204	Operating Systems	Core	3	3
13	MCA-205	Practical – II (CONSM & Algorithms)	Core	2	4
14	MCA-206	Practical – III (OOPS)	Core	2	4
15		Elective – II	Elective	3	3
16		Social Orientation	Common to all PG students	2	2
<b>THIRD SEMESTER</b>					
17	MCA-301	Modeling and Simulation	Core	3	3
18	MCA-302	Database Management Systems	Core	3	3
19	MCA-303	Computer Networks	Core	3	3
20	MCA-304	Practical – IV (DBMS)	Core	2	4
21	MCA-305	Practical – V (Visual Programming)	Core	2	4
22		Elective – III	Elective	3	3
23		Elective – IV	Elective	3	3
24		Social Orientation	Common to all PG students	2	2
<b>FOURTH SEMESTER</b>					
25	MCA-401	Internet Programming and Web Technology	Core	3	3
26	MCA-402	Mobile Computing	Core	3	3
27	MCA-403	Software Engineering	Core	3	3
28	MCA-404	Practical – VI (Web Tech )	Core	3	6
29	MCA-405	Practical – VII (CASE Tools)	Core	3	6
30		Elective – V	Elective	3	3
31		Elective – VI	Elective	3	3

<b>FIFTH SEMSETER</b>					
32	MCA-501	Computer Graphics and Visualization	Core	3	3
33	MCA-502	Distributed Computing	Core	3	3
34	MCA-503	Information Security	Core	3	3
35	MCA-504	Practical-VIII (Computer Graphics)	Core	3	6
36	MCA-505	Practical – IX (Mini-Project Work)	Core	3	6
37		Elective – VII	Elective	3	3
38		Elective – VIII	Elective	3	3
<b>SIXTH SEMESTER</b>					
39	MCA-601	Project Seminar	Core	3	
40	MCA-602	Project Work and Dissertation	Core	9	
41	MCA-603	Project Viva voce	Core	3	

**M.C.A. (Master of Computer Application)**  
**List of Elective Courses offered from the Academic Year 2012-2013**

SL. NO	CODE	COURSE TITLE	CREDIT S	CONTACT HOURS
<b>FIRST SEMESTER (Any one)</b>				
1	MCA-107	Accounting and Financial Management	3	3
2	MCA-108	Business Process	3	3
3	MCA-109	Introduction to PC and its utilities	3	3
<b>SECOND SEMESTER (Any one)</b>				
4	MCA-207	System Software	3	3
5	MCA-208	Operation Research	3	3
6	MCA-209	Microprocessor Architecture	3	3
7	MCA-210	Architecture of Unix	3	3
8	MCA-211	Principles of Programming Languages	3	3
9	MCA-212	Middleware Technology	3	3
10	MCA-213	Image Processing	3	3
<b>THIRD SEMESTER (Any two)</b>				
11	MCA-306	Multimedia Systems and Applications	3	3
12	MCA-307	E-Commerce	3	3
13	MCA-308	Neural Networks	3	3
14	MCA-309	.NET Framework and C#	3	3
15	MCA-310	Client Server Systems	3	3
16	MCA-311	ATM Networks	3	3
17	MCA-312	Component Software	3	3
18	MCA-313	Distributed Database Systems	3	3
19	MCA-314	AI and Expert Systems	3	3
<b>FOURTH SEMESTER (Any two)</b>				
20	MCA-406	Artificial Intelligence	3	3
21	MCA-407	Fundamentals of Agent technology	3	3
22	MCA-408	Enterprise Resource Planning	3	3
23	MCA-409	Elements of Software Project Management	3	3
24	MCA-410	Software Testing and Quality Assurance	3	3
25	MCA-411	Object Oriented Analysis and Design	3	3
26	MCA-412	Data Warehousing and Mining	3	3
27	MCA-413	Cryptography	3	3
28	MCA-414	Advanced JAVA	3	3
<b>FIFTH SEMESTER (Any two)</b>				
29	MCA-506	Natural Language Processing	3	3
30	MCA-507	Decision Support System	3	3
31	MCA-508	Soft Computing	3	3
32	MCA-509	Information Retrieval	3	3
33	MCA-510	Embedded Systems	3	3
34	MCA-511	Computational Biology	3	3
35	MCA-512	Software Architecture	3	3
36	MCA-513	Pattern Recognition	3	3
37	MCA-514	Computer Vision	3	3

**CENTRAL UNIVERSITY OF KARNATAKA**  
**Syllabus for Master of Computer Applications (M.C.A.)**

**CORE PAPERS**

**FIRST SEMESTER**

**MCA-101 : MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

**Unit -I**

Mathematical Logic : Connectives, negation, conjunction, disjunction, statement formulas and TT, conditional and bi-conditional, well formed formulas, tautologies, equivalence of statement formulae, duality law, tautological implications, functionally complete set of connectives; normal forms disjunctive, conjunctive, principal disjunctive and principal conjunctive normal forms.

**Unit -II**

The theory of inference for statement calculus, Validity using TT, rules of inference, consistency of premises and indirect method of proof, Automatic Theorem proving, Predicate Calculus, Predicates, the statement function, variables and quantifiers.

**Unit -III**

Set Theory : Basic Concepts of Set theory, Notation, Inclusion and equality, Power set, Operations on sets, Set identities, Ordered pairs and n-tuples, Cartesian products, Relations and Ordering, Relations, Properties of binary relation, relation matrix and graph of a relation, partition and covering of a set, equivalence relations, composition of binary relations, partial ordering, partially ordered set, Functions, Definition, composition, Inverse, Binary and n-ary operations, characteristic function of a set, hashing function, Recursions, Functions, sets and predicates.

**Unit -IV**

Lattices and Boolean Algebra : Lattices as partially ordered sets, properties of lattices, Lattices as Algebraic systems, Some special lattices, Boolean algebra, functions, representation and minimization.

**Unit -V**

Graph theory : Definition, Examples, Paths and Cycles, Planarity, colouring graphs, trees.

**Reference Books**

1. J.P. Tremblay and R.Manohar, Discrete Mathematical structures with applications to Computer Science, Tata McGraw Hill publishers, 2008.
2. Robin. J.Wilson, Introduction to Graph theory. (Fourth edition).

**MCA-102 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE  
PROGRAMMING**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

**Unit -I**

Digital logic fundamentals: Number systems, Boolean algebra, gates, simplification of Boolean expressions, combinational logic: adders, subtractors, Decoders, encoders, multiplexer/demultiplexers, Sequential Logic : Flip - flops, Counters.

**Unit -II**

Introduction to Intel s 8086/88 : Register model, Bus interface unit, Execution unit Control Unit: hardwired and microprogrammed control. Memory organization: Basic

memory cell, RAM, ROM and DRAM, associative, cache and virtual memory organizations.

### **Unit -III**

Assembly Language Programming : Instruction formats, addressing modes, Intel 8086/88 instruction mnemonics, timing data transfer, arithmetic and machine control instructions , Introduction to Macro assembler.

### **Unit -IV**

Input/Output organization : Input interface, Data transfer techniques : synchronous, asynchronous, Interrupt driven, Intel 8086/88 interrupt organization types, DMA, I/O processors, serial communication.

### **Unit -V**

Processor organization: General register organization, stack organization. IBM PC architecture: Mother board, Display adapters, add on cards, power supply. Architectural overview of Pentium, P-II, P-III and P-4.

### **Text Books**

1. M.Morris Mano, Computer Systems Architecture, Pearson Education, 3rd Edition, 2003.
2. Liu Gibson, Microcomputer Systems the 8086/88 family, PHI, 2nd edition, 2001.
3. Govindarajulu, IBM PC and Clones, PHI, 2002.

### **Reference Books**

1. A.K.Ray, K.M.Bhurchandi, Advanced Microprocessors and Peripherals, TMH, 2000.
2. Peter Abel, IBM PC Assembly language and Programming, PHI,2000,

## **MCA-103 : DATA STRUCTURES**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I**

Introduction, algorithmic notation, Space and Time analysis of an algorithm, information and its storage representation, Representation and its manipulation of strings, Pattern Matching. Searching and sorting techniques.

### **Unit -II**

Arrays: Array representation, array processing, single and multi dimension arrays.  
Stacks: Stack representations, stack operations.  
Queues: Definitions, implementations of queues, circular queues, application of queues.  
Linked lists: Singly, doubly, circular linked list

### **Unit -III**

Trees: Binary trees, binary search trees, building a binary search tree, tree traversal techniques.  
Graphs: Definitions, undirected and directed graphs, traversal, minimum cost spanning tree, topological sorting.

### **Unit -IV**

Hash Table: Hash functions, collision resolution strategies, hashtable implementation.  
Binary Search Trees: Binary search tree (BST), insertion and deletion in BST, complexity of search algorithm, path length, AVL trees, B-trees.

## Unit -V

File Structures: Physical storage media file organization, organization of records into blocks, sequential files, indexing, primary indices, secondary indices, B+ tree index files, B tree index files, indexing and hashing comparisons.

### Text Books

1. Ellis Horowitz, Sartaj Sahni and Susan Anderson, Fundamentals of Data Structures using C, Computer Science Press, 1993.
2. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to data structures with applications 2nd edition, Tata McGraw,Hill, 2001

### Reference Books

1. D. Samanta, Classic Data structures , Prentice,Hall of India pvt. ltd., 2001.

## MCA – 104 : PROBLEM SOLVING AND PROGRAMMING

Credits : 3

Contact Hrs : 3

IA : 40 Marks

Exam : 60 Marks

### Unit -I

Introduction to problem solving: problem solving strategies, problem identification, problem understanding, algorithm development, solution planning (flowcharts, pseudo-code, etc.), modular programming design, basic program structure in C, simple data types, variables, constants, operators, comments, control flow: if, while, for, do-while, switch.

### Unit -II

Functions: Types, parameters, prototypes, recursion.

Arrays & Pointers: Array usage, pointers, addresses and types, call by reference, pointer , array duality, strings , arrays of pointers, arguments to main, pointers to functions.

### Unit -III

Structures: Member accessing, pointers to structures, structures and functions, arrays of structures, linked lists, trees.

Other Data Types: Unions, enumerations and bit fields.

### Unit -IV

Bitwise Operators: Usage, device accessing. Type manipulation: Coercion, typedef, initialization, Static, global, external, register. Dynamic Allocation: Uses, pitfalls. The Pre-processor: Define, include, macro's, ifdef.

### Unit -V

Input and Output: Concepts, Character and File I/O, Basic Curses, Simple File I/O, The Standard I/O Routines, ANSI Standard Libraries.

### Text Books

1. Brian W. Kernighan and Dennis M.Ritchie, The C Programming Language, Pearson Education Inc., 2<sup>nd</sup> Edition (2005).
2. Byron Gottfried, Programming with C, 2<sup>nd</sup> Edition, (Indian Adapted Edition), TMH publications, (2006).
3. Dromey, How To Solve It By Computer , Dorling Kindersley (India) Pvt Ltd, 2008.



## Reference Books

1. Stephen G.Kochan, Programming in C , Third Edition, Pearson Education India, (2005).
2. E. Balagurusamy, Computing fundamentals and C Programming, Tata McGraw,Hill Publishing Company Limited, (2008).
3. Behrouz A.Forouzan and Richard.F.Gilberg, A Structured Programming Approach Using C,2<sup>nd</sup> Edition, Brooks,Cole Thomson Learning Publications, (2007).

## MCA – 105 : COMMUNICATION SKILLS

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Communication: concepts and definition , importance , process, communication ,model , types , mode of communication , objectives , inter, intra personal communication, barriers, commandments of communication.

Developing Communication Skills: a) reading: preparation, reading styles, linear reading , faster reading , reading techniques b) writing: effective writing, report writing, speech writing , minutes , communication aids , agenda writing , letters ,article writing , improving English language writing , when to write and when not to write. listening and speaking: a) listening: listening , importance , art of listening ,advantages , mode of expression , listening tests b) speaking: art of conversation , using telephone , methods of asking questions, brain storming , presenting report, improving speech delivery , expressing techniques

### Unit -II

Interviews Techniques: What and Why?, types of interviews, understanding the intricacies, planning for interviews, answering skills, effective communication during interviews, tips, mock interview.

Group Discussion: Group discussion , purpose , process of group discussion ,preparation , getting started , art of guiding and controlling discussion , personality test through group discussion , lateral thinking , participation techniques , mock G.D.

### Unit -III

Body Language: Origin and development of body language, Tool for personality identification, Analysis of body language, Types, Desirable body language, Attitude and body language, Body language as a powerful communication.

Negotiation Techniques: Meaning, Importance, Fundamentals, Preparation, Techniques of Negotiation, Managing process of negotiation, Inter personal behavior – Case Study , Mock negotiations

Meetings: Meaning , Importance, Objectives, Leading and participating in meetings, Success indicators – Understanding the process of meetings, Communication skills for meetings, Mock Meetings, Seminars.

### Unit -IV

Management Communication Relationships: Communication in Management, Semantics, Employee and Employer communication, Communication within Management, Downward and Upward communication, Communication by specialists, The Union's role in communication.

Presentation: Meaning and types of presentation, Understanding the audience, Planning, Designing, Written and oral, Making use of notes and outlines Techniques for delivering presentation , personal style, A postscript, model presentation

### Unit -V

A whole review of the ten sessions and evaluation of the students. Practical communication with a cross section of the society.

## Reference Books

1. Owen Hargie, The Handbook of Communication Skills, 3<sup>rd</sup> edition, Routledge, 2006

### MCA-106 : PRACTICAL – I (DS using C)

Credits : 2  
Contact Hrs : 4

IA : 40 Marks  
Exam : 60 Marks

Data Structure algorithms studied in paper MCA-103 shall be implemented using C.

## SECOND SEMESTER

### MCA-201 COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit -I

Numerical techniques for finding roots, bisection method, newton, raphson method, numerical integration using simpson's rules, gaussian quadrature method, solving differential equations, interpolation and extrapolation.

#### Unit -II

Basic statistical measures – Mean, median, standard deviation, skew, kurtosis; rank, percentile, frequency distributions, standard distributions, regression analysis, least squares fit, polynomial and curve fitting, multiple regression;

#### Unit -III

Introduction to time,series analysis, forecasting, moving averages, exponential smoothing, autoregressive models; goodness of fit methods, ANOVA, F-test, applications to computer Science.

#### Reference Books:

1. W.H. Press, et.al: Numerical recipes in C, Cambridge University Press.
2. Statsoft : Statsoft online Textbook, <http://www.statsoft.com>.

### MCA-202: FUNDAMENTALS OF ALGORITHMS

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit -I

Introduction : Algorithm, pseudo code for expressing algorithms analysis, time complexity and space complexity, efficiency of algorithms, O-notation , Omega notation and Theta notation.  
Divide And Conquer : General method, binary search , merge sort , quick sort.

#### Unit -II

Greedy Method : General method, Knapsack problem , job sequencing with deadlines , minimum, cost spanning trees : Prim's and Kruskal's algorithms , Single source shortest paths : Dijkstra's algorithm.

### **Unit -III**

Dynamic Programming : General method , multistage graphs, all pairs shortest paths, single source shortest paths , optimal binary search trees , 0/1 knapsack problem , traveling sales person problem.

### **Unit -IV**

Back Tracking: General method, N-queen problem, sum of subsets problem, graph colouring, Hamiltonian cycles , Knapsack problem.

### **Unit -V**

Branch And Bound : Least Cost(LC) search, Bounding, LC branch and bound, FIFO branch and bound, Travelling sales person problem.

### **Text Books**

1. E. Howrowitz, Sahni, S.Rajasekaran, Fundamentals of computer algorithms, Galgotia publications, 2004.

### **Reference Books**

1. Gilles Brassard and Paul Bratley, Fundamentals of Algorithmics, Prentice Hall of India Pvt.Ltd., 1997.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C,Addison,wesley, Third Indian Reprint, 2000.

## **MCA-203 : OBJECT ORIENTED PROGRAMMING**

Credits : 3

Contact Hrs : 3

IA : 40 Marks

Exam : 60 Marks

### **Unit -I**

Limitations in structured programming, characteristics of object oriented language, data types loops , pointers , arrays , structures, functions , classes , objects.

### **Unit -II**

Operator overloading, inheritance, polymorphism, templates, exception handling class hierarchies, library organization and containers, strings, stream, design and programming.

### **Unit -III**

Java vs. C++, java on the internet, exception handling, multithreading and persistence, java keywords and flow control, garbage collection.

### **Unit -IV**

Final declaration, packages and interfaces, java I/O classes, run time type, identification user interface design, basics with swing.

### **Unit -V**

Network programming, applets, class architecture, simple applet programs, abstract window tool kit.

**Note:** Unit I & II deals with C++ and Java  
Unit III , IV & V deals with Java.

### **Text Books**

1. Bjarne Stroustrup, The C++ Programming Language, (3<sup>rd</sup> and Special Edition) Addison Wesley, 2000
2. Bruce Eckel, Thinking in Java, (3<sup>rd</sup> Edition) Prentice Hall PTR, 2002 .

### **Reference Books**

1. Robert Lafore, Object Oriented Programming in C++ , Galgotia publications, 4<sup>th</sup> Edition, 2002.
2. E. Balaguruswamy, Programming with Java, Tata McGraw Hill Publications Limited, 2<sup>nd</sup> Edition, 1999.

## **MCA-204: OPERATING SYSTEMS**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I**

Introduction early operating systems, buffering & spooling, multiprogramming, time sharing, protection, operating system structures.

Process Management: process concept, hierarchy of process, critical section problem, semaphores, process coordination problems, inter process communication.

### **Unit -II**

CPU Scheduling: Scheduling concepts, scheduling algorithms, algorithms, algorithm evaluation, multiple processor scheduling.

Deadlock: Deadlock problem, characterization, prevention, avoidance, detection, recovery, combined approach to deadlock handling.

### **Unit -III**

Memory Management: Introduction, multiple partition, paging, segmentation, paged segmentation, virtual memory concept, overlays, demand paging and performance, page replacement algorithms, allocation algorithms, trashing.

### **Unit -IV**

Secondary Storage Management: Physical characteristics, disk scheduling algorithms, sector queuing, file systems: file operations, access methods, allocation methods, directory systems, file protection, implementation issues.

### **Unit -V**

Case Studies: Linux and Windows 2000 Operating Systems.

### **Text Books**

1. Silberschatz, Peter Baer Galvin & Greg Gagne, Operating System Concepts, 7<sup>th</sup> Ed., Addison Wesley Publications.

### **Reference Books**

1. William Stallings, Operating Systems Internals and Design Principles, PHI India, Fourth Edition, 2003.
2. H.M. Deitel, Operating Systems, Addison Wesley, 2<sup>nd</sup> Edition

### MCA-205 : PRACTICAL – II (CONSM & Algorithms)

Credits : 2  
Contact Hrs : 4

IA : 40 Marks  
Exam : 60 Marks

Lab. Assignments shall be carried out to implement the techniques/methods studied in paper MCA - 201 and MCA,202 using C / C++.

### MCA – 206 : PRACTICAL –III (OOPS)

Credits : 2  
Contact Hrs : 4

IA : 40 Marks  
Exam : 60 Marks

Lab. Assignment shall be carried out to include the following features of C++ and java:

- ❖ Classes, objects, constructors and destructors, Function overloading, Operator overloading, Friend functions, Inheritance, virtual functions, abstract classes.
- ❖ Exception Handling and Templates, STL

## THIRD SEMESTER

### MCA – 301 : MODELLING AND SIMULATION

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit -I

Introduction: Models, behaviors, uses of simulations and motivations.

#### Unit -II

Analytical system simulation techniques: monte-carlo methods, numerical computation techniques, lag models, distribute lag model and cob-web model.

#### Unit -III

Discrete system simulation: Different queuing models and studies. simulation languages: Simscript and GPSS. simulation system building paradigms: time, oriented and event, oriented, message, oriented, knowledge-based, simulation engine development.

#### Unit -IV

Analysis of simulation output: Estimation methods, simulation statistics, replication of runs, batch means, regenerative techniques, time series analysis, spectral analysis and autoregressive means. simulation of business applications: equipment maintenance, warehouse management, facility utilization, workflow management, project management. design and analysis of experiments (DoE, DACE etc).

#### Text Books

1. G. Gordon: System simulation, Prentice Hall
2. J. M. Caroll: Simulation using personal computers;
3. B. S. Gottfried: Elements of stochastic process simulation,

## MCA-302 DATABASE MANAGEMENT SYSTEMS

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Introduction to Database Systems: overview, data models, database system architecture, history of database systems, entity-relationship model: basic concepts, constraints, keys, design issues, entity relationship diagram, weak entity sets, extended E-R features design of an E-R database schema reduction of E-R schema to tables

### Unit -II

Relational Model: Structure of relational databases, relational algebra, extended relational algebra, operations, modification of database, views, tuple, relational calculus, domain relational calculus.

SQL: Background, basic structure, set operations, aggregate functions, null values, nested subqueries, views, complex queries, modification of the database, joined relations, data definition language, embedded SQL, dynamic SQL, Other SQL features, Other relational Languages: Query-by-Example, QUEL.

### Unit -III

Integrity and Security: Domain, Constraints, Referential Integrity, Assertions, Triggers, Security and Authorization, Authorization in SQL, encryption and authentication.

Relational Database Design: First Normal Form, Second normal form, Boyce-Codd Normal Form, Third Normal Form, Fourth Normal Form.

### Unit -IV

Storage and File Structures: Overview of physical storage media magnetic disks raid tertiary storage storage access file organization organization of records in files data,dictionary storage.

Indexing and Hashing: Basic concepts, ordered indices, B<sup>+</sup>-Tree index Files, B-Tree Index Files Static hashing, Dynamic hashing, Index definition in SQL, multiple-key access

### Unit -V

Transactions: Transaction concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation Transaction Definition in SQL Testing for Serializability

Concurrency Control: Lock based protocols, time stamp based protocols, validation based protocols, multiple granularity, deadlock handling, insert and delete operations, recovery system: failure classification, storage structure, recovery and atomicity, log-based recovery.

### Text Books

1. Silberschatz, Korth, Sudarshan, Database System Concepts , 4<sup>th</sup> Edition McGraw,Hill Higher Education, International Edition 2002.

### Reference Books

1. Fred R McFadden, Jeffery A Hoffer, Mary B. Prescott, Modern Database Management: 5<sup>th</sup> Edition, Addison Wesley, 2000.
- 2.Elmasri, Navathe, Fundamentals of database Systems , Third Edition, Addison Wesley, 2000.
- 3.Jefrey D.Ulman, Jenifer Widom, A First Course in Database Systems:, Pearson Education Asia, 2001.
- 4.Bipin C Desai, An Introduction to Database Systems , Galgotia Publications Pvt Limited, 2001.

## MCA-303: COMPUTER NETWORKS

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Introduction to networks and communication media: uses network hardware network software reference models example networks network standardization. basis for data communication , transmission media, wireless transmission, telephone systems, satellite communication.

### Unit -II

The Data Link Layer: data link layer design issues, error detection and correction methods, elementary data link protocols, sliding window protocols, protocol verification methods, channel allocation, multiple access protocols, IEEE 802standards.

### Unit -III

The Network Layer: Network Layer design issues Routing algorithms Congestion Control algorithms Internetworking Network Layer in Internet.

### Unit -IV

The Transport Protocols: Transport Service, transport protocols, internet transport protocols, UDP TCP, performance issues.

### Unit -V

The Application Layer: application layer design issues, domain name system, electronic mail world wide web, multimedia, other applications, network security, basic cryptography, DES, RSA.

### Text Books

1. Andrews S. Tanenbaum, Computer Networks , Prentice Hall of India Private Limited, (4<sup>th</sup> Edition), 2003.

### Reference Books

1. Leon Garcia and Widjaja, "Communication Networks, Fundamental concepts and key architecture", Tata McGraw Hill, 2001.

## MCA – 304 : PRACTICAL – IV (DBMS)

Credits : 2  
Contact Hrs : 4

IA : 40 Marks  
Exam : 60 Marks

Lab. Assignment shall be carried out to include the following:

- SQL : Data definition in SQL, basic data retrieval, condition specification, arithmetic and aggregate operators, SQL join, set manipulation, categorization, updates, views, views and updates.
- The student is required to develop a logical and physical database design for the given problem.
- The logical design performs the following tasks: 1) Map the ER/EER diagrams to a relational schema. Identify primary keys, include all necessary foreign keys and indicate referential integrity constraints. 2) Identify the functional dependencies in each relation, 3) Normalize to the highest normal form possible.
- Perform physical design based above logical design using Oracle/MYSQL on Windows platform or MySQL/PostgreSQL on Linux platform

- Perform DML and DDL using all possible SQL commands and with the help any one host languages like C, C++, VB etc (ie embedded SQL)

Perform DML and DLL using PL/SQL and PL/SQL for the above problems

### MCA – 305 : PRACTICAL – V (VISUAL PROGRAMMING)

Credits : 2  
Contact Hrs : 4

IA : 40 Marks  
Exam : 60 Marks

Assignments related to VB/VB.NET programming language shall be carried out including the following features:

- Decision and iterative constructs
- Procedures, functions and exceptional handling
- Arrays, enumeration and structure
- Working with forms, GUI interface with windows forms and designing menus
- Objects and classes
- Overloading, inheritance, over riding
- Interfaces, namespaces and collections
- Events and delegates
- Multithreading and garbage collection
- Database programming
- Components and assemblies

### FOURTH SEMSTER

#### MCA-401 : INTERNET PROGRAMMING AND WEB TECHNOLOGY

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### **Unit -I**

Networks, protocols, TCP/IP protocol suites, brief history of internet, internet address, ports, sockets, name resolution, firewalls, protocol tunneling, proxy servers and internet standards. web basics: history of web, inside URLs web browsers, web servers, resources of internet, h/w and s/w requirement of internet.

#### **Unit -II**

HTML: Anatomy of HTML document, text basics, rules, images and multimedia, document layout and webs, formatted lists, cascading style sheets, forms, tables, frames and executable content.

DHTML : Adding animation, multiplying the media, adding interactivity (dragging and dropping ) , working with data and dialog boxes, working with text, understanding browser object models, working with VB script and Java script, embedding active-X controls in web document.

#### **Unit -III**

Introduction to CGI , PERL : Introduction to CGI, perl data structures, control structures, pattern matching and regular expressions, I/P and O/P in PERL, report formatting in PERL, PERL built in functions, custom functions, references and anonymous data structures, object oriented programming in PERL, advanced data manipulation, database programming with PERL, PERL, CGI programming, web programming with PERL script.

#### **Unit -IV**

Servelts: Retrieving information, sending HTML informations, sending multimedia content, session



tracking, security, database connectivity, Applet servlet communication, Interservlet communication  
-ASP: Basics, variables, ASP control structures, object properties, methods and events, request and response objects, Application, session, cookies and error handling objects. Scripting objects, ASP components, data store access, using Record sets and building script components for ASP.

#### **Unit -V**

XML: Anatomy of an XML Document, markup elements and attributes, creating valid documents, developing advanced DTDs, XML objects, checking validity, creating XML links, advanced addressing, viewing XML in browsers , processing , event-driven programming , programming with DOM, metadata, styling XML with CSS.

#### **Reference Books**

1. Chris Ullman, Beginning ASP 3.0 , Wrox Press Ltd, 2001.
2. Chuckmsiano and Bill Kenndy, HTML The Definite Guide , O Reilly publications, 2000.
2. J. Hunter, William Crawford, Java Servlet programming, O Reilly publications, 2000.
3. Joseph schmuller, Dynamic HTML , BPB publications,2000.
4. Micheal Mcmillan, Perl from the ground up , Tata Mcgraw, Hill Edition, 1999.

### **MCA-402 MOBILE COMPUTING**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### **Unit -I**

Cellular architecture, Mobile computing issues and challenges, architecture issues, communication issues, bandwidth management issues, energy issues, information management issues, reliability issues, security issues, social issues, trust management and anonymity issues, applications (horizontal and vertical), wireless mobile network characteristics, portable characteristics, mobility characteristics.

#### **Unit -II**

Wireless Communication principles: Multiplexing (SDM, FDM, TDM, CDM) , modulation, hidden terminal, exposed terminal  
Channel allocation: Fixed channel allocation, dynamic channel allocation, hybrid channel allocation, flexible channel allocation

#### **Unit -III**

Location Management: Location management problem, location management update principles (no,update, full,update, lazy,update, selective,update), location management architecture (two tier, tree,based, hierarchical etc.), location management algorithms (two location, reporting cell, profile,based, etc)

#### **Unit -IV**

Mobility Model: Individual mobility model (random walk, random way-point, random-direction, smooth random, gauss-markov model), group-based mobility model (column, nomadic, pursue, reference point group,mobility model).

Mobile Protocols: Mobile, IPv.4, Ipv.6, Mobile TCP (m-TCP)

Information Dissemination: Information dissemination through wireless medium, broadcasting, Push- Pull Periodic, on-demand, real-time, variable-sized data broadcasting schemes

Mobile Payment Models: Payments in Mobile environment, E-cash, M-pay, Pay-box, EMPS, E-Ticket

### **Unit -V**

Mobile Computing application development using J2ME platform. Sensor Network: wireless sensor network, WSN applications, sensor network issues and challenges, energy management in WSN, sensor network routing protocols (data aggregation, clustering, data fusion)

### **Reference Books**

1. Jochen Schiller , Mobile Communications , Pearson Publications
2. Tomasz Imielinski & Henry F. Korth, Kluwer, Mobile Computing, Academic Publishers
3. Asoke Talukder, Roopa Yavagal, Mobile Computing – Technology, Application & Service Creation, McGraw Hill Publications.
4. Mohammad Ilyas, Mobile Computing Hand Book, Auerbuch Publications
5. C. S. Raghavendra, Krishna M. Sivalingam, Taieb F. Znati, Wireless Sensor Networks, Springer Publications, 2004
6. Tolga Onel, Ertan Onur, Cem Ersoy and Hakan Delic, “Wireless Sensor Networks for Security:Issues and Challenges” , Book Chapter, Advances in Sensing with Security Applications, Springer Publications, 2006

## **MCA-403 : SOFTWARE ENGINEERING**

Credits : 3

Contact Hrs : 3

IA : 40 Marks

Exam : 60 Marks

### **Unit -I**

The Product: The evolving role of software. The Process: Software Engineering: A layered technology, the software process, software process models, linear sequential model, prototyping model, RAD model evolutionary software process models component based development formal methods model fourth generation techniques.

### **Unit -II**

Software Project Planning: Observation on estimating software scope resources software project estimation decomposition techniques empirical estimation models make buy decision.

Project Scheduling And Tracking: Basic concepts relationship between people and effort scheduling earned value analysis.

### **Unit -III**

System Engineering: Computer based systems, The system engineering hierarchy Business process engineering: overview Product engineering: overview Requirement engineering System modeling.

Analysis Concepts and Principles: Requirement analysis requirement elicitation for software analysis principles software prototyping specification.

Analysis Modeling: The elements of the analysis model, data modeling, functional modeling and information flow, behavioral modeling, the mechanics of structured analysis, data dictionary.

### **Unit -IV**

Design Concepts And Principles: software design and software engineering, the design process, design principles, design concepts, effective modular design, heuristics for effective modularity design model, design documentation. Architectural design: software architecture data design, architectural styles, mapping requirements into software architecture, transform mapping, transactional mapping refining architectural design.

User interface design: the golden rules, user interface design, task analysis and modeling,

interface design activities, implementation tools, design evaluation.

#### **Unit -V**

Software Testing Techniques: Software testing fundamentals, test case design, white box testing, basis path testing, control structure testing, black box testing, testing for specialized environments, architectures and applications

Software Testing Strategies: A strategic approach to software engineering strategic issues unit testing integration testing validation testing system testing, the art of debugging.

#### **Text Books**

1. Roger S. Pressman, Software Engineering. A Practitioners Approach , Sixth Edition, 2005

#### **Reference Books**

1. C. Ghezzi, M. Jazayeri and D. Mandrioli, Fundamentals of Software Engineering, Printice Hall of India Private Limited, 2<sup>nd</sup> Edition,2002.
2. Richard Farley , Software Engineering Concepts , Tata McGraw Hill, 2003

### **MCA – 404 : PRACTICAL – VI (WEB Tech. )**

Credits : 3  
Contact Hrs : 6

IA : 40 Marks  
Exam : 60 Marks

Lab. Assignment shall be carried out to implement the methods/techniques studied in the paper MCA-401 including the following:

- Identifying well known ports on a Remote System: By trying to listen to the various well known ports by opening client connections. If the exception does not occur then the remote port is active else the remote port is inactive.
- Writing a Chat application: i). One-One: By opening socket connection and displaying what is written by one party to the other. ii). Many-Many (Broad cast): Each client opens a socket connection to the chat server and writes to the socket. Whatever is written by one party can be seen by all other parties.
- Data retrieval from a Remote database: At the remote database a server listens for client connections. This server accepts SQL queries from the client, executes it on the database and sends the response to the client.
- Mail Client: i). POP Client: Gives the server name , user name and password retrieve the mails and allow manipulation of mail box using POP commands. ii). SMTP Client: Gives the server name, send e-mail to the recipient using SMTP commands.
- Simulation of Telnet: Provide a user interface to contact well-known ports, so that client-server interaction can be seen by the user.
- Simple file transfer between two systems ( without protocols): By opening socket connection to our server on one system and sending a file from one system to another.
- TFTP, Client: To develop a TFTP client for file transfer. (Unix Network programming, Stevens.)
- HTTP-Server: Develop a HTTP server to implement the following commands. GET, POST, HEAD, DELETE.

## MCA – 405 : PRACTICAL – VII (CASE Tools)

Credits : 3  
Contact Hrs : 6

IA : 40 Marks  
Exam : 60 Marks

Lab assignments shall be carried out based on the paper MCA-403 using CASE tools.

## FIFTH SEMESTER

### MCA-501 : COMPUTER GRAPHICS AND VISUALIZATION

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit -I

Introduction, Overview of graphics systems, video display devices, refresh cathode ray tubes, raster scan and random scan displays, raster scan and random scan display processor, color CRT monitors, DBST, 3D viewing devices, stereoscopic and vr systems, input devices, hard copy devices.

#### Unit -II

Output primitives, line drawing algorithms, circle drawing algorithms, circle drawing algorithms, polynomials and spline curves, area filling algorithms, character generation, attributes of output primitives, line, curve, area fill, character and bundled attributes, anti aliasing techniques.

#### Unit -III

2D Transformations, 2D viewing, graphical user interfaces and interactive input methods.

#### Unit -IV

3D concepts, 3D transformations, 3D viewing. visible surface detection.

#### Unit -V

Multimedia hardware & software, components of multimedia, text, image, graphics, audio, video animation, authoring, multimedia communication systems, applications videoconferencing virtual reality, interactive video, video on demand.

#### Text Books

1. Donald Hearn and M. Pauline Baker, Computer Graphics , 2<sup>nd</sup> Edition, Prentice Hall of India,2007.
- 2.Ralf Steinmetz, Klara steinmetz, "Multimedia Computing, Communications and Applications", Pearson education, 2004.

#### Reference Books

- 1.Steven Harrington, Computer Graphics Programming Approach , McGraw Hill, 2<sup>nd</sup> Edition.
2. Roy A. Plastock and Gorden Kelley, Theory and Problems of Computer Graphics , Schaum s Outline Series, McGraw Hill,2007.

## **MCA-502: DISTRIBUTED COMPUTING**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit I**

Basic concept of distributed computing, Evolution of Distributed computing, Distributed computing system models, Issues in designing Distributed operating systems.

Message Passing: Features of good message passing system, issues in IPC by message Passing, Synchronization, buffering, Multidatagram messages, Encoding and decoding of message data, Process addressing , Failure handling, Group Communication.

### **Unit II**

Remote procedure calls: Introduction to RPC, The RPC model, Transparency of RPC, Implementing of RPC mechanism, Stub Generation, RPC messages, Marshaling Arguments and results, server management, Parameter passing semantics, Call Semantics, Communication protocols for RPC, Client Server Binding, Exception Handling, Security RPC in Heterogeneous Environments, Light Weight RPC, Optimizations for better performance.

### **Unit III**

Distributed Shared Memory: Introduction, General architecture of DSM system, Design and implementation issues of DSM, Granularity, Structure of shared memory space, Consistency models, Replacement strategy, Thrashing, Heterogeneous DSM, Advantages of DSM.

Synchronization: Need of synchronization, Clock synchronization, Event ordering, Mutual Exclusion, Deadlock, Election Algorithms.

### **Unit IV**

Resource Management: Desirable Features of Global scheduling algorithm, Task assignment approach, Load balancing approach, load sharing approach.

Process Management: Introduction, Process migration, Threads in Distributed systems.

### **Unit V**

Distributed File System: Desirable features of Distributed file system, File models, File Accessing models, file sharing semantics, File caching schemes, File replication, Fault tolerance, Atomic transactions

Naming: Features of Naming system, Fundamental terminology and concepts, System oriented names, Object locating mechanisms, human oriented names, Name caches, Naming and security.

Security: Potential attacks to computer systems, cryptography, Authentication, access control, Digital signatures.

### **Reference Books**

1. Pradeep K. Sinha, Distributed Operating systems Concept and Design, Prentice-Hall
2. Andrew Tanenbaum, Marteen Ven Steen, Distributed systems: Principles and paradigms, Prentice – Hall
3. G. Couloris, Distributed System, Concept & Design, Addison Wesley.
4. P. K. Sinha, Distributed Operating Systems, PHI(2005).
5. Michel J. Quinn, Parallel Computing: Theory and Practice, McGraw-Hill.
6. Jordan Harry and A. Gita, Fundamentals of Parallel Processing, PHI.

## MCA-503: INFORMATION SECURITY

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I :** Security Models and Assessment, Security Evaluation, Vulnerability Analysis

Need for security awareness, Definitions, Data Versus Information, Identification and Authentication Essentials, Access Control and Access Control Structures, Security Policies, Security Models and Confidentiality, Organization Security Architecture, Security Audit, Network Audit, Security Policy, Risk Mitigation, Incident Handling, Legal Support, Computer Forensics, Risk Analysis, Vulnerability Analysis, Security Audits and Risk Management, Security Assurance and Evaluation Criteria.

### **Unit -II:** Physical Security

Traditional Security, Access Control Systems using Swipe Cards, RFID, Biometrics

### **Unit -III:** Operating System and Application Security

PGP, Security Protocols such as IPsec, PKI, Digital Signatures, Web Server Security, Access Control of objects, Authentication, Processes, Files, Users, Buffer Overflow Attacks, Kernel Flaws, Logging, Backups

### **Unit -IV :** Network Security

TCP/IP Security, Internet Security Procedures, PPP, ECP, TLS EAP, DESE, BIS, Firewall, IP Sec Architecture and Protocols, Dial in Operations, RAS PAP, CHAP, RADIUS, DIAMETER, Key distribution, IKE, Certification and Management, Intrusion Detection Systems, VLANs and VPNs, Email security, Network Attacks and DNS protection, DMZ setup, Proxy services etc. Encryption techniques :Cryptography Techniques, RSA, DES, 3DES

### **Unit -V :** Databases and Distributed Systems Security

Relational Databases, Statistical Database Security, Multi-level Secure Databases, Concurrency Control and Multi-Level Security, Authentication, Secure APIs, CORBA Security.

### **Reference Books**

1. Hatch and Lee , Hacking Exposed Linux , Tata McGraw Hill
2. Garfinkel and Spafford ,Practical UNIX and Internet Security, Oreilly
3. Matt Bishop , Computer Security , Pearson Publications, 2003.
4. Uyless Black, Internet Security Protocols, Pearson Publications,2000.
5. Dieter Gollmann, Computer Security , John Wiley and Sons, 1999.
6. Caelli.J, Longley D. and Shain M., Information Security Handbook, MacMillan 1991.
7. Macclure S., Scambray J. and Kurtz G., Hacking Exposed : Network Security Secrets and Solutions , McGraw,Hill, 1999.
8. Davice and Price, Security of Computer Networks, Wiely 1989.
9. Riccardo Focardi and Roberto Gorrieri, Foundations of Security Analysis and Design : Tutorial Lectures , Springer LNCS Series,2001.
10. Thomas R Peltier, Information Security Policies, Procedures and Standards – Guidelines for Effective Information Security Management, Auerbach Publications,2002.
11. Charlie Kaufman, Radia Perlman et.al, Network Security, A PRIVATE Communication in a PUBLIC World –Pentice Hall Series in Computer Networking and Distributed Systems, 1995.
12. Glen Bruce and Rob Dempsey, Security in Distributed Computing, A Pentice Hall,1997.
13. Alison Anderson et.al., Computer and Intrusion Forensics, George Mohay, Artech House Publications , 2003.
14. Charles P.Pfleeger,Shari Lawrence Pfleeger, Security in Computing , Pearson Education, 2003.

## MCA – 504 : PRACTICAL - VIII (COMPUTER GRAPHICS)

Credits : 3  
Contact Hrs : 6

IA : 40 Marks  
Exam : 60 Marks

Lab. assignments shall be carried out using C/C++ programming language to include the following features of computer graphics and visualization based on the paper MCA-501:

- scan converting lines, circles and ellipses
- filling rectangles, polygons and ellipse arcs
- line and curve attributes
- clipping lines, circles, ellipse and polygons
- 2D and 3D transformations
- spline representations, Bezier curve and surfaces; B, Spline curves and surfaces
- 3D rendering of surfaces of objects

## MCA – 505 : PRACTICAL – IX (MINI-PROJECT WORK)

Credits : 3  
Contact Hrs : 6

IA : 40 Marks  
Exam : 60 Marks

Each student shall undertake a mini-project relating to topics studied in the course. The student shall familiarize with the technical writing and presentation skills associated with a software project. The Lab assignments shall include the technical topics for oral and written presentation.

The students shall be acquainted with the following ICT enabled tasks :

Blogging, social networking (facebook, group sms), free open source usage, android OS, zigbee (wireless networking), webcasting, podcasting, video streaming, virtualization, video conferencing, web designing(case studies), Intranet search engine, e\_books, National knowledge network (NKN), Plagiarism detection tools, software and hardware standards, etc.

## MCA – 601 / 602 / 603 : PROJECT WORK SEMINAR, DISSERTATION AND VIVA

Credits : 15

IA (Project work seminar) : 50 Marks  
Exam (Project wok dissertation) : 150 Marks  
Exam (Project wok viva-voce) : 50 Marks

**PROJECT WORK:** Project work will be carried out either in the department or in any Institution / Industry under the supervision of guide(s) approved by the Department of Computer Science.

- ❖ Each student shall carry out the project work individually and present the work done in the seminar conducted in the department at regular intervals (minimum two seminars must be conducted in the semester).
- ❖ The students are required to submit three copies of the project report (dissertation) based on the work done by him/her during the project period.

The project topics should be based on the syllabus or beyond.

## PROJECT DISSERTATION FORMAT :

**SUMMARY/ABSTRACT:** All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3,4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
- Statement about the Problem
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

**TOPIC OF THE PROJECT:** This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

**OBJECTIVE AND SCOPE:** This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

**PROCESS DESCRIPTION:** The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

**RESOURCES AND LIMITATIONS:** The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

**CONCLUSION:** The write-up must end with the concluding remarks briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest.

### **The following suggested guidelines must be followed in preparing the Final project Report:**

Good quality white executive bond paper A4 size should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

**Page Specification :**(Written paper and source code)

- Left margin : 3.0 cms
- Right margin : 2.0 cms
- Top margin : 2.54 cms
- Bottom margin: 2.54 cms

Page numbers , All text pages as well as Program source code listing should be numbered at the bottom center of the pages.

**Normal Body Text: Font Size:** 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing

**Paragraph Heading Font Size:** 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.



**Chapter Heading Font Size:** 20, Times New Roman, Centre Aligned, 30 point above and below spacing.

**Coding Font size :** 10, Courier New, Normal

**Submission of Project Report to University:** The student will submit his/her project report in the prescribed format. The Project Report should include:

- One copy of the summary/abstract.
- Three hard Copies of the Project Report
- Soft copy of project on CD/DVD in a thick envelope pasted inside of the back cover of the project report.
- The Project Report may be about 75 pages (excluding coding).

## ELECTIVE / SUPPORTIVE SUBJECTS

### FIRST SEMESTER (Any one)

#### MCA-107 : ACCOUNTING AND FINANCIAL MANAGEMENT

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

##### Unit -I

Accounting: principles, concepts, conventions, double entry system of accounting, introduction to basic books of accounts, sole proprietary concern, control accounts for debtors and creditors, closing of books of accounts and preparation of trial balance. Final accounts: trading and profit and loss account, balance sheet of sole proprietary concern with normal closing entries. Depreciation: meaning.

##### Unit -II

Financial management: scope, functions, jobs of financial managers. Ratio analysis: meaning, advantages, limitations, types of ratio and their applicability.

##### Unit -III

Fund flow statement: meaning of the term fund, flow of fund, working capital cycle preparation and interpretation of fund flow statement, cash flow statement, costing nature, importance, basic principles.

##### Unit -IV

Budget and budgetary control: nature and scope importance types of budgets methods of finalization of flexible budget. Marginal costing: natures, scope and importance, break even, analysis, uses and its limitations.

##### Unit -V

Standard costing: nature and scope, computation and analysis of variances with reference to material cost, labor cost overhead cost interpretation of the variances.

##### Text books

1. Jain and narang, financial accounting , sultan and chand co.
2. R.l. gupta and v.k. gupta, introduction to financial accounting , sultan and Chand co.
3. S.n. maheswari, principles of management accounting , sultan and chand co.
4. S.p.jain and narang, advanced cost accounting , kalyani publishers, delhi.
5. S.p. iyengar, cost and management accounting , sultan and chand co.
6. S.c.kuchhal, financial management, chaitnaya publishing house, allahabad.

#### MCA-108 : BUSINESS PROCESS

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

##### Unit -I

Nature and types of business organizations, introduction to business process, organization structure ,definition complexity, formalization, outcomes for individuals size technology internal culture environment national cultures it industry scenario.

##### Unit -II

Recognizing a creation company, the whoosh beginners mind, creation company vs. Compliance company.

**Unit -III**

Becoming a creation company choosing to change the art of collaboration models. Leading a creation company, freedom and focus, creation leadership.

**Unit -IV**

Introduction to business process, reengineering business process, reengineering through IT people view case study empowering through IT.

**Unit -V**

Introduction to E-business , rules of E-business, E-business execution framework, trend spotting construction steps of E-business design, case studies, constructing the e,business architecture.

**Text books**

1. Richard h. Hall,organizations, structures, processes, and outcomes, pearson education, 2001.
2. M. S. Jayaraman et al., business process reengineering, tata mcgraw hill publications, 2001.
3. Tom mcgehee, whoosh: business in the fast lane, perseus publication, 2002.
4. R. Kalakota and m. Robinson, E-business: roadmap for success, pearson Education, 2000.

**MCA-109 : INTRODUCTION TO PC AND ITS UTILITIES**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

**Unit -I**

Introduction to computers: basic components , hardware & software resources, number system: decimal, binary, octal, hexadecimal, conversions, introduction to windows operating system, components of windows os, desktop properties, GUI.

**Unit -II**

Introduction to Microsoft word: various formatting techniques, mail merge, tables and other features.

**Unit -III**

Introduction to Microsoft excel: worksheets, chart wizards, function wizard and other features.

**Unit -IV**

Introduction to Microsoft power point: various views, slide layout, inserting pictures and sounds, custom animation and other features.

**Unit -V**

Introduction to internet, getting connected to internet, internet features, protocols, e-mail, internet explorer & outlook express.

**Text books**

1. N.Krishnan, Windows & MS-Office 2000 With Database Concepts, Scitech, Publications, 2001.
2. N. Krishnan, Computer Fundamental & Windows With Internet Technology .
3. Alexis Leon & Mathews Leon, Internet For Every One,Vikas Publishing House Private Ltd,2001.

## SECOND SEMESTER (Any one)

### MCA-207: SYSTEM SOFTWARE

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit -I

Introduction to system software and machine structure : system programs assembler, compiler, interpreter, operating system. Machine structure instruction set and addressing modes.

#### Unit -II

Assemblers: basic assembler functions, machine dependent and machine independent assembler features. Assembler design two-pass assembler with overlay structure, one-pass assembler and multi-pass assembler.

#### Unit -III

Loaders and linkers : basic loader functions, machine dependent and machine independent loader features, loader design linkage editors, dynamic linking and bootstrap loaders.

#### Unit -IV

Macroprocessors: basic macroprocessor functions, machine independent features, macroprocessor design recursive, one-pass macro processor, two-pass macro processor, general-purpose and macro processing with language translators.

#### Unit -V

Debuggers: Introduction, debugger architecture, H/W debugger facilities, OS debugger infrastructure, controlling execution, breakpoints and single stepping, inspecting data and variables debugging GUI applications.

#### Text Books

1. Leland L. Beck, System Software In Introduction To System Programming, Addison Wesley, 3<sup>rd</sup> Edition, 1996.
2. Jonathan B. Rosenberg, How Debuggers Work : Algorithms, Data Structures, And Architecture , John Wiley & Sons , 1 Edition (September 27, 1996)

#### Reference Books

1. Damdhare, Introduction To System Software , Mcgraw Hill 1987.

### MCA – 208 : OPERATION RESEARCH

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit -I

Overview of operations research, concept of linear programming model, graphical method, linear programming methods, duality.

#### Unit -II

Transportation problem, assignment problem, network techniques.

#### Unit -III

Integer programming formulations, cutting-plane algorithm, branch-and-bound technique, zero-one

implicit enumeration technique.

#### **Unit -IV**

Inventory control, queuing theory.

#### **Unit -V**

Dynamic programming, project management, replacement and maintenance analysis.

#### **Text Books**

1. R.panneerselvam, operations research , prentice hall of india, 2002.

#### **Reference Books**

1. S.Dharani Venkatakrishnan, Operations Research Principles And Problems, Keerthi Publishing House, 1992.
2. Kanti Swarup, Manmohan, P.K.Gupta, Operations Research, Sultan Chand & Sons, 2008.

### **MCA – 209 : MICROPROCESSOR ARCHITECTURE**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### **Unit -I**

Introduction to the microprocessor : history , microprocessor based personal computer system, number systems, computer data formats – architecture & addressing: microprocessor architecture, real mode memory addressing, protected mode memory addressing, memory paging , addressing modes.

#### **Unit -II**

8086/8088 : pin-outs and pin functions , clock generator (8284a) , bus buffering and latching , bus timing , ready and the wait state, minimum mode verse maximum mode .alp instructions : data movement arithmetic and logic program control. Assembly language with C/C++ .

#### **Unit -III**

Memory interface: memory devices , address decoding, 8088 and 80188 (8-bit), Memory interface, dynamic RAM, Basic I/O interface: introduction to I/O interface, I/O port address decoding, the programmable peripheral interface, the 8279 programmable keyboard/display interface, 8254 programmable interval timer, analog-to-digital (ADC) and digital-to-analog (DAC) conversions.

#### **Unit -IV**

Interrupts : Basic interrupt processing, hardware interrupts, expanding the interrupt structure, 8259a programmable interrupt controller, interrupt examples . direct memory access and DMA-controlled I/O : basic DMA operation, the 8237 DMA controller, shared-bus operation, disk memory systems, video displays. bus interface: the ISA bus, the peripheral component interconnect (PCI) bus, the parallel printer (LPT1) interface, the serial com ports, the universal serial bus (USB), accelerated graphics port (AGP).

**Unit -V** : 80186, 80188, and 80286, the pentium and pentium pro microprocessors.

## Text books

1. Barry B. Brey-The Intel Microprocessors 8086/ 8088, 80186/ 80188, 80286,80386, 80486, Pentium & Pentium Pro Processors , Seventh Edition.

## Reference Books

1. Gaonkar, Microprocessor Architecture, Programming And Applications , Wiley Eastern Ltd., 1987.

## MCA-210 : ARCHITECTURE OF UNIX

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Introduction to kernel: system concepts, kernel data structures, buffer cache. File representation: inodes structure of a regular file directories, conversion of a path name to an I-node, super block inode assignment allocation of disk blocks, system calls for file system.

### Unit -II

Process structure: process states and transitions, layout of system memory, context of a process saving, the context manipulation of process, address space sleep. Threads and lightweight process: fundamentals of threads, lightweight process design, multithreading in Solaris, threads in mach, digital Unix.

### Unit -III

Process control: process creation, termination, invoking the process, user ID of a process, changing the size of the process, the shell init process, signal generation reliable and unreliable signals, exceptions. Process scheduling: time, clock, interrupt handling, scheduler, goals, traditional unix scheduling solaris, SVR4, and mach schedulers.

### Unit -IV

Interprocess communications: process tracing system V IPC messages ports message passing port operations. Synchronization and multiprocessing: Synchronization in traditional Unix kernels, multiprocessor systems, master and slave processes, semaphores, spin locks, conditional variables, read-write locks.

### Unit -V

I/O subsystem: driver interface, disk drivers, device driver, frame work, poll system call block, I/O streams: messages and queues stream, I/O configuration and setup multiplexing, FIFOs and pipes, network interface.

## Text books

1. Maurice J.Bach, Design Of Unix Operating Systems, Prentice Hall Of India, 1994.
2. Uresh Vahalia, Unix Internals,The New Frontiers, Pearson Education, 2001.
3. Graham Glass And King Ables, Unix For Programmers And Users, Pearson Education, 3<sup>rd</sup> Edition, 2003.

## MCA – 211 : PRINCIPLES OF PROGRAMMING LANGUAGES

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Language design issues: reasons for studying concepts of programming language, language evaluation criteria, influences on language design, structure and operation of computer, virtual computers and binding times, language paradigms.

### Unit -II

Data types: properties of types and objects, elementary data types, structured data types. abstraction: abstract data types, encapsulation by subprograms, type definition, storage management.

### Unit -III

Sequence control: implicit and explicit sequence control, sequencing with arithmetic and non-arithmetic expressions, sequence control between statements. Subprograms control: subprogram sequence control, attributes of data control shared data in subprograms.

### Unit -IV

Inheritance: inheritance, polymorphism; language translation issues: programming language syntax, stages in translation, formal translation models.

### Unit -V

Advances in language design: variations on subprogram control, language constructors for parallel processing language semantics, software architecture.

### Text Books

1.Terrance W. Pratt, Marvin V Zelkowitz, Programming Languages, Design And Implementation, PHI, 2002, (4th Edition).

### Reference Books

- 1.Ravi Sethi, Programming Languages Concepts & Constructs , Addison,Wesley, (2<sup>nd</sup> Edn.),1996.
- 2.E.Horowitz, Fundamentals Of Programming Languages , Galgotia Publishers,1984.
- 3.A.B.Tucker, Robert, Noonan, Programming Languages , Mcgraw Hill,2002.
- 4.D.Appleby, J.J.Vandekopple, Programming Languages Paradigm And Practice , Mcgraw Hill, International Editions, (2<sup>nd</sup> Edition), 1997.

## MCA – 212 : MIDDLEWARE TECHNOLOGY

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Client-server, file server, data base server, group server, object server, web server, middleware, general middleware, service specific middleware client, client-server building blocks, RPC messaging, peer-to-peer

### Unit -II

EJB: EJB architecture, overview of EJB, software architecture, view of EJB conversation building and deploying EJBs, roles in EJB.

### **Unit -III**

EJB session beans, EJB entity beans, EJB clients, EJB deployment, building an application with EJB.

### **Unit -IV**

CORBA, distributed systems, purpose, exploring CORBA alternatives, architecture, overview CORBA and networking model, CORBA object model, IDL, ORB, building an application with CORBA.

### **Unit -V**

COM, data types, interfaces, proxy and stub, marshalling, implementing Server/client, interface pointers, object creation, invocation, destruction, comparison of COM and CORBA

### **Text Books**

1. Robert Orfali, Dan Harkey, Jeri Edwards, 'The Essential Client/Server Survival Guide', Galgotia Publication Pvt. Ltd., 2002.
2. Tom Valesky, 'Enterprise Java Beans', Pearson Education, 2002.
3. Jeremy Rosenberger, 'Teach Yourself Corba In 14 Days', Techmedia, 2000.
4. Jason Pritchard, 'Com And Corba Side By Side', Addison Wesley, 2000.

### **Reference Books**

1. Mowbray, 'Inside Corba', Pearson Education, 2002.

## **MCA – 213 : IMAGE PROCESSING**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I**

Digital image fundamentals and transforms: elements of visual perception, image sampling and quantization, basic relationship between pixels, basic geometric transformations, introduction to fourier transform and DFT, properties of 2D Fourier transform, FFT, separable image transforms , walsh\_hadamard\_discrete cosine transform, HAAR, slant\_karhunen\_loeve transforms.

### **Unit -II**

Image enhancement techniques: spatial domain methods: basic grey level transformation, histogram equalization, image subtraction, image averaging, spatial filtering: smoothing, sharpening filters laplacian filters, frequency domain filters : smoothing, sharpening filters, homomorphic filtering.

### **Unit -III**

Image restoration: model of image degradation/restoration process, noise models, inverse filtering, least mean square filtering, constrained least mean square filtering, blind image restoration, pseudo inverse singular value decomposition.

### **Unit -IV**

Image compression: lossless compression: variable length coding, LZW coding, bit plane coding, predictive coding, DPCM. Lossy compression: transform coding, wavelet coding, basics of image compression, standards: jpeg, mpeg, basics of vector quantization.

### **Unit -V**

Image segmentation and representation: edge detection thresholding, region based segmentation



boundary representation: chain codes, polygonal Approximation boundary segments boundary descriptors: simple descriptors, Fourier descriptors, regional descriptors simple descriptors, texture

### **Text Books**

1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing , Pearson Education 2003.

### **Reference Books**

1. William K Pratt, Digital Image Processing John Willey (2001)
2. Millan Sonka, Vaclav Hlavac, Roger Boyle, Broos/Colic, Image Processing Analysis And Machine Vision, Thompson Larniy (1999).
3. A.K. Jain, Phi, Fundamentals of Digital Image Processing, New Delhi (1995).
4. Chanda Dutta Magundar , Digital Image Processing And Applications, Prentice Hall of India, 2000

## **THIRD SEMESTER (Any two)**

### **MCA – 306 : MULTIMEDIA SYSTEMS AND APPLICATIONS**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### **Unit -I**

Introduction: Multimedia elements, multimedia applications, system architecture evolving technologies defining objects data interface standards need for data compression multimedia databases

#### **Unit -II**

Multimedia data compression: types of compression, binary image compression color, gray scale and still video image compression, video image compression, audio compression, fractal compression. Data and file formats: RTF, TIFF, RIFF, MIDI, JPEG, AVI video file formats, MPEG standards.

#### **Unit -III**

Multimedia I/O technologies: pen input, video and image display systems, print output technologies, image scanners, digital voice and audio, digital camera, video images and animation full motion video. Multimedia storage and retrieval technologies: magnetic media technology, optical media, hierarchical storage management, cache management for storage systems.

#### **Unit -IV**

Multimedia application design: types of multimedia systems, virtual reality design components of multimedia systems, organizing multimedia databases, application work flow design issues. Multimedia authoring systems: hypermedia application design considerations user interface design information access object display / playback issues.

#### **Unit -V**

Distributed multimedia systems: components, distributed client-server operation multimedia object servers multi, server network topologies distributed multimedia databases managing distributed objects.

### **Text Books**

1. Prabhat K. Andleigh, Kiran Thakrar, Multimedia Systems Design , PHI 2002.

## Reference Books

- 1.Tay Vaughan, Multimedia Making It Works Fifth Edition, Tmh, 2001.
- 2.Jeffery Jefcoat, Multimedia Systems And Application , Tmh.
- 3.Fred Halsall, Multimedia Communication Application Networks, Protocols And Standards , Addison Wesley, 2001.

## MCA-307 : E-COMMERCE

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Electronic commerce environment and opportunities: background, the electronic commerce environment, electronic marketplace technologies, modes of electronic, Commerce: overview, electronic data interchange, migration to open EDI, Electronic commerce with WWW/internet commerce net advocacy web Commerce going forward

### Unit -II

Approaches to safe electronic commerce: overview, secure transport protocols secure transactions secure electronic payment protocol(SEPP), secure electronic Transaction (set), certificates for authentication security on web servers and Enterprise networks electronic cash and electronic payment schemes: internet Monetary payment and security requirements payment and purchase order process, online electronic cash

### Unit -III

Internet/intranet security issues and solutions: the need for computer security specific intruder approaches security strategies security tools encryption enterprise networking and access to the internet antivirus programs security teams.

### Unit -IV

Mastercard/visa secure electronic transaction: introduction, business requirements, concepts, payment processing e-mail and secure e,mail technologies for electronic commerce: introduction the mean of distribution a model for message handling how does e,mail work? Mime: multipurpose internet mail extensions s/mime: secure multipurpose internet mail extensions moss: message object security services

### Unit -V

Internet and web site establishment: introduction technologies for web servers, internet tools relevant to commerce, internet applications for commerce, internet charges, internet access and architecture searching the internet.

## Text Books

- 1.Daniel Minoli & Emma Minoli, Web Commerce Technology Handbook , TataMcGraw,Hill , 1999.
2. K.Bajaj & D. Nag, E,Commerce , Tata McGraw,Hill, 1999.

## MCA -308: NEURAL NETWORKS

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Introduction, characteristics of artificial neural networks, learning in biological, Systems and machines, brain and computers, differences in simple neurons.

### Unit -II

Perception and representation, learning, linear separability, problems with the Perception training algorithms, multilayer perception, back propagation training algorithm, learning difficulties, applications.

### Unit -III

Counter propagation networks, normal operation, training, full counter propagation networks, applications to data compression, khonen network algorithm, neighborhoods. Hopfield nets, learning, the energy landscape, storing and recall of patterns, learning In boltzman machines, learning, applications.

### Unit -IV

Statistical methods, training, application to general non-linear optimization problem. Adaptive resonance theory, architecture, classification, implementation, training aids, characteristics.

### Unit -V

Associative memory, bi-directional associative memory, structure of types. Optical neural networks, vector matrix multipliers, holographic correlators, hopfield net using electro optical matrix multipliers and volume holograms. The cognitron structure, training, lateral inhibition, the neocognitron structure, generalization, training, application of neural nets, pattern recognition, decision making system, medical Diagnosis. Recent trends in neural nets.

### Text Books

1. Philip D Wasserman, Neural Computing Theory And Practice , Van Nostrand And Reinhold, 1989.

### Reference Books

1. James A Freeman And David M Skapura, Neural Networks Algorithms, Application And Programming Techniques , Addison Wesley Publishing Company, 1991.

## MCA – 309 : .NET FRAMEWORK AND C#

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Introduction to the .NET platform, common language runtime(CLR), the common type specification(CTS) the common language specifications (CLS) assemblies , .NET base classes CLR debugger.

### Unit -II

Introduction to C# , data type operators flow control and iteration arrays and strings basics of c# classes boxing and unboxing, reflection, interoperability the preprocessors attributes namespaces.

### **Unit -III**

Object-oriented programming in C#, encapsulation, inheritance, and polymorphism exception handling garbage collection input and output (directories ,files, and streams).

### **Unit -IV**

Implementing the ICollectionable and IComparable interfaces, introduction to .NET Collections (including custom collections) custom indexers, delegates and events, multithreading and synchronization type reflection and attributes programming the windows registry.

### **Unit -V**

GDI+ graphics tutorial(including fonts, brushes, images, and using .net resources) COM, COM+, and .NET interoperability ADO.NET for database programming with datasets and object model. Windows applications: winforms, winforms namespace, creating winforms applications in VS.NET developing windows applications.

### **Text Books**

- 1.Robert J.Oberg, Introduction To C# Using .Net ,Phi,2002.
- 2.Andrew Troelsen, C# And .Net Platform , Apress, 1<sup>st</sup> Edition,2001.

### **Reference Books**

- 1.Ben Albahari, Peter Drayton And Brad Merrill, C# Essentials ,Spd,2001.
2. Microsoft C# Language Specifications , Wp Publishers And Distributors Pvt.Ltd.,2001

## **MCA – 310 : CLIENT SERVER SYSTEMS**

Credits : 3

IA : 40 Marks

Contact Hrs : 3

Exam : 60 Marks

### **Unit -I**

Client/server system concepts: introduction, concepts, N-tier vs 2-tier, client/server architecture, 2-tier architecture, 3-tier architecture, case study of n-tier architecture, client/server models, gartner classifications, middleware, database connectivity and its need, upsizing, down sizing, right sizing, characteristics, types of servers and clients.

### **Unit -II**

Client/server system architecture: client/server building blocks, hardware, software, middleware, types of middleware, DLE, MOM, transaction processing monitors, ODBC, need for database connectivity, design overview of ODBC, architecture, components, applications, driver managers, drivers, data sources, ODBC 2.5 and ODBC 3.0, operating system services, base services, external services, server scalability.

### **Unit -III**

Client/server databases: SQL database servers, server architecture, multithread architecture, hybrid architecture, stored procedures, triggers, rules of client/server transaction processing, transaction models, chained and nested transactions, transaction management standards, distributed database characteristics, data warehousing, data mining.

### **Unit -IV**

Client/server protocols: RPC, IPC.

### **Unit -V**

Recent trends in client/server computing: intranet, extranet, internet, CORBA, etc.

## Reference Books

1. Robert Orfali, Dan Harkey, Jerri Edwards "The Essential Client Server Survival Guide, III Edition, Wiley Publications, 1999.
2. Alex Berson, Client/Server Architecture, Tata Mcgrawhill Publications, 1992.
3. Neil Jenkins Et Al., Client/Server Unleashed, 1996.

## MCA -311 : ATM NETWORKS

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Introduction: ATM historical perspective, protocol architecture, logical connections, cells transmission of ATM cells, SDH sonnet switches.

### Unit -II

ATM protocol: connection setup, routing switching, signaling, ATM service categories QoS parameters, adaptation layer.

### Unit -III

Routing issues: routing for high speed networks rsvp, traffic and congestion control achieving QoS traffic shaping generic cell rate algorithms rate based congestion control connection admission control.

### Unit -IV

High speed Lans: fast Ethernet, ATM Lan's lane.

### Unit -v

Protocols over ATM: multiple protocols over ATM, IP over ATM, TCP over atm real time transport protocol, wireless ATM, current trends.

## Text Books

1. Rainer handel, manfred n.huber, stefan schroder, atm networks, addison wesley, 1999.

## Reference Books

1. William stallings, high speed networks tcp/ip and atm design principles, prentice hall international, 1998.
2. Uyles black, atm vol.1 and 2, php tr, 1999.
3. William stallings, isdn with broad lane isdn with frame relay and atm, phi, fourth edition, 1999.

## MCA – 312 : COMPONENT SOFTWARE

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Components are for composition, components custom, made versus standard software inevitability of components, standards, importance of standards, foundation, components, objects, modules, interfaces, component weight, object vs class composition, inheritance, approaches to disciplined inheritance.

## **Unit -II**

Patterns, framework, architecture, component models and platforms, object and component using standards, from procedures to objects, specification of interfaces and object interface relationships and polymorphism, CORBA, CORBA component model, java component technology, applet, servlets, beans, enterprise beans.

## **Unit -III**

The microsoft way, COM object range, COM object creation, from COM to DCOM component document and OLE, contextual composition and services, COM apartments, MTS, COM+.

## **Unit -IV**

Component architecture, component frameworks, component framework vs connectors, component frameworks vs aspect oriented programming, framework for contextual composition, black box component framework.

## **Unit -v**

Component development, component oriented programming, problem of asynchrony, multithreading, inheritance, component distribution and acquisition, component assembly.

## **Reference Books**

1. Clemens Szyperski, Component Software , Pearson Education,First Print,2004.

## **MCA – 313 : DISTRIBUTED DATABASE SYSTEMS**

Credits : 3

Contact Hrs : 3

IA : 40 Marks

Exam : 60 Marks

## **Unit -I**

Introduction : distributed data processing, distributed database design, distributed query processing, distributed directory management, distributed concurrency control, distributed deadlock management, reliability of distributed DBMS, operating system support, heterogeneous databases. overview of relational DBMS

## **Unit -II**

Review of computer networks : data communication concepts, types of networks, protocol standards, broadband networks, wireless networks, internet. Distributed DBMS architecture : DBMS standardization, architectural model for distributed DBMS, distributed DBMS architecture : client/server systems, peer-to-peer distributed systems.

## **Unit -III**

Distributed database design : alternative design strategies : top-down design process, bottom-up design process, distribution design issues : reasons for fragmentation, fragmentation alternatives, degree of fragmentation, correctness rules of fragmentation, allocation alternatives, information requirements, fragmentation : horizontal fragmentation, vertical fragmentation, hybrid fragmentation.

Semantic data control : view management: views in centralized DBMS, updates through views, views in distributed DBMS.

Data security : centralized authorization control, distributed authorization control.

## **Unit -IV**

Distributed concurrency control : locking-based concurrency control algorithm, Timestamp, based concurrency control algorithms : basic to algorithm, conservative to algorithm, optimistic

concurrency control algorithms, Deadlock management : deadlock prevention, deadlock avoidance, deadlock detection and resolution.

Distributed DBMS reliability : system, state and failure, reliability and availability, mean time between failures/mean time to report, failure and fault tolerance in distributed systems : reasons for failures, basic fault tolerance approaches and techniques.

#### **Unit -v**

Distributed object database management: object, abstract data types, composition, class, collection, subtyping and inheritance, object distribution design : horizontal class partitioning, vertical class partitioning , path partitioning, class partitioning algorithms, allocation, replication.

#### **Reference Books**

1.M.Tamer Ozsu,Patric Valduriez, "Principles of Distributed Database System" II Edition, Pearson Education.

### **MCA – 314 : AI AND EXPERT SYSTEMS**

Credits : 3

Contact Hrs : 3

IA : 40 Marks

Exam : 60 Marks

#### **Unit -I**

Problem solving and AI, puzzles and games, problem states and operators, heuristic programming, state space representations, state descriptions, graph notations, non, Deterministic programs.

#### **Unit -II**

State space search methods, breadth first and depth first search, heuristic, admissibility, optimality of algorithms, performance measures, problem reduction representations, and/or graphs and higher level state space.

#### **Unit -III**

Problem reduction search methods, cost of solution trees ordered search, alpha beta and Minimum procedure, theorem proving in predicate calculus, syntax, Semantics, Herbrand universe: variables, qualifiers, unification, resolvents.

#### **Unit -IV**

Predicate calculus in problem solving, answer extraction process, resolution, automatic program writing, predicate calculus, proof finding methods.

#### **Unit -v**

Expert systems: expert systems and conventional programs, expert system organization, knowledge engineering: knowledge representation techniques, knowledge acquisition, acquiring knowledge from experts, automating knowledge acquisition. Building an expert system: architecture of an expert system, ask in building an expert system, difficulties in developing an expert system.

#### **Reference Books**

1.E. Charniak, C.K.Reiesbeck And D.V.Mcdermett, Artificial Intelligence Programming, Lawrence Erlbaum Associates, N.J., 1987.

2.N. J. Nilsson, Principles Of Artificial Intelligence , Tiega Press, Polo Alto, 1986.

3.Elaine Rich And Kevin Knight, Artificial Intelligence , Mcgraw Hill, 1991.

4.Donald A. Waterman, A Guide To Expert Systems , Tech Knowledge Series In Knowledge Engineering, 1986.

## FOURTH SEMESTER (Any two)

### MCA – 406 : ARTIFICIAL INTELLIGENCE

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit -I

Introduction: intelligent agents, search strategies, solving problems by searching breadth first depth-first, depth-limited iterative deepening, bidirectional informed search methods, A\* , AO\* , games as search problems alpha-beta pruning.

#### Unit -II

Representation: propositional logic, first order logic, frame systems and semantic networks.

#### Unit -III

Reasoning: inference in first, order logic forward and backward chaining, resolution unification, logical reasoning systems.

#### Unit -IV

Planning: simple planning agent from problem solving to planning, basic Representations for planning practical planners, hierarchical decomposition, Resource constraints uncertainty probabilistic reasoning systems.

#### Unit -V

Learning: general model of learning agents, inductive learning, computational, Learning theory learning in neural and belief networks, reinforcement learning types of communicating agents robotics: tasks, parts, configurations spaces, Navigation and motion planning.

#### Text Books

1. Stuart J.Russell And Peter Norvig, Artificial Intelligence, A Modern Approach , Tata Mc Graw Hill Publisher 2<sup>nd</sup> Edition,2005.

#### Reference Books

1. Elaine Rich And Kevin Knight, Artificial Intelligence , Tata Mc Grew Hill Publisher,2<sup>nd</sup> Edition.
2. Dan W.Patterson, Introduction To Artificial Intelligence And Expert Systems , Prentice Hall Of India.

### MCA – 407 : FUNDAMENTALS OF AGENT TECHNOLOGY

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit -I

Introduction, intelligent agents, environments intelligent agents agents and objects agents and expert systems agents as intentional systems abstract architectures for Intelligent agents how to tell an agent what to do synthesizing agents

#### Unit -II

Deductive reasoning agents, agents as theorem provers agent, oriented programming, Concurrent metatem, Practical reasoning agents,practical reasoning equals deliberation plus means, ends Reasoning means, ends reasoning implementing a practical reasoning agent, homer the procedural reasoning system Reactive and hybrid agents, brooks and the subsumption architecture the



limitations of reactive agents hybrid agents

### **Unit -III**

Multiagent interactions, utilities and preferences multiagent encounters, dominant, Strategies and nash equilibria, competitive and zero, sum interactions, the prisoner dilemma other symmetric 2x2 interactions dependence relations in multiagent systems reaching agreements mechanism design auctions negotiation argumentation communication speech acts agent communication languages ontologies for agent communication coordination languages

### **Unit -IV**

Cooperative distributed problem solving task sharing combining task and result sharing handling inconsistency coordination multiagent planning and synchronization

### **Unit -V**

Methodologies agent, oriented analysis and design techniques, pitfalls of agent Development mobile agents applications of agents

### **Text Book s**

1. Michael Wooldridge, An Introduction To Multiagent Systems, John Wiley & Sons Ltd.2002.

### **Reference Books**

1. Gerhard Weiss, Multi,Agent Systems A Modern Approach To Distributed Artificial Intelligence, Mit Press,1999
2. Walter Brenner Et Al, Intelligent Software Agents,Foundation And Application, Springer Verlag,1998.
3. Nicholas R. Jennings, Michael Wooldridge, Agent Technology: Foundations, Applications And Markets, Springer Verlag Publishing.

## **MCA - 408 : ENTERPRISE RESOURCE PLANNING**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I**

Integrated management information seamless integration, supply chain management, integrated data model, benefits of ERP, business engineering and ERP, definition of business engineering, principles of business engineering, business engineering with Information technology.

### **Unit -II**

Building the business model, ERP implementation an overview role of Consultant, vendors and users, customization, precautions, ERP post implementation options, ERP implementation technology guidelines for ERP implementation.

### **Unit -III**

ERP domain, MPG/PRO IFS/avalon, industrial and financial systems, baan IV sap market dynamics and dynamic strategy.

### **Unit -IV**

Description multi, client server solution, open technology, user interface, application integration.

### **Unit -V**

Basic architectural concepts, the system control interfaces, services, presentation interface

database interface.

### **Text Books**

1.Vinod Kumar Garg And N.K.Venkita Krishnan, Enterprise Resource Planning concepts And Practice , Phi,2<sup>nd</sup> Edition,2004.

### **Reference Books**

1.Jose Antonio Fernandz, The Sap R/3 Handbook , Tata Mcgraw Hill Publications, 2006.

## **MCA- 409 : ELEMENTS OF SOFTWARE PROJECT MANAGEMENT**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I**

Introduction: defining a software development process identify the software model activities, relationship among activities document information on each activity, tailoring improving the process. Discipline need for implementing discipline attributes of successful leader. Communicating in harmony personality traits, management tools.

### **Unit -II**

Project schedule planning: top down and bottom up planning, initial and final project schedule plans, types of activity relationships estimating the duration of an activity, critical path identifying milestones, activity responsibility matrix, project check list.

### **Unit -III**

Project tracking: overview of project progress, project outlook occurrence of tracking, meetings, tracking meeting ground rules, recovery plans the role of escalations.

### **Unit -IV**

Product requirement and specifications: product, requirement understanding the customers, problem to solve, product objectives, providing direction for the solution, product specifications, defining the final product, development, testing, UNIT test function test function test plan anticipating qualities weak link.

### **Unit -V**

Marketing issues: Vendor relationships the vendor contract process defining the vendors work performance incentives a trackable plan measure performance routinely quality system proximity to main location acceptance of deliverables is hipped product non preferential treatment selecting , replacing a vendor legal considerations subcontractors post projects review Product certification reviews.

### **Text Books**

1. Neal Whitten, 'Managing Software Development Projects , Formula For Success', John Wiley And Sons , Inc, II Edition , 1995.

2.Watts Humphrey, 'Managing The Software Process', Addison Wesley, 1989.

## MCA - 410 : SOFTWARE TESTING AND QUALITY ASSURANCE

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Software testing principles: need for testing , psychology of testing , testing economics , white box, black box, grey box testing SDLC and testing , verification & validation , weyuker's adequacy axioms.

### Unit - II

Testing strategies: white box testing techniques, statement coverage, branch coverage, condition coverage, decision/condition coverage, multiple condition coverage, dataflow coverage, mutation testing, automated code coverage analysis, black box testing techniques, boundary value analysis, robustness testing, equivalence partitioning, syntax testing, finite state testing, levels of testing, UNIT, integration and system testing.

### Unit -III

Testing object oriented software: challenges, differences from testing non-OO software, class testing strategies, class modality, state, based testing, message sequence specification.

### Unit -IV

Introduction to quality and quality control, evolution of quality control, quality assurance, quality circles and quality improvement teams, benefits of quality control, quality and reliability , quality costs, measuring quality costs, total quality management.

### Unit -V

CMM model and its stages, introduction to PCMM, CMMI and six sigma concepts. ISO 9000, ISO 9000-part3 for software quality.

### Text Books

1. Roger S. Pressman, Software Engineering. A Practitioners Approach , Fifth Edition, 2001
2. William E.Perry, " Effective Methods For Software Testing (2nd Edition) ", John Wiley & Sons, 2000.
3. Robert V.Binder, " Testing Object,Oriented Systems: Models Patterns And Tools ", Addison Wesley, 2000.
- 4.Rajneesh Kapur, Getting Iso 9000 In A Software Organization , By BPB Publications.
- 5.Allan C Gillies, Software Quality Theory And Management , Thompson Learning.
- 6.Stephen H. Kan, Metrics And Models In Software Quality Engineering , Pearson Education.
- 7.Norman E Fenton And Shan Lawrence Pfleeger, Software Metrics , Thompson Learning.
- 8.Mordechan Ben, Chrissis Mike Konard And Sandy Shrum, Cmmi, Pearson Education Ltd.

### Reference Books

1. Glenford J.Myers, "The Art Of Software Testing ", John Wiley & Sons, 1997.
2. Boris Beizer, Black,Box Testing: "Techniques For Functional Testing Of Software And Systems ",John Wiley & Sons, 1995.
3. P.C.Jorgensen, " Software Testing , A Craftman's Approach ", Crc Press, 1995.

## MCA – 411 : OBJECT ORIENTED ANALYSIS AND DESIGN

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Overview of object-oriented systems development need for object orientation, overview of the unified approach, object basics ,object-oriented systems development life cycle the software

development process, building high, quality software, object-oriented systems development, reusability.

### **Unit -II**

Object, oriented methodologies, unified modeling language, static and dynamic models, why modeling, introduction to the unified modeling language, UML diagrams UML class diagram, use-case diagram, UML dynamic modeling, model management UML extensibility, UML meta-model.

### **Unit -III**

Object-oriented analysis process, identifying use cases use-case driven object, oriented analysis, business process modeling, use-case model, object analysis, classification classifications theory, approaches for identifying classes, identifying, object relationships , identifying attributes and methods, defining attributes by analyzing, use cases and other uml diagrams.

### **Unit -IV**

The object-oriented design process and design axioms the object, oriented design process, object, oriented design axioms, corollaries, design patterns. Designing classes , the object-oriented design philosophy, UML object constraint language, designing classes, the process, class visibility, designing classes, refining attributes , designing methods and procedures, access layer , designing access layer classes, case study ,view layer, designing interface objects user interface design as a creative process, designing view layer classes

### **Unit -V**

Case study , use-case model, developing effective documentation, analyzing the vianet bank ATM, relationship analysis for the vianet bank ATM system, defining attributes for vianet bank objects, object responsibility , defining methods for vianet bank objects, refining attributes for the vianet bank objects , designing methods for the vianet bank objects , designing the access layer for the vianet bank ATM , designing User interface for the vianet bank ATM.

### **Text Books**

1. Ali Bahrami, Object Oriented Systems Development , Mcgraw Hill Publicationinternational Edition.

## **MCA – 412 : DATA WAREHOUSING AND MINING**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I**

Evolution of database technology, introduction to data warehousing and data mining, differences between operational databases and data warehouses.

### **Unit -II**

Data warehouse architecture & design, hardware & operational design, tuning and testing.

### **Unit -III**

Data mining: data preprocessing, data mining primitives, languages & system architectures, concept description: characterization and comparison, mining association rules, classification and prediction.

### **Unit -IV**

Cluster analysis, applications and trends in data mining.

## **Unit -V**

Introduction to Microsoft s ole db for data mining, dbminer.

### **Text Books**

- 1.Sam anahory and dennis murray, data warehousing in the real world, Addison Wesley 1997.
2. Jiawei han et, al., data mining: concepts and techniques , morgan kaufmaan Series , 2000.

### **Reference Books**

1. Usama M.Fayyad, Gregory Piatetsky, Shapiro, Padhrai Smyth And Ramasamy Uthurusamy, "Advances In Knowledge Discovery And Data Mining", The M.I.T Press, 1996.
2. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", John Wiley & Sons Inc., 1998.
3. Sean Kelly, "Data Warehousing In Action", John Wiley & Sons Inc., 1997

## **MCA – 413 : CRYPTOGRAPHY**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I**

OSI Security Architecture, Classical Encryption techniques, Cipher Principles, Data Encryption Standard, Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES, AES Cipher, Triple DES, Placement of Encryption Function, Traffic confidentiality

### **Unit - II**

Key Management , Diffie-Hellman key Exchange , Elliptic Curve Architecture and Cryptography , Introduction to Number Theory , Confidentiality using Symmetric Encryption , Public Key Cryptography and RSA.

### **Unit - III**

Authentication requirements , Authentication functions , Message Authentication Codes , Hash Functions , Security of Hash Functions and MACs , MD5 message Digest algorithm , Secure Hash Algorithm , RIPEMD , HMAC Digital Signatures , Authentication Protocols , Digital Signature Standard

### **Unit -IV**

Authentication Applications: Kerberos, X.509 Authentication Service, Electronic Mail Security , PGP, S/MIME, IP Security , Web Security.

### **Unit -V**

Intrusion detection, password management , Viruses and related threats , Virus counter measures, Firewall design principles , Trusted systems.

### **Reference Books**

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003.

## MCA -414: ADVANCED JAVA

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

Java basics review: data structures, collection classes, event handling, multithreading, byte code interpretation, customizing application, java streaming, networking.

### Unit -II

Distributed computing: distributed computing: lookup services, remote method invocation (RMI), common object request broker architecture (CORBA), JDBC, technology, servlets.

### Unit -III

Java beans and swing: bean concepts, events in bean box, bean, customization, persistence, application , deployment using swing , advanced swing techniques, JAR file handling.

### Unit -IV

Java enterprise applications: JNI, java server pages, session beans, entity beans, programming and deploying enterprise java beans, java transactions Java web services.

### Unit -V

Related java techniques: performance tuning techniques, improving performance by design, internationalization, case study, deploying N-tier application, E-commerce applications.

### Text Books

1. Calvin Austin And Monica Pawlan, Advanced Programming For The Java 2 Platform , 2000.
2. Deitel & Deitel , "Java How To Program" , Prentice Hall , 7<sup>th</sup> Edition, 2007.
3. Gary Cornell And Cay S. Horstmann, " Core Java, Vol. 2: Advanced Features," , Sun Microsystems Press, 2008.
4. Stephen Asbury, Scott R. Weiner, Wiley, "Developing Java Enterprise Applications", 1998.

## FIFTH SEMESTER ( Any two)

## MCA – 506 : NATURAL LANGUAGE PROCESSING

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit - I

Introduction, knowledge in speech and language processing ambiguity models and algorithms language, thought, and understanding the state of the art and the near term future some brief history.

### Unit -II

Morphology and finite, state transducers, survey of english morphology inflectional morphology derivational morphology finite, state morphological parsing the lexicon and morphotactics, morphological parsing with finite, state transducers orthographic rules and finite, state transducers combining FST lexicon and rules

lexicon, free FSTS: the porter stemmer human morphological processing.

### **Unit -III**

Word sense disambiguation and information retrieval selection restriction, based Disambiguation limitations of selectional restrictions robust word sense Disambiguation machine learning approaches dictionary, based approaches, information retrieval the vector space model term weighting term selection and creation homonymy, polysemy, and synonymy improving user queries other information retrieval tasks.

### **Unit - IV**

Discourse reference resolution reference phenomena syntactic and semantic constraints on conference preferences in pronoun interpretation an algorithm for pronoun resolution text coherence the phenomenon an inference based resolution algorithm discourse structure.

### **Unit - V**

Machine translation language similarities and differences the transfer metaphor syntactic transformations lexical transfer the interlingua idea: using meaning direct translation using statistical techniques quantifying fluency quantifying faithfulness search usability and system development.

### **Text Books**

1. Daniel Jurafsky and James H. Martin, Speech and Language Processing: An Introduction To Natural Language Processing, Computational Linguistics And Speech Recognition, Pearson Education, 2002.

### **Reference Books**

1. Bharathi, A., Vineet Chaitanya and Rajeev Sangal. Natural Language Processinga Paninian Perspective. Prentice Hall India, Eastern Economy Edition.1995.

## **MCA- 507 : DECISION SUPPORT SYSTEM**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I**

Decision making, systems, modeling, and support introduction and definition systems models modeling process decision making: the intelligence phase the design phase, the choice phase evaluation: the implementation phase alternative decision making models decision support systems decision makers, case applications.

### **Unit -II**

Decision support system development: introduction, life cycle methodologies prototype technology levels and tools development platforms tool selection developing DSS enterprise systems: concepts and definition evolution of information. Systems information needs characteristics and capabilities comparing and integrating EIS and DSS, EIS data access, data warehouse, OLAP, multidimensional analysis, presentation and the web including soft information enterprise on systems ,organizational DSS supply and value chains and decision support supply chain problems and solutions computerized systems MRP, ERP, SCM frontline decision support systems.

### **Unit -III**

Introduction organizational learning and memory knowledge management development methods, technologies, and tools success knowledge management and artificial intelligence electronic

document management. Knowledge acquisition and validation: knowledge engineering scope acquisition methods, interviews tracking methods observation and other methods grid analysis.

#### **Unit -IV**

Inference techniques: reasoning in artificial intelligence inference with rules: the inference tree , inference with frames model, based and case, based reasoning, explanation and meta knowledge inference with uncertainty representing uncertainty probabilities and related approaches theory of certainty approximate reasoning using

#### **Unit -V**

Implementing and integrating management support systems implementation: the major issues , strategies system integration generic models MSS, DSS, ES integrating EIS, DSS and ES, and global integration intelligent DSS intelligent modeling and model management examples of integrated systems problems and issues in integration.

#### **Reference Books**

1. Efrain Turban, Jay E.Aronson, Decision Support Systems And Intelligent Systems 6th Edition, Pearson Education, 2001.

### **MCA – 508 : SOFT COMPUTING**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### **Unit -I**

Artificial neurals : basic, concepts, single layer perception, multi layer perception, supervised and un-supervised learning back propagation networks, application

#### **Unit -II**

Fuzzy systems: fuzzy sets and fuzzy reasoning, fuzzy matrices, fuzzy functions decomposition, fuzzy automata and languages, fuzzy control methods, fuzzy decision making, applications

#### **Unit -III**

Neuro-fuzzy modeling: adaptive networks based fuzzy inter faces classification and representation trees, data dustemp algorithm rule base structure identification, neuro-fuzzy controls

#### **Unit -IV**

Genetic algorithm: survival of the fittest, pictures computations, cross over, mutation, reproduction, rank method, rank space method, application

#### **Unit -V**

Soft computing and conventional AI: AI search algorithm, predicate calculus, rules of interface , semantic networks, frames, objects, hybrid models, applications

#### **Reference Books**

- 1.Jang J.S.R.,Sun C.T And Mizutami E , Neuro Fuzzy And Soft Computing Prentice Hall New Jersey,1998
2. Timothy J.Ross:Fuzzy Logic Engineering Applications.Mcgraw Hill,Newyork,1997.
3. Laurene Fauseett:Fundamentals Of Neural Networks.Prentice Hall India,New Delhi,1994.
4. George J.Klir And Bo Yuan,Fuzzy Sets And Fuzzy Logic,Prentice Hall Inc.,New Jersey,1995
5. Nih.J.Ndssen Artificial Intelligence,Harcourt Asia Ltd.,Singapore,1998.



## MCA – 509 : INFORMATION RETRIEVAL

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit –I

Boolean retrieval, the term vocabulary and postings lists, dictionaries and tolerant retrieval, index constraints, index compression.

### Unit -II

Scoring, term weighting and the vector space model, computing scores in a complete search system, evaluation in information retrieval,

### Unit –III

Relevance feedback and query expansion, XML retrieval Probabilistic information, retrieval, language models for information retrieval,

### Unit – IV

Text classification and naïve bayes, vector space classification and machine learning on documents, flat clustering, hierarchical clustering.

### Unit – V

Matrix decomposition and latent semantic indexing, web search basics, web crawling and indexes, link analysis.

### Text Books

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Scitiz, Introduction to Information Retrieval, cambridge University Press, 2008.

### Reference Books

1. Ricardo Baeza-yates and Berthier Ribeiro – Neto, Modern Information Retrieval, Addison-Wesley .
2. C.J.Longman van Rijsbergen, Information Retrieval, Butterworths, London,1979.

## MCA – 510 : EMBEDDED SYSTEMS

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### Unit -I

An overview of embedded systems: introduction to embedded systems, categories and requirements of embedded systems, challenges and issues related to embedded software development, hardware/software co-design, introduction to IC technology, introduction to design technology.

### Unit -II

Embedded software development: concepts of concurrency, processes, threads, mutual exclusion and inter-process communication, models and languages for embedded software, synchronous approach to embedded system design, scheduling paradigms, scheduling algorithms, introduction to rtos, basic design using rtos

Embedded C language: real time methods, mixing C and assembly, standard I/O functions, preprocessor directives, study of c compilers and IDE, programming the target device

### **Unit -III**

Hardware for embedded systems: various interface standards, various methods of interfacing, parallel I/O interface, blind counting synchronization and gadfly busy waiting, parallel port interfacing with switches, keypads and display units, memory and high speed interfacing, interfacing of data acquisition systems, interfacing of controllers, serial communication interface, implementation of above concepts using C language

### **Unit -IV**

Study of atmel RISC processor: architecture, memory, reset and interrupt , functions, parallel I/O ports, timers/counters, serial communication, analog interfaces, implementation of above concepts using c language, implementation of above concepts using C language.

### **Unit -V**

Case studies and applications of embedded systems: applications to: communication, networking, database, process control, case studies of: digital camera, network router, rtlinux.

### **Reference Books**

1. Raj Kamal, Embedded Systems, Tata Mcgraw Hill.
2. David E. Simon, An Embedded Software Primer, Pearson Education.
3. Muhammad Ali Mazidi And Janice Gillispie Mazidi, The 8051microcontroller And Embedded Systems, Pearson Education.
4. Frank Vahid, Tony Givargis, Embedded System Design: A Unified Hardware/Software Introduction, John Wiley.
5. Craig Hollabaugh, Embedded Linux, Pearson Education
6. Daniel Lewis, Fundamentals Of Embedded Software, Pearson Education.
7. Barnett, Cox, O'cull, Embedded C Programming And The Atmel Avr , Thomson Learning  
Myke Predko, Programming And Customizing The 8051 Microcontroller, TMH

## **MCA – 511 : COMPUTATIONAL BIOLOGY**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

### **Unit -I**

Introduction of bioinformatics : definition challenges in bioinformatics internet and bioinformatics molecular biology s central dogma DNA, RNA and proteins genes & genomes representation of DNA, RNA and protein structures codons & anticodons, open reading frames(ORF), exons & introns, software tools for bioinformatics.

### **Unit -II**

Literature databases : public databases and data formats, popular gene and protein databases, sequence alignment and sequence searching, database search strategies, querying strategy , similarity searching vs homology popular tools for database searching and querying fetch, lookup, entrez, netfetch, blast, fasta interpretation of results

### **Unit -III**

Pairwise alignment : problem definition & biological motivation, similarity and differences, global alignment, local alignment gap penalty models substitution matrices PAM, blosum, applying dynamic programming to pairwise alignment needleman,wunsch algorithm, smith\_waterman algorithm

### **Unit -IV**

Multiple sequence alignment: computational challenges dynamic programming solution approximation algorithms, center star, distance from consensus, sum of pairs, progressive alignment, multiple alignment to a phylogenetic tree, tools for multiple sequence alignment, clustalw

#### **Unit -v**

Phylogenetic analysis : basic definitions, from MSA to phylogenetics, phylogenetic tree construction methodologies, distance based methods, upgma, neighbour joining character based methods, maximum parsimony, fitch algorithm, weighted parsimony, sankoff s algorithm, maximum likelihood, tools for phylogenetic tree construction Paup, phylip.

#### **Reference Books**

1. S.Sundararajan, R.Balaji, Introduction To Bioinformatics , Himalaya Publishing House,2002.
2. Andreas D.Baxeavanis, B.F.Oullette, Ouellette, B.F.Francis, Bioinformatics : A Practical Guide To The Analysis Of Genes And Proteins ,2<sup>nd</sup> Edition,2004.
3. David Mount , Bioinformatics : Sequence & Genome Analysis .
4. Cynthia Gibas, Per Jambeck, Lorrie Lejeune, Developing Bioinformatics Computer Skills

### **MCA – 512 : SOFTWARE ARCHITECTURE**

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### **Unit -I**

Introduction software architecture software design levels an engineering discipline for software the status of software architecture architectural styles pipes and filters data abstraction and object oriented organization event based, implicit invocation layered systems repositories interpreters process control other familiar architecture heterogeneous architectures.

#### **Unit -II**

Case studies , key word is context instrumentation software mobile robotics cruise control three vignettes in mixed style

#### **Unit -III**

Shared information systems database integration integration in software development environments integration in the design of buildings architectural structures for shared information systems

#### **Unit -IV**

Guidance for user, interface architectures the quantified design space the value of Architectural formalism formalizing the architecture of a specific system formalizing an architectural style formalizing an architectural design space towards a theory of software architecture z notation

#### **Unit -v**

Requirements for architecture description languages first class connectors adding implicit invocation to traditional programming languages tools for architectural design unicon exploiting style in architectural design environments beyond definition/use: architectural interconnection

#### **Reference Books**

1. Mary Shaw, David Garlan, Software Architecture Perspectives On An Emerging Discipline ,

Prentice Hall Of India, Eastern Economy Edition,1996.

2. Boris Beizer, " Software Testing Techniques (2nd Edition) ", Van Nostrand Reinhold, 1990.

### MCA – 513 : PATTERN RECOGNITION

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit -I

Introduction: application of pattern recognition, statistical decision theory, image processing and analysis. probability: introduction, probability of events, random variables, joint distribution and densities, moments of random variables, estimation of parameters from samples, minimum risk estimations.

#### Unit -II

Statistical decision making: introduction, baye's theorem, multiple features, conditionally independent features, decision boundaries, estimation of error rates, characteristic centers, estimating the composition of populations.

#### Unit -III

Non parametric decision making: introduction, histograms, kernel and windows estimators, nearest neighbor classification techniques, adaptive decision boundaries, adaptive discriminant functions, minimum squared.

#### Unit -IV

Clustering: introduction, hierarchical clustering, partitional clustering.

#### Unit -V

Artificial neural networks: introduction, nets without hidden layers, nets with hidden layers, the back – propagation algorithm, hopped nets – an application: classifying sex from facial images.

#### Reference Books

1. Earl Gose, Richard Johnsonbaugh And Steve Jost, Pattern Recognition And Image Analysis, Phi.
2. Duda R.O. And Hart P.E., Pattern Classification And Scene Analysis, John Wiley.
3. Fu. K. S., Syntactic Methods In Pattern Recognition, Academic Press.

### MCA – 514 : COMPUTER VISION

Credits : 3  
Contact Hrs : 3

IA : 40 Marks  
Exam : 60 Marks

#### Unit - I

Computer vision issues : Achieving simple vision goals, high-level and low-level capabilities, a range of representations, the role of computers, computer vision research and applications, image formation, image model, image functions, imaging geometry, reflectance, spatial properties, color digital images, imaging devices for computer vision, photographic imaging, sensing range, reconstruction imaging.

#### Unit – II

Early Processing : Recovering Intrinsic Structure, Filtering the Image, Finding Local Edges, Range Information from Geometry, Surface Orientation from Reflectance Models, Optical Flow, Resolution Pyramids, Boundary Detection, On Associating Edge Elements, Searching Near an

Approximate Location, The Hough Method for Curve Detection, Edge Following as Graph Searching - Edge Following as Dynamic Programming ,Contour Following.

### **Unit – III**

Region Growing, Regions, a local technique: blob coloring, global techniques: region growing via thresholding, splitting and merging, texture, structural models of texel placement, texture as a pattern recognition problem, the texture gradient.

### **Unit – IV**

Motion, Motion Understanding , Understanding Optical Flow , Understanding Image Sequences, Representation of Two-Dimensional Geometric Structures, Two-Dimensional Geometric Structures , Boundary Representations ,Region Representations, Simple Shape Properties,

### **Unit - V**

Representations of Three-Dimensional Structures, Solids and their Representation, Surface Representations, Generalized Cylinder Representations, Volumetric Representations, Understanding Line Drawings, Knowledge Representation and Use, Representations, Semantic Nets, Semantic Net Examples, Control Issues in Complex Vision Systems.

### **Reference Books**

1. Dana Harry Ballard, Christopher M. Brown, Computer vision, Prentice-Hall, 1982
2. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer, 2011
3. Pedram Azad, Tilo Gockel, R. Dillmann, Computer Vision: Principles and Practice, Elektor Electronics Publishing, 2008.