



RCSS
RAJAGIRI COLLEGE OF
SOCIAL SCIENCES
(AUTONOMOUS)

Syllabus

Master of Computer Applications

**Rajagiri College of Social Sciences,
Kalamassery, Kerala. 683104**

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Rules and Regulations

1. Conditions for Admission

Qualifications

- i) A candidate seeking admission to MCA course must have

A pass with not less than 50% marks in any recognized regular Bachelor's Degree course of minimum three years duration in any discipline with Mathematics at 10+2 level.

OR

A pass with not less than 50% marks in any recognized Regular Bachelors Degree course of minimum three years duration in any discipline with Mathematics/Statistics(this does not include Business Mathematics or Business Statistics) as one of the Subjects.

OR

A pass with not less than 50% marks in BCA degree of minimum three years duration from a recognized University.

- ii) Subject to the regulation relating to prescribed minimum of the respective qualifying examination, the minimum marks of admission to the course of studies shall be a pass in the case of SC/ST candidates.
- iii) Candidates belonging to Socially and Educationally Backward Classes (SEBC) referred to GO(P)208/66/Edn dated. 2-5-96 and subsequent amendments to order issued by the Government shall be given a relaxation of 2% marks in the prescribed minimum for admission.
- iv) A relaxation of 5% marks from the prescribed minimum shall be allowed in the case of physically handicapped persons.
- v) Candidates who have passed the qualifying examination in more than one chance in the subject (excluding languages) will have their percentage marks derated at the rate of 5% for every additional appearance for the purpose of ranking.

Candidates with such degrees awarded by the Mahatma Gandhi University or any other degree recognized as equivalent to degrees in (i) by the Mahatma Gandhi University also are eligible to apply.

Reservation of seats shall be as per rules prescribed in the relevant rules by the Directorate of Technical Education, Government of Kerala.

2 Duration of the Course :

The course shall extend over a period of three academic years consisting of six semesters.

3. Requirements of attendance and progress :

A candidate will be deemed to have completed the course of any semester only if

- a) He has put in not less than 75% of attendance.
- b) His progress and conduct have been satisfactory.

4. Procedure for completing the Course :

- i. The academic year will be divided into two semesters, the odd semester normally commencing at the beginning of the academic year and even semester ending with the academic year.
- ii. The course work in the subjects of study of the odd semesters will ordinarily be conducted only in odd semesters and that of even semesters only in even semesters.
- iii. A candidate may proceed to the course of study of any semester if and only if he has completed the course in the previous semester and has registered for the examination of the previous semester.
- iv. A candidate who is required to repeat the course of any semester for want of attendance / progress or who desires to rejoin the semester after a period of discontinuance or who upon his own request is specially permitted to repeat the semester in order to improve his performance, may be permitted to join the semester for which he is eligible or permitted to join.

5. Assessment :

- i. The assessment will comprise of sessional assessment and university examination in certain subjects, and wholly sessional assessments in others, carrying marks as specified in the subject of study and scheme of assessment.
- ii. A candidate shall be declared to have passed in any subject in full in any semester if he/she secures not less than 50% marks in sessional, not less than 40% marks in the University examination including project and viva and not less than 50% of the over all aggregate marks for the subject i.e., university examination marks and sessional marks of the subjects put together.
- iii. A student may be given the option to improve the marks obtained in theory subjects of any semester (except the sixth semester) by canceling all the theory examinations of the semester. There will be no provision to improve the sessional marks of any semester unless he repeats the semester.
- vi) University examinations will be conducted at the end of each semester for subjects offered during the semester.
- v) Semester examinations will normally be conducted in October/November and in April/May of each year.

- vi) All Sessional work shall be valued and marks awarded on the basis of day to day performance, periodic tests and assignments. The allocation of sessional marks for individual subjects shall be on the following basis.

Theory Subjects		Practicals	
Attendance	10%	Attendance	10%
Assignments /Seminar	30%	Regular class work / Lab record / Class Performance	50%
Tests	60%	Tests	40%
Total	100%	Total	100%

The sessional marks allotted for attendance shall be awarded in direct proportion to the percentage of attendance secured by the candidate in the subject. However, full sessional marks for attendance shall be awarded to those who are securing 80% of the attendance and above.

6. Normalization of Sessional Marks

For the MCA course, the maximum internal marks(awarded internally) and external marks(awarded by external examiner appointed by the university) for all theory / practical papers shall be 25 and 75 respectively, except for the following papers. MCA107, MCA108, MCA506, MCA507, MCA508.

To enforce uniformity in the awarding of internal marks by all institutions, there is a need to stipulate rules for normalizing the marks so that the abnormal and unjust variations in sessional marks are controlled to a reasonable extent.

For MCA 108, MCA 507 and MCA 508, having only sessional assessment, the Head of the institution should ensure that the class average does not exceed 80%. For the remaining papers the following normalization method shall be implemented by the University.

Normalization Method

The maximum percentage of internal marks of a candidate shall be limited to 40% above that of external marks secured by the candidate.

In the case of a candidate who fails to get the pass minimum or absent for external examination for a paper, the normalized internal marks shall be computed only when he/she gets through the new external examination and the internal marks will be computed as per the new external marks.

Illustration

Internal	Maximum marks - 25	Pass minimum - 12.5
External	Maximum marks - 75	Pass minimum – 30
External	Maximum Marks - 25	Pass Minimum - 10
Overall	Maximum marks - 100	Pass minimum - 50

Reg. No.	External		Max. % of internal eligible (% of external+40%)	Internal awarded by college	Internal marks after normalization
	Marks awarded out of 75	Percentage			
1	40	53%	93	20	20
2	15(failed)	20%	-	-	-
	30(Next appearance)	40%	80%	22	20(limited to 80%)
3	60	80%	100	21	21
4	Absent	-	-	-	-
	60(Next appearance)	80%	100	18	18

The above shall be computed using software and the normalized internal marks in the last column shall be carried over to the mark list.

7. University Exam Question Paper Pattern

The pattern shall comprise of 2 parts: PART A (10 x 3=30 marks) and PART B (5 x 9=45 marks). **Part A** shall have 30 marks, in which the student is expected to answer 10 short questions (3 marks each) out of 12 questions evenly prepared from all the five modules. These questions can consist of definitions, theoretical concepts, short illustrative examples, block schematics etc.. **Part B** shall have 2 questions from each module, out of which the student has to answer one from each module (9 marks). These can be descriptive type questions, derivations, problems or collection of 2 or more smaller questions in a topic. This offers 50% choice to the students, yet forces him to study all the five modules.

8 Passing requirements/classification of successful candidates

- i) A candidate shall be declared to have passed in any subject if he/she satisfies clause 5(ii) above.
- a) If any candidate fails in want of either minimum marks for university examination or minimum marks for overall aggregate for any subject, he/she can appear for the supplementary examination at the ensuing chance only in the failed subjects alone.
- b) If any candidate fails in want of minimum marks for *sessional part* alone for any subject, he/she has to write supplementary examination for ***both the sessional part and university examination in the ensuing chance only in the failed subjects alone***. Sessional part of such candidates may be evaluated by the institution, considering the marks for attendance already obtained, but new assessment should be done for seminar/assignment and tests along with the subsequent batch. The new sessional mark has to be forwarded to the university along with the sessional marks of subsequent batch.
- c) If any candidate fails in MCA 108, MCA 507 & MCA 508, having only sessional assessment, he/she has to redo the work for that subject along with the subsequent batch.
- ii) A candidate who successfully completes the course and satisfy all the passing requirements of the six semesters within six academic years of joining the course will be declared to have qualified for the degree. However, in exceptional cases with genuine and convincing reasons, it is the discretion of the syndicate of the University to effect changes in this regard.
- iii) A candidate who qualifies for the degree and secures not less than 75% of the aggregate of total marks of all the six semesters ***in the first attempt in all the subjects*** shall be declared to have passed the MCA Degree examination in ***First Class with Distinction***.
- iv) A candidate who qualifies for the degree and secures not less than 60% of the aggregate of total marks of all the six semesters shall be declared to have passed the MCA Degree examination in First Class .
- v) All other successful candidates shall be declared to have passed the MCA Degree examination in Second Class.
- vi) Successful candidates who complete the examinations with Distinction shall be ranked on the basis of the aggregate of the total marks of all six semesters.

9 Revision of Regulations

The University may from time to time revise, amend or change the regulations, curriculum, scheme of examinations and syllabi. These changes unless specified otherwise will have effect from the beginning of the semester following the notification by the University.

SCHEME

I Semester

Course No.	Subject	No. of hours per week		Duration of Exam in hrs	Sessional Marks Max.	Sem. Exam. Marks Max	Total Mark
		Lect	Lab.				
MCA 101	Mathematical Foundations of Computer Science	4	-	3	25	75	100
MCA 102	Digital Systems & Logic Design	4	-	3	25	75	100
MCA 103	Computer Organization and Architecture	4	-	3	25	75	100
MCA 104	Principles of Management and Accounting	4	-	3	25	75	100
MCA 105	Structured Programming in C	4	-	3	25	75	100
MCA 106	C Programming Lab	-	4	3	25	75	100
MCA 107	PC Hardware Lab	-	2	2	25	25	50
MCA 108	Communication & Soft skills	-	2		50		50
	Total	20	8				700

II Semester

Course No.	Subject	No. of hours per week		Duration of Exam in hrs	Sessional Marks Max.	Sem. Exam. Marks Max	Total Mark
		Lect	Lab.				

MCA 201	Probability and Statistics	4	-	3	25	75	100
MCA 202	Data Structures and Analysis of Computer Algorithms	4	-	3	25	75	100
MCA 203	Microprocessors and Embedded Systems	4	-	3	25	75	100
MCA 204	Operating Systems	4	-	3	25	75	100
MCA 205	Object Oriented Programming with C++	4	-	3	25	75	100
MCA 206	C++ Lab	-	4	3	25	75	100
MCA 207	Data Structures Lab in 'C'	-	4	3	25	75	100
	Total	20	8				700

III Semester

Course No.	Subject	No. of hours per week		Duration of Exam in hrs	Sessional Marks Max.	Sem. Exam. Marks Max	Total Mark
		Lect	Lab.				
MCA 301	Java and Web Programming	4	-	3	25	75	100
MCA 302	Software Engineering	4	-	3	25	75	100
MCA 303	System Software	4	-	3	25	75	100
MCA 304	Data Base Management Systems	4	-	3	25	75	100
MCA 305	Data Communications	4	-	3	25	75	100
MCA 306	Java Programming Lab	-	4	3	25	75	100

MCA 307	DBMS Lab	-	4	3	25	75	100
	Total	20	8				700

IV Semester

Course No.	Subject	No. of hours per week		Duration of Exam in hrs	Sessional Marks Max.	Sem. Exam. Marks Max	Total Mark
		Lect	Lab.				
MCA 401	Operations Research	4	-	3	25	75	100
MCA 402	Computer Networks	4	-	3	25	75	100
MCA 403	Linux and Shell Programming	4	-	3	25	75	100
MCA 404	Object Oriented Modeling and Design	4	-	3	25	75	100
MCA 405	Elective- I	4		3	25	75	100
MCA 406	Linux Lab	-	4	3	25	75	100
MCA 407	Open Source Lab – Python/PHP	-	4	3	25	75	100
	Total	20	8				700

V Semester

Course No.	Subject	No. of hours per week		Duration of Exam in hrs	Sessional Marks Max.	Sem. Exam. Marks Max	Total Mark
		Lect	Lab.				
MCA 501	Computer Security	4	-	3	25	75	100
MCA 502	Internet Technology and Distributed Applications	4	-	3	25	75	100
MCA	Computer Graphics	4	-	3	25	75	100

503							
MCA 504	Data Mining	4	-	3	25	75	100
MCA 505	Elective - II	4	-	3	25	75	100
MCA 506	Computer Graphics Lab	-	2	2	25	25	50
MCA 507	Seminar	-	2		50	-	50
MCA 508	Mini Project	-	4		100	-	100
	Total	20	8				700

VI Semester

Course No.	Subject	No. of hours per week		Duration of Exam in hrs	Sessional Marks Max.	Sem. Exam. Marks Max	Total Mark
		Lect	Lab.				
MCA 601	Project	-	28	-	200	200	400
MCA 602	Viva-voce	-	-	-		100	100
	Total	-	28				500

ELECTIVE-I

1. Visual Programming
2. Software Quality Management
3. Business Data Processing & COBOL Programming
4. Enterprise Resource Planning
5. Multimedia Systems
6. Neural Networks & Fuzzy Logic
7. Artificial Intelligence
8. Management Information Systems

ELECTIVE-II

1. User Interface Design
2. Bioinformatics
3. Digital Image Processing
4. Advanced Computing Paradigms

5. XML & Web Services
6. Distributed Computing
7. Embedded Systems

SEMESTER 1

MCA 101 - Mathematical Foundations of Computer Science

Module 1:- Sets: Basic Concepts

Relations: Binary relations, Equivalence relations and partition.

Functions: Different types of functions, Composition and Inverse, Recursive and hashing functions. Mathematical Induction.

Module 2:- Partial Ordering Relations

Partially ordered set: Representation of Poset - Hasse Diagram, LUB, GLB, well ordered set, meet and join of elements.

Lattices as partially ordered sets: Definition and basic properties, Lattices as algebraic systems, sub lattices.

Basic Concepts of Automata Theory: Alphabets, Strings, Languages, DFA, NFA and their representations.

Module 3:- Logic

Mathematical logic, Logical operators – Conjunction, Disjunction, Negation, Conditional and biconditional. Truth tables. Equivalence formula, Tautology, methods of proof-direct, indirect, contradiction, equivalence and induction. Inference Theory, Validity by truth table, Rules of Inference. .

_Predicate calculus : Predicates , statement functions, variables and quantifiers, predicate formulas, free and bound variables, the universe of discourse.

Module 4:- Graph Theory

Basic terminology: Different types of graphs – Directed and undirected, Simple, Pseudo, Complete, Regular, Bipartite. Incidence and degree, Pendant and Isolated vertex and Null graph. Isomorphism, Sub graphs, Walk, Path and Circuit, Connected and disconnected graphs and components, operations on graphs. Euler Graphs, Fleury's Algorithm, Hamiltonian circuits and paths. Traveling salesman problem. Matrix representation of graphs – Incidence and Adjacency matrices.

Module 5:- Trees & Planar Graph

Trees: Basic properties, Rooted and binary trees, Binary search trees, Tree traversals – Pre order, , In order and Post order , Spanning Trees, Prims and Kruskals algorithm.

Planar graphs: Kuratowski's two graphs and Euler's formula . Detection of planarity.

References

- Discrete Mathematical Structures with Applications to Computer Science by J. P. Tremblay and R Manohar, Tata McGraw-Hill Publications, 1997.
- Graph Theory by Narsingh Deo, Prentice-Hall of India publications, 2004.
- Theory of computer science (Automata, Languages and Computation), 2nd ed. Mishra K.L.P , N Chandrasekharan, Prentice-Hall of India publications.
- Discrete Mathematical Structures, Theory and Applications . D.S. Malik, Thomson Learning , I Edn.
- Discrete Mathematics for Computer Science, Haggard, Thomson Learning , I Edn.
- Discrete Mathematics and Its Applications by Kenneth H Rosen. Tata McGraw-Hill Publications.
- Introduction to Automata Theory, Languages and Computation by Hopcroft and J. D .Ullman. Narosa Publications.
- Mathematical foundation of Computer Science by Y. N Sings. New Age international Publishers.
- Bernard Kolman, Robert.C.Busby & Sharon Ross, "Discrete Mathematical structures" Prentice Hall of India,2001.

MCA 102 DIGITAL SYSTEMS & LOGIC DESIGN

Module1 - Number systems and code.

Number systems - Efficiency of number system, Decimal, Binary, Octal, Hexadecimal conversion from one to another- Binary addition, subtraction, multiplication and division, representation of signed numbers, addition and subtraction using 2's complement and 1's complement.

Binary codes - BCD code, Excess 3 code, Gray code, Alphanumeric code, Error detection codes, Error correcting code.

Module II - Logic Gates and Boolean Algebra.

Logic Gates - Basic logic gates- AND, OR, NOT, NAND, NOR, Exclusive OR, Exclusive NOR gates- Logic symbols, truth table and timing diagrams.

Boolean Algebra - Basic laws and theorems , Boolean functions, truth table, minimization of boolean function using K map method, Realization using logic gates and universal gates.

Module III - Combinational and Sequential Logic Circuits.

Combinational circuits - Half adder, Full Adder, Parallel binary adder, Subtractor, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers, Parity bit generator, PLA.

Sequential circuits - Flip Flops – RS, JK, T and D Flip Flops, Edge triggered Flip Flops, Master slave Flip Flops.

Module IV - Registers and counters.

Registers - Serial in serial out, Serial in Parallel out, Parallel in serial out, Parallel in Parallel out registers, Bidirectional shift registers, universal shift registers.

Counters - Synchronous and asynchronous counters, UP/DOWN counters, Modulo-N Counters, Cascaded counter, Programmable counter, Counters using shift registers, application of counters.

Module V - Introduction to computers.

Basic components of a computer , I/O devices - Input and output devices, printers, Display devices, Scanners. Mother Board - components of mother board. Secondary storage devices - Hard disk- components of hard disk, data storage in hard disk, disk geometry. CD Family, DVD.

References

- Digital logic and Computer design - Morris Mano, Prentice Hall of India, 2004.
- Digital Fundamentals - Floyd, Pearson Education, 2004.
- All about Hard Disk- Manohar Lotia, BPB Publications.
- Digital principles and Applications- Albert Paul Malvino, Donald P Leach, McGraw Hill.
- All about Mother Board- Manohar Lotia, 2002.
- Digital computer Fundamentals - Thomas C Bartee, McGraw Hill.
- The Complete Reference PC Hardware – Craig Zacker, John Rourke, Tata McGraw-Hill, 2004.

MCA 103 Computer Organization & Architecture

Module I

Introduction: Basic structure of computers-Machine Instructions and programs: Memory Locations and addresses, Memory Operations, Instructions and Instruction sequencing, Addressing modes, Basic Input Output Operations, Subroutines.

Module II

Central Processing Unit : Arithmetic & Logic Unit: Number Representation – Addition of positive numbers – Fast Adders – Signed Addition and Subtraction – Multiplication of positive numbers – Multiplication using Booth's algorithm -

Fast Multiplication – Floating point numbers and Operations. The Processing Unit :
Basic Concepts - Instruction execution cycle - sequencing of control signals - hardwired control - microprogrammed control - control signals - microinstructions- microprogram sequencing - Branch address modification- Pre fetching of microinstructions

Module III

The Main Memory: Memory Hierarchy – Main memory - RAM-ROM – Cache

Memory – Performance Considerations -Virtual Memory- Memory Management Requirements, Secondary storage – memory interleaving.

Module IV

Input / Output Organization: Accessing I/O devices - Interrupts: Interrupt processing – hardware interrupts –programmable interrupt controller – Vectored Interrupts - Interrupt nesting - Daisy chaining - Direct memory access (DMA):

DMA operations & DMA Controller – Buses – Introduction to I/O interfaces.

Module V

Parallel processing : Basic Parallel Processing Architecture - Flynn’s Classification - SISD, MISD, SIMD, MIMD structures - Pipelining – Basic Concepts of pipelining, Instruction Pipelining, Hazards, Vector processing & Vector processors - Loosely Coupled & Tightly Coupled Systems - Instruction-level parallelism: Concepts of instruction-level parallelism (ILP), Superscalar,

Superpipelined and VLIW processor architectures - Comparison of RISC and CISC.

References

Computer Organization, V C Hamacher, Mc-Graw Hill International Edition, Fifth Edition.

Computer Architecture: A Quantitative Approach - John Hennessy and David Patterson,

Morgan Kaufmann Publishers Inc., Third Edition

Computer System Architecture – M Morris Mano –(Prentice Hall)- Third Edition.
Computer Organization and Architecture- William Stallings - Fifth Edition.

Structured Computer Education – Andrew S Tanenbaum-(Prentice Hall)-Fourth Edition.

MCA 104 Principles of Management & Accounting

Module I

Basic Managerial Concepts, Levels of management, Managerial Skills, Concept of management principles, nature and need of management, management functions, management thought – classical approach, scientific management, fayol’s management, bureaucratic approach, systems approach, Contingency approach. Planning – Meaning, nature, structure, steps, effective planning, MBO, SWOT Analysis. Organizing – meaning, process, structure, formal and informal, types of organization, departmentation, delegation of authority.

Module II

Staffing – meaning, nature, staffing process, recruitment & selection. Directing, supervision, Motivation – significance, motivational theories- Maslow's need hierarchy, McGregor's Theory X & Theory Y. Leadership, Communication – formal and informal, Oral and written, barriers, effective communication. Controlling-concepts, steps, objectives, features of a good control system.

Module III

Organizational behavior – Key elements, scope, models of OB, Individual behavior, personality, attitudes values and job satisfaction, Group behavior, team building- Types, process, roles.

Module IV

Marketing Management-importance, scope. Core Marketing Concepts, Marketing research, Customer value, Customer relationship management, Brand Equity, Product Life Cycle, Pricing Strategies, Distribution Channels, Promotions – Sales promotions, advertising and public relations. Marketing Information System, Global marketing and Integration.

Module V

Management Accounting- concepts, functions, role, Financial Accounting, Principles of accounting, accounting concepts, double entry system, journal entry, posting, trial balance, subsidiary books, final accounts. Depreciation – meaning, methods of depreciation.

References

- Principles of Management, R N Gupta, S.Chand & Company Ltd.
- Essentials of Management – Koontz & Wheinrich, 7th Edition, PHI Publications
- Global marketing management, Keegan, 7th Edition, PHI Publications
- Marketing management – Kotler, Keller, Jha and Koshy, 13th edition, Pearson Education
- Accounting for Management, Srinivasan & Murugan, S.Chand & Company Ltd
- Organisational Behavior, S.S Khanka, S.Chand & Company Ltd
- Principles of Management, L M Prasad, Sultan Chand Publications

MCA 105 Structured Programming in C

Module I

Introduction to algorithm, flowchart, structured programming concept, programs – Compiler, Interpreter.

Introduction to C Language: The C character set, identifiers and keywords, data types, how floats and doubles are stored, constants, variables and arrays, declarations, expressions, statements, Lvalues and Rvalues , type conversion, symbolic constants.

Module II

Operators and expressions: Arithmetic operators, unary operator, relational and logical operator, assignment operators, the conditional operator, type conversion, Library function

Data input and output: Single character input, single character output, scanf, printf, puts gets functions, interactive programming.

Control statement: Branching: if else statement, Looping, nested control structure, switch statement, break statement, continue statement, comma operator, goto statement.

Module III

Functions: Overview, function prototypes, passing arguments to a function, recursion.

Program structure: Storage classes, automatic variables, external variables, static variables, multifile program.

Arrays: Defining an array, passing array to functions, multidimensional arrays, strings: one dimensional character array, array of strings.

Module IV

Pointers: Fundamentals, void pointer, null pointer, passing pointers to a function, pointers and one dimensional arrays, dynamic memory allocation, operation on pointers, pointers and multidimensional arrays, array of pointers, pointer to an array, pointers and strings, structure pointer, pointers to function, pointers and variable length arguments list, passing functions to other functions.

Structures and unions: Defining a structure, processing a structure, user defined data types, structure and pointers, passing structure to function, self-referential structures, and union.

Module V

Data files: Why files, opening and closing a data file, reading and writing a data file, processing a data file, unformatted data file, concept of binary file.

Low level programming: Register variable, bitwise operations, bit fields.

Additional features of C: Enumeration, Command line parameters, Macros, C Preprocessor.

References

- The c programming language – Brian W Kernighan & Dennis Ritchie IInd edition Eastern Economy Edition, Prentice Hall 2001
- Programming with C – Byron S Gottfried– Schaum’s outlines 2nd Edition,2010
- Computer Science: A Structured Programming Approach Using C, Forouzan,
- 3rd Cengage Learning 2007
- C – How to Program, Deitel & Deitel, Pearson Education Asia, 6th Edition,2009
- Programming in C –Pradip Dey, Manas Ghosh – Oxford Higher Education ,2007
- Ansi C programming Bronson, Cengage learning, C2009
- Understanding pointers in C- Yashavant Kanetkar – BPB publication , 2009
- Let us C - Yashavant Kanetkar – BPB publication C. 1997
- C by discovery – l s Foster – Pearson C 2005
- Working with C - Yashavant Kanetkar – BPB publication,2008
- Instant C program – Ivor Horton – Wrox, 1995
- The art of programming computer science with ‘C’ – Steven c Lawlor – Wess , Cengage C2006

MCA 106 C Programming Lab

Section A

- Implementation of the various Data Types in C.
- Demonstration of Data type conversion (Hint: Usage of type casting).
- Implementation of various Storage Types.
- Demonstration of for loop.
- Demonstration of do...while loop.
- Demonstration of while loop.
- Demonstration of nested if (Hint: Use logical operators).
- Demonstration of switch... case structure.
- Implementation of arrays.
- Implementation of multidimensional arrays (Hint: implement matrix operation).
- Implementation of functions (Hint: Demonstrate call by value, call by schemes, passing of arrays).

- Demonstration of various string operations (Hint: Usage of user defined functions only allowed).
- Demonstration of pointer operations.
- Demonstration of recursion (Hint: GCD, factorial, Fibonacci series).
- Demonstration of Debugging a C program.

Section B

- Implementation of structures (Hint: simple structure operations, array of structures).
- Implementation of Union.
- Implementation of pointers to structures and unions.
- Demonstration of dynamic allocation of memory (Hint: malloc, calloc, realloc, free).
- Demonstration of sorting techniques (Hint: selection sort, bubble sort).
- Demonstration of searching techniques (Hint: linear search, binary search).
- Demonstration of bitwise operations.
- Demonstration of macro processing.
- Demonstration of various file operations. (Hint: Text file)
- Implementation of character counting, line counting and word counting for a file.
- Program to find the lengthiest line in a text file.

MCA 107 - PC HARDWARE LAB

1. Identification of PC Components and Assembling the PC
2. Understanding BIOS set up-
3. Installation of Operating Systems-
4. Installation of Software Packages
5. Replacing and fitting of Hard Disk and Removable Disk Drives on PC
6. Identification of different cards in the PC
7. Disc Managers and it's use
8. Virus removal and disc scan
9. Backup and Restoration utility
10. Connecting input/output devices and installation of their driver softwares.
11. Configuration of Audio and Video
12. Trouble shooting of the PC

Reference

The Complete Reference – PC Hardware – Craig Zacker & John rourke, Edition 2001
Tata McGraw
Hill

MCA 108 Communication & Soft skills

Module I

Communication- Channels, Technical Communication, Importance. Listening Process – Types, Improving Listening Process.

Module II

Speaking- Speech Process, Strategies for good communication,
Improving fluency, Body Language,
Professional Speaking – Job Interviews, Group Discussions.

Module III

Presentation Skills,
Professional Writing – resumes and job
applications, Email messages, Reports.

References

- Effective Technical Communication- M. Ashraf Rizvi, 2005 edition, Tata McGraw Hill Publications
- Technical Communication, Pfeiffer & Padmaja, 6th Edition, Pearson Education
- The Ace of Soft Skill, Ramesh, Pearson Publications.
- Technical English, Sumant, 2nd Edition, Tata McGraw Hill Publications

SEMESTER 2

MCA 201 PROBABILITY AND STATISTICS

Module 1:-Basic Statistics

Measures of central tendency: - mean, median, mode; Measures of dispersion- Range, Mean deviation, Quartile deviation and Standard deviation; Moments, Skewness and Kurtosis, Linear correlation, Karl Pearson's coefficient of Correlation, Rank correlation and linear regression.

Module 2:- Probability Theory

Sample space, Events, Different approaches to probability, Addition and multiplication theorems on probability, Independent events, Conditional probability, Bayes Theorem

Module 3:- Random variables and Distribution

Random variables, Probability density functions and distribution functions, Marginal density functions, Joint density functions, mathematical expectations, moments and moment generating functions. Discrete probability distributions - Binomial, Poisson distribution, Continuous probability distributions- uniform distribution and normal distribution.

Module 4:- Sampling and Estimation

Theory of Sampling: - Population and sample, Types of sampling

Theory of Estimation: - Introduction, point estimation, methods of point estimation- Maximum Likelihood estimation and method of moments, Central

Limit Theorem (Statement only) .

Module 5:-Testing of hypothesis

Null and alternative hypothesis, types of errors, level of significance, critical region, Large sample tests – Testing of hypothesis concerning mean of a population and equality of means of two populations

Small sample tests – t Test-for single mean, difference of means. Paired t-test,

Chi-square test (Concept of test statistic χ^2), F test - test for equality of two population variances.

References

- Fundamentals of statistics: S.C.Gupta, 6th Revised and enlarged edition April 2004, Himalaya Publications.
- Introduction to Probability and Statistics, Medenhall, Thomson Learning, 12 Edn.
- Fundamentals of Mathematical Statistics- S.C.Gupta, V.K.Kapoor. Sultan Chand Publications.

- Introduction to Mathematical Statistics -Robert V. Hogg & Allen T. Craig. Pearson education.

MCA 202 DATA STRUCTURES AND ANALYSIS OF COMPUTER ALGORITHMS

Module I

Introduction: Algorithms, Data Structures, Data Types, Concepts in performance analysis – space complexity, time complexity- asymptotic notation

Arrays: Ordered lists – polynomial addition, sparse matrices, representation of array.

Stacks and Queues: Definition and concepts, Operations on stacks. Application of stacks- Evaluation of Arithmetic Expression, infix to postfix conversion. Queue, representation of queue, circular queue, deque, priority queue, Application of queues.

Module II

Linked List: Singly linked list, Linked stacks and queues, Polynomial addition, sparse matrices, doubly linked list and dynamic storage management.

Trees : Basic terminology, binary trees, binary tree representation, Binary tree traversal, Binary search tree – searching ,insertion , deletion , Balanced Trees – AVL Tree, B, B+.

Graphs: Terminology and representation, Traversals- BFS, DFS.

Module III

Searching and Sorting: Searching – Linear search, binary search, Fibonacci and interpolation search. Comparison of different methods.

Sorting – Insertion, Bubble, Selection, Heap, Radix. Sort comparison.

Hashing Techniques: Different hashing functions, methods for collision handling.

Module IV

Divide and conquer method – General method, Finding the maximum and minimum, Analysis of Binary search, Quick sort and Merge sort.

Greedy Method and Dynamic programming method – The general method, Minimum cost spanning tree- Prim's algorithm and Kruskal's algorithm Dynamic programming- General method, multistage graphs, All pairs shortest paths.

Module V

Backtracking and Branch and Bound techniques – The general method, The 8-Queens problem, Branch and Bound- Least Cost search, Travelling salesman problem. **NP-Hard and NP -complete problems** - Basic concepts, non deterministic algorithm, class of NP-hard and NP- complete .

References

- Fundamentals of data structures – Ellis Horowitz and Sartaj Sahni (Galgotia , 1994)
- Fundamentals of computer algorithms- Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajeshkharan (Universities Press , 2007)
- Data Structure using C & C++ b, Tannenbaum and Augustine,prentice hall.
- Data Structures – a pseudocode approach with C –Richard F Gilberg, Behrouz A Forouzan, Thomson Learning, 2 Edn., **Cengage Learning C2005**
- Data Structures and program design – R. L Kruse (Prentice Hall of India),C2001
- Data structures and Algorithms in C++, Adam Drozdek, Thomson Learning, 3 Edn, C2005
- Classic data structures – D Samanta (PHI), 2006
- Fundamentals of algorithms – Gilles Brassard, Paul Bratley (PHI),C1996
- Introduction to the design and analysis of algorithms – Anany Levitin (Pearson),2011

MCA 203 Microprocessors and Embedded Systems Addressing Modes of 8086.

Module 1 - The Processors : 8086

Register Organization of 8086, Architecture, Signal Description of 8086, Physical Memory Organization, General Bus Operation, I/O Addressing Capability, Special Processor Activities, Minimum Mode 8086 System and Timings, Maximum Mode 8086 System and Timings.

Module 2 - Instruction Set, Assembler Directives and Assembly Language Programming of 8086

Machine Language Instruction Formats – Instruction Set of 8086-Data transfer instructions,Arithmetic and Logic instructions,Branch instructions,Loop instructions,Processor Control instructions,Flag Manipulation instructions,Shift and Rotate instructions,String instructions,

Assembler Directives and operators, Example Programs, Introduction to Stack, STACK Structure of 8086, Interrupts and Interrupt Service Routines, Interrupt Cycle of 8086, Non-Maskable and Maskable Interrupts, Interrupt Programming, MACROS.

Module 3 - Special Purpose Programmable Devices and their Interfacing

Data transfer schemes-programmed I/O, Interrupt I/O, DMA, DMA Controller 8257, Programmable Interval Timer 8253, Programmable Interrupt Controller 8259A, Programmable Communication Interface 8251 USART, Programmable Peripheral Interface 8255.

Module 4 – Architecture and Comparison of various Processors

80186, 80286, 80386, 80486, Pentium

Case Study on Advanced Multiprocessors

Module 5 - Introduction to Embedded Systems

Embedded system – classification, Hardware Components of an Embedded system.

Microcontrollers 8051 – Introduction, Architecture, Memory Organization, Instruction Set – Programming.

References

- Advanced Microprocessors and Peripherals – Architecture, Programming and Interfacing by A.K. Ray and K.M. Bhurchand, Tata McGraw Hill, 2002 Edition
- Embedded Systems – Architecture, Programming & Design by Raj Kamal -Tata McGraw Hill.
- The Intel Microprocessors 8086/8088, 80816/80188, 80286, 80486 Pentium and Pentium Pro Processor – Architecture, Programming and interfacing by Barry B Brey, 4th Edition, PHI.
- Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, 2nd Edition, Tata McGraw Hill, 2002.
- Microprocessor x86 Programming by K.R. Venugopal and Raj Kumar – BPB publications
- Microprocessors and Microcomputer based system design by Mohamed Rafiqussaman.
- Micro Controllers – [Theory And Applications] by Ajay V. Deshmukh- Tata McGraw Hill.

MCA 204 Operating Systems

Module I:

Evolution of operating systems:-Serial processing, Batch Processing, multiprogramming. Types of operating systems-Batch Operating System, Multi programming-Time sharing, Real time, distributed operating systems.

Operating Systems Structures:- Systems Components, Operating System Services, System Calls, System Programs, System Structures, Virtual Machines

Processor Management:-Job and process concept, Operating system view of processes, process-state transition diagram, PCB (Process control block), Threads, Operating system services.

Process Scheduling:-Types of schedulers, scheduling and performance criteria, scheduling algorithms, multiple processor scheduling.

Module II:

Inter process synchronization and communication-Concurrent Processes- need for inter process synchronization, critical section problem, mutual exclusion-mutual exclusion algorithms, semaphoresdefinition busy wait implementation, monitors, inter process communication using messages. **Deadlocks:** -Definition –Deadlock characterization-Resource allocation graph, methods for handling deadlocks, deadlock prevention, deadlock avoidance-safe state-resource allocation graph algorithmBanker's algorithm, deadlock detection, recovery from deadlock.

Module III:

Memory Management:-Preliminaries-address binding , dynamic linking and loading, Overlays. logical versus physical address space, Swapping, Contiguous allocation Paging-principles of page allocation. structure of page table- hardware support, multi level paging, hierarchical paging, inverted page table, shared pages.

Segmentation-principles of operation, hardware, implementation of segment table, protection and sharing, fragmentation, segmentation with paging.

Module IV:

Virtual Memory-Demand paging –performance. Page replacement-page replacement algorithms. Thrashing, Segmentation and paging implementation of virtual memory, hierarchical address translation tables and MMUS.

Device Management:-Disk structure, Disk scheduling-FCFS-SSTF-C-Scan-Look, Disk management, Swap space management, Disk reliability.

Module V:

File Management:-File structure, File types, File access, File attributes, File operations. Directories-Flat directory systems, hierarchical directory systems. File system implementation-Allocation methods-contiguous allocation, linked allocation, indexed allocation

References

- Abraham Silberschatz and Peter Baer Galvin, Greg Gange ‘Operating System Concepts’, (Sixth Edition) Wiley - India.
- Milan Milenkovic ‘Operating systems’ TATA Mc GrawHill.
- Andrew S. Tanenbaum, “Modern Operating System, Prentice Hall India

MCA 205 Object Oriented Programming with C++

Module I

Introduction to Object-Oriented Programming: Evolution of programming methodologies. Procedural Approach Vs Object-Oriented Approach. Encapsulation and Abstraction, Message Passing, Inheritance, Reusability, Extensibility, Polymorphism, Overloading.

Objects and Classes: Access Specifiers. Memory Allocation for Objects, Friend Functions and Friend Classes, Static Data Members; Static Member Functions. this pointer. Comparison of class with structure. Inline functions.

Arrays and Strings: Arrays Within a Class; Arrays of Objects; Objects as Function Arguments;

Returning Objects; const Member Functions; Constructing Two-Dimensional Arrays. String Manipulation using objects

Module II

Constructors and Destructors: Purpose of Constructors and Destructors. Default Constructors, Constructors with & without parameters, Constructor Overloading, Copy Constructor. Invoking Constructors and Destructors.

Pointers in C++ : Pointer declaration and Access, Pointer to void, pointer and arrays, pointer to pointer, pointer to functions, call by pointer, pointer arrays, Jagged array, array of pointers to string, memory management – new and delete, pointer to object. self referencing class, wild pointers.

Module III

Polymorphism: Overloading Concepts, Function Overloading: Operator Overloading: Defining Operator Function, Rules for overloading Operators. Overloading unary operators, overloading binary operators, Overloading Comma, [], (), -, new, delete Operators. Type Conversions – Basic to Class, Class to Basic and One class to another class type, Advanced Type Casting. **Module IV**

Inheritance: Basic Concepts, Reusability & Extensibility. Defining derived classes, protected access specified in Base class constructors and destructors in derived classes – Types of Inheritances. Making a Private Member Inheritable; Member Classes: Nesting of Classes. **Virtual Functions:** Virtual Base Classes, Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract classes.

Module V

Console I/O operations: C++ streams and C++ stream classes – Predefined Objects, unformatted I/O operations, Formatted I/O operations - manipulators - User defined manipulators - Overloading << and >> Operators for Objects.

Disk I/O Operations: Stream Classes, classes for file stream operations, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple objects, tellg() and seekg(), seekp() and tellp(). Updating a File : Error Handling During File Operations; Command-Line Arguments ,sequential access to a file, file input/output with stream class,error handling during file manipulations, filter utilities.

Templates: Generic Functions- A generic swap function, Functions with more than one Generic Type, Overloading a Function Template. Generic Classes – A stack generic class, Class template with more than one Generic Type, type name and template keywords, Template Restrictions, The power of Templates.

Exception Handling: Fundamentals of Exception Handling, Catching Class Types, Using Multiple catch statements, Catching All Exception, Restricting Exception, throw statement, Setting the Terminate and Unexpected Handlers, Uncaught exception, bad_exception Classes, and Built-In Exceptions. Exception Vs Error Handling, Assertion in C++.

References

- Deitel & Deitel, *C++ How to program*, Pearson Education Asia, 7th Edition, 2010.
- Computer Science: A Structured Programming Approach Using C++, Forouzan, Thomson Learning , 2 Edn
- C++ Programming: Malik, Thomson Learning , 3 Edn
- K.R Venugopal Rajkumar, *Mastering C++* , TMH.
- Gaddis Tony, *Starting Out with C++*, dreamtech Press,
- Sotter A Nicholas and Kleper J Scott, *Professional C++*, Wiley Publishing Inc.
- Schildt Herbert, *The Complete Reference C++*, Tata McGraw Hill, 4th Edition

MCA 206 C++ Lab

1. Program to Implement Classes and Objects.
2. Program to Implement Constructors and Destructors with array of Objects.
3. Program to Implement Passing and returning parameters as objects by reference.
4. Program to demonstrate Function Overloading.
5. Program to overload different operators – incr & decr operators with post & pre forms; new, delete, [], () and arithmetic operators.
6. Program to perform pointer sort operation.
7. Program to demonstrate friend functions and friend classes.
8. Program using objects for String manipulation functions.
9. Program to implement different types of inheritances like Multiple, Multilevel and Hybrid.
10. Program to demonstrate the use of Virtual Functions.
11. Program to demonstrate the use of abstract classes.
12. Program to demonstrate I/O streams and functions.
13. Program to Overload << and >> operators as a member and as a non-member operator functions.
14. Program to create a file to store some records and search for a particular record and display it.
15. Program to demonstrate namespaces and Volatile member functions.
16. Program to perform all possible Type Conversions.
17. Program to create function Templates, and overload the function Templates.
18. Program to create a generic stack class and member functions to perform stack operations.
19. Program to implement Exception Handling with minimum 5 exception classes including two built-in exceptions.

MCA 207 Data Structures LAB in C

- Program to represent sparse matrix manipulation using arrays.
- Program to represent Singly Linked List.
- Program to represent Doubly Linked List. • Program to represent Circular Linked List.
- Polynomial addition using Arrays and Linked List.

- Program to represent Stack operations using array and linked list • Program to represent Queue operations using array and linked list • Program for Conversion of infix to postfix.
- Program for Evaluation of Expressions.
- Program to represent Binary Tree Traversals.
- Program to represent Searching procedures (Linear search , Binary search and Interpolation search)
- Program to represent sorting procedures (Selection , Bubble , Insertion ,Quick , Heap , Merge)
- Program to find the minimum cost spanning tree using Prim's Method.
- Program to implement 8-Queens Problem.

SEMESTER 3

MCA 301 Java and Web Programming

Module I

Introduction to object oriented programming-Features of Java – Data types, variables and arrays – Operators – Control statements – Classes and Methods – Inheritance.

Module II

Packages and Interfaces –Exception Handling – Multithreaded Programming – Input/Output – Files – Utility Classes – String Handling. Generics, Generic Class, Generic methods.

Module III

Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus.

Module IV

JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries.. Networking– InetAddress class – URL class- TCP sockets - UDP sockets.

Module V

Web page Designing using HTML, Scripting basics-Client side and server side scripting. Java Script-Object, names, literals, operators and expressions- statements and features- events- windows- documents- frames- data types- built-in functions- Browser object model- Verifying forms. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

References

- Java The Complete Reference , Herbert Schildt 7th Edition. Tata McGrawHill Edition
- Java 6 by Rogers Cadenhead, Laura Lemay, Pearson education
- Java Programming – A Practical Approach – C Xavier, Tata McGraw-Hill Edition

- K. Arnold and J. Gosling, “The JAVA programming language”, Third edition, Pearson Education, 2000
- Javascript A Beginners Guide, 3rd Edition – John Pollock - Tata McGraw-Hill Edition

MCA 302 SOFTWARE ENGINEERING

Module 1 The Software Process

Software and Software Engineering, Software Development Process Models – The Waterfall Model, V-Model , Incremental Process Models, Prototyping, the Spiral Model, Concurrent Models. Software Implementation and Management process- inspection, Agile Development, Principles that Guide Practice

Module II Modeling and Design

Understanding Requirements, Requirements Modeling: Scenarios, Information, and Analysis Classes, Requirements Modeling for WebApps, Design Concepts, Software Architecture : Definition, Importance and Styles, User Interface Design

Module III Quality Management

Quality Concepts, Review Techniques, Software Quality Assurance, Software Configuration Management, Product Metrics

Module IV Testing

Software Testing Strategies, Testing Conventional Applications, Testing Object-Oriented Applications, Testing Web Applications

Module V Project Management

Project Management Concepts, Process and Project Metrics, Estimation for Software Projects, Project Scheduling, Risk Management

References

- Pressman, R.S., Software Engineering: A Practitioner's Approach, MGHISE, 7th Edition, 2010
- Sommerville, I., Software Engineering, Pearson Education, 7th Ed., 2005.
- Software Engineering principles & Practice- Waman S Jawadekar 2nd Edition, Tata Mc-Graw Hill Publishing Co. Ltd.
- Schach, S., Software Engineering, TMH, 7th Ed., 2007
- Kelkar, S.A., Software Engineering: A Concise Study, PHI, 2007
- Humphrey, W.S., Managing the Software Process, Addison Wesley, 1999
- Hughes, B and Cotterel, M., Software Project Management, 3rd Edition, TMH, 2004.
- Brooks, F.P., The Mythical Man-Month, Pearson, 1995

MCA 303 System Software

Module I

General concepts-Review of assembly and machine language programming, distinction between system software and application software, Language processors:- Introduction , Language processing activities.

Assemblers:- Elements of Assembly language programming, A simple assembly scheme, Pass structure of assemblers, Design of two pass assemblers

Module II

Macros and macro processors:- Macro definition and call, Macro expansion, Nested macro calls, advanced macro facilities, design of macro pre processor Linker-Relocation and linking concepts-self relocating programs.

Loader-Types of loaders

Editor-Types of editors-Components of editor-Debug monitor **Module**

III

Introduction to compiling:- Compilers, Analysis of a source program, the phases of a compiler,

Lexical analysis:-The role of the lexical analyzer, Input buffering, specification of tokens Recognition of tokens, Finite automata, Conversion of an NFA to DFA, From a regular expression to an NFA

Module IV

Syntax analysis:- the role of the parser, Context free grammars, writing a grammar, Top down parsing Bottom up parsing, syntax directed translation-syntax directed definition, ,

Construction of Syntax Tree, L R parsers-LR parsing algorithm, Constructing SLR parsing tables, SLR parsing table

Module V

Intermediate code generation-postfix notation, syntax tree, three-address code, basic blocks and flow graph,the DAG representation of basic blocks, Backpatching, Code optimization:- The principal sources of optimization, optimization of basic blocks, loops in flow graphs, Peephole optimization

Code Generations:- Issues in the design of a code generator, simple code generator

References

- System Programming and operating Systems- D.M.Dhamdhare Tata McGraw Hill (Modules 1& 2)
- Compilers Pinciples, Techniques and Tools- Alfred V Aho, Ravi Sethi, Jeffry D Ullman (Modules 3, 4 & 5)
- Systems programming- John J Donovan
- System Software- Leland L Beck, Addison Wesley Publishing Company

MCA 304 DATABASE MANAGEMENT SYSTEMS

MODULE I

Introduction To Database Systems and E-R Model

Overview, A Historical Perspective, Files System versus DBMS, Advantages of DBMS, Describing and storing data in a DBMS Transaction management, Structure of a DBMS, People who work with Databases, Overview of Database Design. Entities, Attributes and Entity Sets, Relationships and Relationship sets, Additional Features of ER Model: Key Constraints. Conceptual Design with the E-R Model Overview of Unified Modeling Languages Recommended to use a couple of specific ER-Models (Chen Model, Yourdon Model etc)

MODULE II

Relational Model and Query Languages

Introduction to the Relational Model. Integrity Constraints over Relations : Primary Key, Foreign Key and General Constraints. E-R Model to Relational Model: Entity Sets to Tables, Relationship Sets to Tables, Translating, Relationship Sets with Key Constraints. Translating Relationship Sets with Participation Constraints, Translating Weak Entity Sets, Translating Class Hierarchies. Translating E-R Diagrams with Aggregation, Introduction to Query Languages, Relational Algebra: Selection and Projection Operations. Set Operations, Renaming, Joins, Division

MODULE III

Structured Query Language

Overview of SQL, Basic Queries in SQL, Union, Intersect and Except, Nested Queries, Aggregate Operators, Null Values, Number, String and Date Functions, Using user defined functions inside queries, Complex Integrity Constraints in SQL, Triggers and Views in SQL, Embedded SQL and Cursors

MODULE IV

Relational Database Design

Introduction to Schema Refinement, Functional Dependencies, Properties of Decomposition, Normal Forms: First Normal Form, Second Normal Form, Third Normal Form, Boyce Codd Normal Form, Fourth Normal Form, Fifth Normal Form

MODULE V

Transaction Management, Concurrency Control, Distributed System and Database Administration

The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions: Serialisability, Anomalies Due to Interleaved Execution .Schedules

Involving Aborted Transactions, Lock-Based Concurrency Control: 2 PL – Basic & Strict, Dead Locks, Introduction to Crash Recovery, Concurrency Control: 2 PL, Serialisability, and Recover-ability, Introduction to Locking Management: Dealing with Deadlock .Introduction to ARIES, Introduction to Distributed Databases: Advantages & Disadvantages, Transaction Types – Local & Global Transactions, Distributed DBMS Architectures, Design of Distributed Databases: Replication, Fragmentation

How to add users, space management of tablespaces and objects

References

- Database Management Systems – Raghu Ramakrishnan and Johannes Gehrke, Third Edition, McGraw Hill, 2003
- Database Systems: Design , Implementaion and Management, Peter Rob, Thomson Learning, 7Edn.
- Concept of Database Management, Pratt, Thomson Learning, 5Edn.
- Database System Concepts – Silberchatz, Korth and Sudarsan, Fifth Edition, McGraw Hill, 2006
- The Complete Reference SQL – James R Groff and Paul N Weinberg, Second Edition, Tata McGraw Hill, 2003

MCA 305 Data Communications

Module I

Signals:-Simplified data communications model. Electric signals - continuous and discrete signals, periodic signals, Fourier Series Representation of Periodic Signals, Frequency, Spectrum and Bandwidth. Analog and Digital data transmission - data and signals, analog and digital transmission, their comparison, Digital data rate and band width. Transmission impairments - Attenuation, Delay distortion, Noise, Channel Capacity.

Transmission Media :- Guided Transmission Media -Twisted pair wires, Coaxial, Optical fiber. Wireless Transmission - Terrestrial microwave, satellite microwave, broad cast Radio, Infrared.

Module II

Digital Transmission:-Digital Data, Digital Signal:-Line coding- characteristics of line coding, Line coding schemes- Unipolar encoding:- NRZ, RZ, Manchester, Differential Manchester. Bipolar encoding:- AMI., Block coding Analog Data, Digital Signal:- Sampling, Sampling theorem, Nyquist rate, Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM).

Module III

Analog Transmission:-Modulation of Analog signals:- Analog to Analog modulation- Amplitude Modulation, Frequency Modulation, and Phase Modulation.

Modulation of Digital Data – Bit Rate and Baud Rate, ASK, FSK, PSK,QAM. Modems.
Multiplexing:- FDM, TDM, statistical TDM, WDM. Channnelization:- FDMA, TDMA,CDMA.

Module IV

Transmission mode:- Parallel transmission, Serial transmission, Asynchronous transmission, synchronous transmission. Line Configurations, full duplex and half duplex transmission.

Circuit switching:- Telephone networks-local loops, trunks.

Packet switching :- Datagram, virtual circuit. Effect of packet size on transmission time. Comparison of circuit switching and packet switching

Module V

High-Speed Digital Access:- DSL Technology-ADSL, xDSL, Spread Spectrum- Concept, Frequency Hopping, Direct Sequence

Cellular Telephony:- Basic concepts, Frequency–Reuse Principle, Transmitting, Receiving, Handoff, Roaming. First Generation, Second Generation-GSM, Third Generation.

References

- William Stallings -Data and Computer communications - Prentice Hall of India VIIth Edition.
- Behrouz A Forougan, Data Communications and Networking, 4th ed.McGraw Hill
- Andrews S. Tanenbaum -Computer Networks, Prentice Hall of India, 4th Edition.

MCA 306 Java Programming LAB

- Program to illustrate class, objects and constructors
- Program to implement overloading, overriding, polymorphism etc
- Program to implement the usage of packages
- Program to create our own exception
- Program for handling file operation

- Implement the concept of thread programming
- Program to implement Generic class and generic methods
- Applet program for passing parameters
- Applet program for running an audio file
- Program for event-driven paradigm in Java
- Event driven program for Graphical Drawing Application
- Program that uses Menu driven Application
- Program to implement JDBC in GUI and Console Application
- Web page design using HTML and client side validation using Javascript
- Programs to implement session Handling and Cookies in Servlets and JSP
- Socket programming to implement communications
- Develop a multi-threaded GUI application of your choice.

MCA 307 - DBMS LAB

1. Table Design- Using foreign key and Normalization .
2. Practice SQL Data Definition Language(DDL) commands.
 - a) Table creation and alteration(include integrity constraints such as primary key, referential integrity constraints, check, unique and null constraints both column and table level
 - b) Other database objects such as view, index, cluster, sequence, synonym etc.
3. Practice SQL Data Manipulation Language (DML) commands
 - a) Row insertion, deletion and updating
 - b) Retrieval of data
 - i) Simple select query
 - ii) Select with where options (include all relational and logical operators)

iii) Functions: Numeric, Date, Character, Conversion and Group functions with having clause.

iv) Set operators

v) Sorting data

vi) Sub query (returning single row, multiple rows, more than one column, correlated sub query)

vii) Joining tables(single join, self join, outer join)

4. Practice Transaction Control Language (TCL) commands (Grant, revoke, commit and

save point options)

5. Usage of triggers, functions and procedures

6. Development of sample applications using Oracle as Back End Sample applications

may include

i). Payroll Information

ii). Student Information System

iii). Bank Transaction

iv). Library Information System etc.

SEMESTER 4

MCA 401 OPERATIONS RESEARCH

Module I

Linear programming problems - Mathematical formulation, graphical method of solution, simplex method

Module II

Duality in linear programming problems, dual simplex method, sensitivity analysis, transportation and assignment problems, Traveling salesman Problem.

Module III

Game theory Introduction, two-person zero-sum games, some basic terms, the maxminiminimax principle, games without saddle points-Mixed Strategies, graphic solution of $2 \times n$ and $m \times 2$ games, dominance property.

CPM & PERT- project scheduling, critical path calculations, Crashing.

Module IV

Queueing theory -basic structure of queueing systems, roles of the Poisson and exponential distributions, classification of queues basic results of M/M/1: FIFO systems, extension to multi-server queues.

Module V

Simulation: simulation concepts, simulation of a queueing system using event list,pseudo random numbers, multiplication congruential algorithm, inverse transformation method, basic ideas of Monte-Carlo simulation.

References

- Taha.H.A ,operation Research : An Introduction, McMilan publishing Co., 1982. 7th ed.
- Ravindran A, Philips D.T & Solbery.J.J, Operations Research: Principles and practice, John Wiley & Sons, New York, 1987.
- Frank S. Budnick, Dennis Mcleavey and Richard Mojena, Principles of Operations Research for Management. All India Traveler Book seller, Delhi.
- Gillet.B.E., Introduction to Operations Research - A Computer oriented algorithmic approach, McGraw Hill, 1987.
- Joseph.G.Ecker & Michael Kupper Schimd, Introduction to operations Research, John Wiley & Sons, 1988.
- Hillier.F.S & Liberman.G.J, operation Research, Second Edition, Holden Day Inc, 1974.

- Kanti Swarup, Gupta.P.K. & Man Mohan, operations Research, S.Chand & Sons.

MCA 402 COMPUTER NETWORKS

Module I

Networking Concepts: Simplified network model. Classification of networks: LAN, MAN, WAN and the Internet. Protocols and protocol architecture. The OSI ref. Model, TCP/IP ref. model, its origin, the Internet layer, the TCP layer, the application layer. Comparison of the OSI and TCP/IP ref. models. A critiques of the OSI model and protocols, A critique of the TCP/IP ref. model, Novel Netware.

Data Link Layer: Need for data link control, Frame synchronization - flag fields, bit stuffing, flow control - stop and wait , sliding window protocol, error detection - parity check, CRC, Error control - Stop and wait ARQ, Go back-N ARQ, HDLC protocol, other data link protocols - LAPB, LAPD.

Module II

Local Area Networks: LAN protocol architecture (IEEE - 802 reference model), Topologies - Bus, tree, ring and star. Logic link control. Medium access control:- Random access- Aloha, CSMA, CSMA/CD, Exponential Back off algorithm ,CSMA/CA, controlled access-Reservation, Polling, Token Passing.

LAN systems: Traditional Ethernet:-MAC sub layer access method(CSMA/CD) ,IEEE 802.3 MAC frame, Addressing physical layer, Physical Layer, Physical Layer, Implementation, Bridged Ethernet, Switched Ethernet, Full-Duplex Ethernet.

FAST ETHERNET:- Mac Sublayer, Physical Layer, Physical Layer Implementation, GIGABIT ETHERNET:- MAC Sublayer, Physical Layer, Physical Layer Implementation.

LAN Connecting Devices-Repeaters, Hubs, Bridges:- filtering, Transparent Bridges, Spaning Tree Algorithm.Two-Layer Switch.

Backbone Networks- Bus Backbone, Star Backbone, Connecting Remote LANs.

Module III

Wireless LAN Technology:-Overview-Wireless LAN Applications, Wireless LAN Requirements, Wireless LAN Technology. Infrared LANs-Strengths and Weakness, Transmission Techniques. Spread Spectrum LANs- Configuration, Transmission Issues. Narrowband Microwave LANs.

IEEE 802.11 Wireless LAN Standard:- IEEE 802.11 Architecture and Services, Medium Access Control-CSMA/CA, Physical Layer-IEEE-802.11 FHSS, IEEE-802.11 DSSS, IEEE-802.11a OFDM, IEEE-802.11b HR-DSSS, IEEE-802.11g OFDM. IEEE-802.11 Addressing Mechanism.

Blue Tooth:- Architecture, Bluetooth Layers, Radio Layer, Baseband Layer, L2CAP, Other Upper Layers.

VIRTUAL LANS:- VLAN Technology, Membership, Configuration, Communication Between Switches, IEEE Standard, Advantages.

Module IV

Network Layer: Services of NW layer, Routing: Characteristics, performance criteria, routing strategies: fixed routing, flooding, random routing, Adaptive routing, congestion control,

Switched WAN – Virtual Circuit Switching, Global addressing, Virtual circuit identifier, Connection Setup:- Permanent Virtual Circuit, Switched Virtual Circuit, X.25 WAN, X.25 layers and protocols.

Module V

High Speed Switched WANs.

Frame Relay:- Back ground, Architecture, Frame Relay Layers, Frame Relay frame –LAPF core, LAPF control.

ATM :- design goals, Cell Network, Asynchronous TDM, ATM Architecture, Identifiers, ATM Layers:- ATM layer, ATM Headers, ATM Adaptation Layer:- AAL1, AAL2, AAL3/4, AAL5.

Transport Layer: Services, elements of transport protocol, simple transport protocol.

References

Behrouz A. Forouzan – Data Communications and Networking- Fourth Edition- Tata McGraw Hill

William Stallings- Data and computer communications- PHI- Seventh Edition.

- Andrew S Tanenbaum- Computer Networks - Fourth Edition- PHI.
- William Stallings – Wireless Communications and Networks- Pearson Education.
- William Stallings- ISDN and BROADBAND ISDN WITH FRAME RELAY AND ATM-Fourth Edition - Pearson Education.
- Gerd Keiser – Local Area Networks- Second Edition - Tata McGraw Hill

MCA 403 LINUX AND SHELL PROGRAMMING

Module I

Introduction to Linux - History, Architecture, Comparison with UNIX, Features and Facilities of Linux, Basic commands in Linux, Files and File Structure - Linux File System, Boot block, Super block, Inode table, Data blocks, Linux standard directories. File naming Conventions, Path, Types of file names and Users, File Commands in Linux, file comparisons, Directory Commands, Text Editors-Functions of a Text Editor, vi Editor, Locating Files, File Access Permissions [FAP], Viewing and Changing FAPs, Redirection, Filters, Pipes.

Module II

Basics of shell programming, various types of shell available in Linux, comparisons between various shells, shell programming in bash - Conditional and looping statements, Iterations, Command Substitution - expr command, arithmetic expansion, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automating system tasks.

Module III

Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of users accounts, creating and mounting file system.

Module IV

Checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel. Installing and removing packages. Backup, restore and Compress utilities - tar, cpio, dump,rsync and restore utilities,

Module V

Communication in Linux - mesg, who- T, talk, write, wall, finger, chfn, ping, traceroute utilities, email facilities . Configuration of servers- Telnet, FTP, DHCP,NFS, SSH, Proxy Server(Squid), Web server (Apache), Samba. Daemons- init, crond, atd, xinetd, inetd, the services file. named, sshd, httpd.

References

- Operating System - Linux, NUT Press, PHI Publisher, 2006 Edition
- Red Hat Linux Bible, Cristopher Negus, Wiley Dreamtech India
- UNIX Shell Programming by YeswantKanetkar, BPB
- Linux Administration Handbook, EviNemeth,Garth Snyder, Trent KHein - Pearson Education.
- Beginning Linux Programming by Neil Mathew & Richard Stones, Wiley Dreamtech India

MCA 404 OBJECT ORIENTED MODELING AND DESIGN

Module I Introduction and Inception

Object – Oriented Analysis and Design, Iterative Development, Inception , Evolutionary Requirements ,Use Cases and Other Requirements Artifacts

Module II Elaboration - Iteration 1

Iteration 1 Basics, Domain Models , System Sequence Diagrams , Operation Contracts Requirements to design, Logical Architecture and UML Package Diagrams, Object Design , UML Interaction Diagrams ,UML Class Diagrams

Module III Design Patterns and Elaboration - Iteration 1 continued

Objects and Responsibilities - Grasp , Object Design Examples , Visibility and Design , Mapping Designs to Code , Test Driven Development and Refactoring

Module IV Elaboration - Iteration 2 and Patterns continued

Iteration 2 Basics , UML Tools and UML as Blueprint , Quick Analysis Update , GRASP : More Object Design ,GoF Patterns

Module V Elaboration - Iteration 3

Iteration 3 Basics, Activity Diagrams and Modeling , State Machine Diagrams and Modeling , Relating Use Cases , Domain Model Refinement , Architectural Analysis , Logical Architecture Refinement, UML deployment and component diagrams

References

- Larman, Craig, Applying UML and Patterns: An Introduction to Object-Oriented Analysis, Pearson Education, 3rd Ed., 2004.
- Michael Bleha, James Rumbaugh, Object-Oriented Modelling & Design with UML, Pearson, 2nd Ed., 2005.
- Bahrami A., Object Oriented Systems Development using Unified Modeling Language, McGraw Hill, 1999.
- Grady Booch et al., Unified Modeling Language User Guide, Pearson Education, 1999
- Martin Fowler et al., UML Distilled, Pearson Education, 2002
- Bruegge B., Object-Oriented Software Engineering, Pearson, 2000.
- The Unified Modeling Language Reference Manual., Rumbaugh, Jacobson and Booch., Addison-Wesley

MCA 406 Linux Lab

Installation of Linux, network based installation

Basic Overview of various commands- cal, pwd, cd, ls, mv, cd, cp, rm, mkdir, rmdir, more, less, touch. Creating and viewing files using cat, file comparisons, disk related commands, checking disk free spaces. Batch commands, kill, ps, who, Printing

commands, find, sort, touch, file, file processing commands- wc, cut, paste etc - mathematical commands - expr, factor etc. Filter commands- pr, head, tail, cut, sort, uniq, tr - Filter using regular expression grep, egrep, sed, awk

Shell Programming -Shells, Scripting Rationale Creating a bash Script, bash Start up Files, A Script's Environment, Exporting Variables, Exit Status, Programming the Shell, Parameter Passing, Operators, looping, Input and Output.

Process Management with Linux, File System management, User Administration, Linux Start up and Shutdown, Software package Management

Network Administration

LAN Card configuration, Server Configuration- DHCP, DNS, FTP, Telnet, SSH, NFS, Web Server, SQUID Proxy server.

References

- Operating System - Linux, NUT Press, PHI Publisher, 2006 Edition
- Red Hat Linux Bible, Cristopher Negus, Wiley Dreamtech India
- UNIX Shell Programming by Yeswant Kanetkar, BPB
- Linux Administration Handbook, Evi Nemeth, Garth Snyder, Trent KHein - Pearson Education.
- Beginning Linux Programming by Neil Mathew & Richard Stones, Wiley Dreamtech India

MCA 407(A) Open Source Lab - Python

1. Data Types and Data Structures :

Introduction to Python: - using the Python interpreter, Overview of programming in Python, Python built-in types, Arithmetic in Python, Program input and Program output, Variables and assignment.

Strings and string operations, List basics, List operations, Dictionaries, Dictionary basics and Tuples,

(a) Simple programs using elementary data items, lists, dictionaries and tuples.

2. Control Structures:

Control Statements:-if statements, while statement, for statements, functions, formal arguments, variable-length arguments, Exceptions, detecting and handling exceptions.

- (a) *Programs using conditional branches, loops.*
- (b) *Programs using functions*
- (c) *Programs using exception handling*

3. **Classes ,files and modules**

Introduction to Classes and Objects:-classes, class attributes, instances, instance attributes, binding and method invocation, inheritance, polymorphism, Built-in functions for classes and instances.

Files and input/output, reading and writing files, methods of file objects, using standard library functions, dates and times

- (a) *Programs using classes and objects*
- (b) *Programs using inheritance*
- (c) *Programs using polymorphism*
- (d) *Programs to implement file operations.*
- (e) *Programs using modules.*

4. **Database and web programming**

Python database application programmer's interface (DB- API), connection and cursor objects, Type objects and constructors, python database adapters.

Creating simple web clients, introduction to CGI, CGI module, building CGI applications, python web application frameworks: django .

- (a) *Programs using python database API.*
- (b) *Programs for creating simple web pages.*
- (c) *Programs for creating dynamic and interactive web pages using forms.*

5. **Development of sample web applications using python.**

Sample applications	may	include
i) Web based		polling
ii) Social networking		site
iii) Online transaction		system
iv) Content management system		

References

1. Core Python Programming by Wesley J. Chun, 2nd Edition , Pearson Education
2. An Introduction to Python by Guido Van Russom, Fred L.Drake, Network Theory Limited.
3. Beginning Python: From Novice To Professional By Magnus Lie Hetland, Second Edition Apress
4. Programming in Python 3 by Mark Summerfield, Pearson Education

Websites :

Online version of An Introduction To Python
<http://www.network-theory.co.uk/docs/pytut/>

online python tutorials
<http://docs.python.org/tutorial/>
<http://zetcode.com/tutorials/pythontutorial/>
<http://www.sthurlow.com/python/>
<http://www.tutorialspoint.com/python/>

A site for django resources
<http://www.djangoproject.com/>
Online book on django Framework
<http://www.djangobook.com/>

MCA 407(B) Open Source Lab- PHP

PHP Basics- Syntax, Operators, Variables, Constants, Control Structures, Language Constructs and Functions.

Functions- Syntax, Arguments, Variables, References, Returns, Variable Scope

Arrays- Enumerated Arrays, Associative Arrays, Array Iteration, Multi-Dimensional Arrays, Array Functions, SPL.

Object Oriented Programming- Instantiation, Modifiers/Inheritance, Interfaces, Exceptions, Static Methods & Properties, Autoload, Reflection, Type Hinting, Class Constants.

Strings and Patterns- Quoting, Matching, Extracting, Searching, Replacing, Formatting

Web Features- Sessions, Forms, GET and POST data, Cookies, HTTP Headers

Databases and SQL - SQL, Joins, Analyzing Queries, Prepared Statements, Transactions. **Streams and Network Programming-** Files, Reading, Writing, File System Functions, Streams

Sample web applications using PHP

References

- Professional PHP 6 EdcLecky –Thompson, Steven D. Nowicki,Thomas Myer
Wrox Publishers

- PHP6 and MySQL Bible – Steve Suehring, Tim Converse, and Joyce Park
Wiley India Pvt.Ltd

MCA 405(1) VISUAL PROGRAMMING

Module I

Parts of Visual C++ program - application object – main window object, view object document object. Event oriented window programming , device context. Elements of GUI & Visual design, Designing and Creating a Visual C++ Program, Project work spaces, Debug and Release Targets, Cleaning up.

Exception handling and Debugging .

Module II

Basics of MFC & MFC-based executables. Event Handling : Reading keystrokes, handling mouse , creating menus, tool bars, buttons, status bar prompts, dialog box, check box, radio buttons, list boxes, combo boxes, sliders, serialization , file handling, multiple documents.

Module III

Understanding Message maps and message loops, Events and Event handling, Mouse events, Keyboard events, Dynamic data Exchange and verification, creating Menus, Modeless dialog boxes. Device contexts, working with images, bitmaps and icons, creating bitmap buttons, creating and using Pens, Brushes, and Fonts.

Module IV

Document - View Architecture basics, the document class and view class, creating SDI applications, Multitasking, creating MDI Applications, Working with menu in documents, Toolbar and status bar.

Module V

Multi threaded Programming- Worker threads , user interface threads, thread synchronization. Basics of COM- ActiveX Technology, The component Object Model, Real COM with

MFC Library, Containment and Aggregation vs. Inheritance

References

- Yeshwant Kanetkar , Visual C++ Programming , BPB
- David Kruglinski, George Shepherd & Scot Wingo, Programming Visual C++, Microsoft Press
- Indian Reprint, 2000
- Holzner Steven, “Visual C++ 6 in record time”, BPB publications
- Jeff Prosise, Programming Windows with MFC, Microsoft Press, 2000

- Charles Petzold, “Programming Windows”, 5th Edition, Microsoft Press, 1999.
- Mickey Williams , David Bennett, Visual C++ 6 Unleashed (Hardcover) , SAMS
- Yeshwant Kanetkar, Visual C++ Projects.
- David Kruglinski, George Shepherd & Scot Wingo, Programming Visual C++, Microsoft Press
- Indian Reprint, 2000
- Chuck Sphar, Learn Visual C++ Now, Microsoft Press/Phi, 1999
- Ivor Horton, Programming Visual C++ Standard Edition, Wrox Press, 1999
- Herbert Schildt, MFC Programming for the GROUND UP, Second Edition, Tata McgrawHill, 2000
- Richard.C.Leinecker and Tom Archer, Visual C++ Programming Bible, Wiley Dream Tech, 2005

MCA 405(2) SOFTWARE QUALITY MANAGEMENT

Module I Quality Concepts

Basic Quality Concepts, Companywide Assessment of Quality, Quality Improvement and Cost Reduction, Quality Control

Module II Basic Quality Management concepts

Process Management, Organization for Quality, Strategic Quality Management, Developing a Quality Culture, Understanding Customer Needs

Module III Software Quality Management

Software Quality in Business Context, Managing Software Quality in an Organization, Planning for Software Quality Assurance, Product Quality and Process Quality

Module IV Metrics and Audits

Software Measurement and Metrics, Walkthroughs and Inspections, Software Configuration Management, Quality Assurance Audits

Module V Techniques for Quality Improvement

ISO 9001, Software CMM and Other Process Improvement Models, Software Testing, Quality Related Additional topics - SQC and SPC, Software Maintenance Models, Maintainability in OO and e-Business Era

References

- Frank Gryna, Richard Chua, Joseph Defeo, "Juran's Quality Planning and Analysis for Enterprise Quality", Fifth Edition, Tata McGraw Hill
- Nina S Godbole, "Software Quality Assurance", 2004, Narosa
- Stephen H.Kan, "Metrics and Models in Software Quality Engineering", Second Edition, Pearson, 2003.
- Jeff Tian, "Software Quality Engineering", 2005, Wiley Student Edition
- Pankaj Jalote, "Software Project Management in Practice", 2002, Pearson
- Roger S. Pressman, "Software Engineering - A Practitioner's Approach", Seventh Edition, McGraw Hill, 2010.
- Humphrey Watts, "Managing the Software Process", Addison Wesley, 1986.

MCA 405(3) BUSINESS DATA PROCESSING AND COBOL PROGRAMMING

Module I

INTRODUCTION

Business Data Processing, Types of COBOL, Mainframe COBOL, Transaction Files, Master Files, File Processing, Coding Format for Cobol Program, Structure of a Cobol Program, Character set, Cobol words, Data names and identifiers, Literal, Figurative Constants, Continuation of lines and notations. IDENTIFICATION , ENVIRONMENT DIVISION AND DATA DIVISION :General formats, Configuration section, Input-output section, Level Structure, Data description entries, Picture clause, Value clause, File section, Working - Storage Section, Editing characters of different data and examples, special-names paragraph, Classes and categories of data.

Module II

PROCEDURE DIVISION, VERBS AND CLAUSES

Structure of procedure division, Data movement verb and other options of move statements, Arithmetic verbs, Sequence control verbs, Input & Output verbs, conditional verb : simple IF, Categories of COBOL statements. Usage Clause, Synchronized clause, Justified clause, Redefines clause and Renames clause, qualification of data names, sign clause, Elementary and Group moves, corresponding option : Move Corresponding, Add Corresponding & Subtract Corresponding, Rounded option, On size error option, compute verb.

Module III

COMPUTATION AND DECISION MAKING

Interactive processing using screen sections, Intrinsic Functions, Conditions: Relational, class, Condition-name, compound, sign, IF statements, Alter statements, Perform statements, Exit statements.

Module IV

ARRAY PROCESSING AND TABLE HANDLING

Occurs clause, subscripting, Assigning values to table elements, Multidimensional tables, Perform & table handling, Indexed tables & Indexing. Set verb, search verb, Occurs depending clause, Index data item.

Module V

SEQUENTIAL,INDEXED & RELATIVE FILE PROCESSING, REPORT WRITER AND SUBROUTINES

File characteristics, file control entries, file description. Statements for sequential files, Sequential file with variable length records, I/O control paragraph, Simple sort verb, file updation, variation of updation, Simple merge verb, input and output procedure in sort statements, Merge verb with output procedure. File control paragraph, for relative files, Procedure division statements for relative files, Indexed sequential files, General format of a report, File section, Report clause, Outline of a report section, Report section - report description entry, report group, procedure division statements, Sample program, Structure of COBOL subroutine, Calling of a Subroutine, State of subroutine and cancel statement, Advantages and Disadvantages of cobol subroutines.

References

- M.K Roy and d Ghosh Dastigar, COBOL Programming, including MS COBOL and COBOL 85, Tata McGraw Hill 1997
- 2.Nancy Stern and Robert a Stern, Structered COBOL Programming, 8th Edition, john Wiley 1997
- 3. Structured Cobol Programming , Shelly Cashman , Thomson aLearning 2Edn.

MCA 405(4) ENTERPRISE RESOURCE PLANNING

Module I

ERP Overview - Definition, History, Benefits, Enterprise Applications. ERP Life Cycle,Implementation Methodology. Costs of ERP Implementation. Selecting Consulting Partner. ERP package Selection, Project Team and Organizational Structure.

Module II

ERP Project Management, Requirements, Business Process Re-engineering - re-engineering phases, role of IT in BPR, benchmarking, Business Process Modeling and Business Modeling, Gaps, Gap management Strategy, Configuration and Testing

Module III

ERP Security, Data Migration, Cut-over Planning and Go Live Preparation, Training, Change management, ASAP Methodology, Success/failure of an ERP

implementation, Application Support-Support Cycle, Transition Cycle, Service levels and SLAs, Support Models.

Module IV

ERP functional Modules- Human capital management, financial Management, Procurement and Inventory Management, Supplier Relationship Management, supply Chain Planning, Sales and Service, CRM, Quality Management, Product Life Cycle management, Logistics.

Module V

Technology for ERP- Portal, Content Management System, Business Intelligence, Data warehousing. Emerging trends in ERP.

Case Studies-ITC, Nestle, Maruti Suzuki, Airtel, Asian Paints.

References

- Enterprise Resource Planning, Rajesh Ray, 1st Edition, McGraw Hill Publications
- Enterprise Resource Planning, Alexis Leon, Tata McGraw Hill Publications
- Enterprise Resource Planning, Jagan Nathan Vaman, Tata McGraw Hill Publications
- Enterprise Resource Planning, Sumner, Pearson Publications

MCA 405(5) MULTIMEDIA SYSTEMS

Module I

Media and data streams – Medium, Properties of a multimedia system, Traditional data streams, Continuous data stream, Information Units. Sound concepts, Music – MIDI, MIDI Devices, MIDI and SMPTE timing standards, MIDI software. Speech – Generation, Analysis, Transmission.

Module II

Images and Graphics – Concepts, Image processing. Video and Animation – Concepts, television, Computer based animation. Data compression – Coding, JPEG- Image preparation, Lossy DCT based Mode, Hierarchical mode, H.261- Image Preparation, Coding Algorithms, Data Stream, MPEG-Video/Audio Encoding, Data stream, MPEG-2, MPEG-4, DVI.

Module III

Multimedia OS – Realtime, Resource Management, Process Management, File

Systems, OS Issues, System Architecture. Multimedia Communication Systems – application Subsystem, Transport Subsystem, QoS and Resource Management.

Module IV

Multimedia DBMS- Characteristics, Data Structure, Operations, Database Model. Hypertext and Hypermedia, SGML, ODA, MHEG.

Module V

Synchronization – Notion of synchronization, Presentation requirements, Reference model for synchronization, Synchronization Specifications, Synchronization Case Studies – MHEG, HyTime, MODE, ACME.

References:

- Multimedia: Computing, Communications and Applications, Steinmetz & Nahrstedt, Pearson Education
- Multimedia communications, Fred Halsall, Pearson Education
- Multimedia Systems, Koegel Buford, Pearson Education

MCA 405(6) NEURAL NETWORKS AND FUZZY LOGIC

Module I

Neural Networks:- Basic Concepts of Neural Networks, Characteristics - Human Brain – Artificial Neural Network – Terminologies, Model of an Artificial Neuron –Architectures – Learning Methods, Some Application Domains .

Module II

Functional Units for Pattern Recognition :- Pattern recognition problem, Basic functional units, Pattern recognition tasks by functional units.

Module III

Feedforward Neural Networks:-Analysis of pattern classification networks: Pattern Classification problem, Perceptron- Learning Law, Convergence Theorem, Representation problem.

Linear inseparability : - Hard problems, Geometrical Interpretation of Hard problems: Multilayer perceptrons. Back propagation- Learning: Features, Performance, Limitations.

Module IV

Fuzzy Logic:- Fuzzy Versus Crisp – Crisp sets – Operations on Crisp Sets, Properties of Crisp Sets , Fuzzy Sets, Basic Fuzzy Set Operations, Properties of

Fuzzy Sets – Crisp Relations, Operations on Crisp Relations - Fuzzy Relations – Operations on Fuzzy Relations , Properties, Membership Functions, Fuzzification, Defuzzification Methods.

Module V

Fuzzy Systems:- Fuzzy Rule Base- Fuzzy Reasoning, Fuzzy Inference systems , Fuzzy Logic Control Systems, Applications.

References

- Yegnanarayana B , Artificial Neural Networks, Prentice-Hall of India Pvt.Ltd
- Haykin S, *Neural Networks – A Comprehensive Foundation*, Second Edition, Pearson Education Asia, 1999.
- S. N. Sivanandan and S. N. Deepa , Principles of Soft Computing , Wiley India 2nd Ed, 2011.
- John Yen, Reza Langari , Fuzzy Logic –Intelligence, Control and Information, Pearson Education,2005.
- Anderson J A, *An Introduction to Neural Networks*, Prentice-Hall of India, 1995.
- S. Rajasekaran and G.A Vijayalakshmi Pai, Neural Networks, Fuzzy Logic, and Genetic Algorithms Synthesis and Applications, Prentice-Hall of India Pvt.Ltd ,2004.
- Bose N K, *Neural Network Fundamentals with Graphs, algorithms, and Applications*, Tata McGraw-Hill, 2001.

MCA 405(7) ARTIFICIAL INTELLIGENCE

Module I

Introduction to Artificial Intelligence – Architecture of Artificial Intelligence Systems-problem solving : Problems and problem spaces. Problem Definition – production systems – control strategies – search strategies, problem characteristics – production system characteristics.

Module II

Knowledge Representation Schemes:- Proposition and predicate logic – Syntax and semantics- Properties of WFFS – Conversion to clausal form – Inference rules – Resolution – Non Deductive Inference Methods – Representation using Rules. Associative Network, Frames and Object Oriented Reprn. of knowledge. Associative Networks – Frame Structure, conceptual dependencies and scripts.

Module III

Search and control strategies – examples of search problem – Uniformed or Blind search problem – Informed search – searching And OR graphs. Matching Techniques

– Structures used for Matching – Measures for Matching, knowledge organization and management – indexing and retrieval techniques.

Module IV

General concepts in knowledge Acquisition – Types of learning, Difficulty in knowledge Acquisition, General Learning model. Early work in Machine Learning – Analogical and Explanation based learning – Analogical Reasoning and Learning – Examples, Explanation based learning. Expert System Architectures – Rule based system, Non production system, Dealing with uncertainty.

Module V

Natural language Processing – Overview of Linguistics, Grammers and Languages, Basic Parsing Techniques, Semantic analysis and Reprn structures Natural language system. Pattern Recognition – Recognition and classification process – classification patterns recognizing and understanding speech. Perception – solving perceptual problem.

References

- Introduction to A.I and Expert system – D.W. Patterson, Prentice Hall of India.
- Artificial Intelligence – Elainc Rich, Mc Graw Hill.
- Principles of Artificial Intelligence – Nilson N. J, Springer Verlag.
- Introduction to Artificial Intelligence – Charvanak. E and Mc dermoit D, Addison Wesley

MCA 405(8) MANAGEMENT INFORMATION SYSTEMS

Module I

Digital Firm- Concepts, Definition, Role, Control System, Management Support, Management Effectiveness, Digital Firm. E-Business and E-Commerce, System Concepts, Feedback and Control, Corporate Planning, Types of strategies, Business Planning, Balance Score Card, Strategic Business Planning. Security Challenges- threats and vulnerabilities, controlling threats, disaster management, information security.

Module II

DSS, Decision Analysis, Organizational Decision Making, concepts on information, Information Classification, Knowledge and Knowledge management. Business Intelligence, Expert Systems. System Analysis, General Model of MIS, Need and role of System Analysis, System development Model, OOA, SSAD, OOSAD Development Life Cycle. Development process of MIS, Process Model.

Module III

Business Process Re-engineering, Value Stream Model, MIS and BPR. DSS, GDSS, Knowledge Management Systems, DSS in E-enterprises, Enterprise Management System, ERP, SCM, CRM, EMS and MIS.

Module IV

Technology of IS – Data Processing, Transaction Processing, OLAP, TQM, Networks – Topology, Data Communication, Unified Communications, Components of UC, WiMAX. Database- Database Models, Database Design, RDBMS, Client-Server Architecture and implementation strategies. Data Warehouse, Architecture of Data Warehouse, Implementation.

Module V

E-Business, Internet and WWW, E-Commerce, categories of E-Commerce, Electronic payment Systems, Content Management Systems, Enterprise Portal, Security in e-business, privacy issues, Tools for security management, Systems Control and Audit, Global MIS – Outsourcing and Off shoring, Global Business strategies.

References

- Management Information Systems, Waman S Jawadekar, 4th Edition, McGraw Hill
- Management Information Systems, O'Brien, Marakas and Behl, 9th Edition, Tata Mcgraw Hill Publication.
- Management Information System, Laudon, Laudon & Dass, 11th Edition, Pearson Education
- Management Information System, Davis & Olson, Tata McgrawHill Publication.
- Information system for Modern management, Murdick, Rose & Cloggett, PHI Publications.

SEMESTER 5

MCA 501 Computer Security

Module I

Introduction: OSI Security Architecture, Security attacks, Security Services, Security Mechanisms, Model for Network Security, Fundamentals of Abstract Algebra : Groups, Rings, Fields, Modular Arithmetic, Euclidean Algorithm, Finite Fields of the form $GF(p)$, Polynomial Arithmetic, Finite Fields of the form $GF(2^n)$, Classical Encryption techniques, Block Ciphers and Data Encryption Standard.

Module II

Advanced Encryption Standard, Multiple Encryption and Triple DES, Block Cipher Modes of operation, Stream Ciphers and RC4, Confidentiality using Symmetric Encryption, Introduction to Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms, Public-Key Cryptography and RSA

Module III

Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Message Authentication and Hash Functions, Hash and MAC Algorithms

Digital Signatures and Authentication Protocols

Module IV

Network Security: Authentication Applications, Electronic Mail Security, IP Security, Web Security, System Security: Intruders, Malicious Software, Firewalls

Module V

Hardware Solutions: Cryptographic Accelerator, Authentication Tokens, Smart Cards, Biometrics, Digital cash, Secret sharing schemes, Zero-knowledge techniques, Folklore, Secret Sharing, Interactive proof.

References

- Stallings, W., Cryptography and Network Security. Principles and Practice, 4th edition, Prentice Hall.
- Steve Burnett & Stephen Paine RSA Security's Official Guide to Cryptography, Tata Mc GrawHill
- Behrouz A. Forouzan, Cryptography & Network Security, Tata McGraw Hill.
- Kaufman, C., Perlman, R., Speciner, M., Network security. Private communication in a public world, Prentice Hall, 2002.
- Trappe, W., Washington, L.C., Introduction to Cryptography with coding theory, Pearson-Prentice Hall, 2006.
- Tanenbaum, A.S., Computer Networks, 4th edition, Prentice Hall,
- Stinson, D., Cryptography. Theory and Practice, 2nd edition, CRC Press.

Online resources

1. Online resources of Stallings's Cryptography and Network Security. Principles and Practice <http://williamstallings.com/Crypto3e.html>

2. Online resources of Menez, van Oorschot, Vanstone's Handbook of Applied Cryptography available at <http://www.cacr.math.uwaterloo.ca/hac/>

MCA 502 INTERNET TECHNOLOGY AND DISTRIBUTED APPLICATIONS

Module I

Internetworking(Host to Host delivery):- Principles, TCP/IP reference model, Connectionless Internetworking, Internet Protocol(IP). IP addressing: Classful addressing, Classless addressing, Subnetting, VLSM, Supernetting. Other Network layer Protocols: ARP, RARP, ICMP, IGMP. IPv6 and ICMPv6- Comparison of IPv4 and IPv6. Point to Point Protocol(PPP), PPPoE.

Module II

Autonomous Systems. Unicasting, Unicast Routing Protocols : Interior Gateway Routing Protocol- RIP, OSPF. Exterior Gateway Routing Protocols - BGP.

Multicasting, Multicast applications, Multicast Routing Protocols: MOSPF, DVMRP. Host Configuration Protocols: BOOTP, DHCP.

Private Networks, Virtual Private Network and Network Address Translation(NAT).

Module III

UDP: Process to Process Communication, User Datagram and Header format, UDP operation, Use of UDP.

TCP:- TCP Services, TCP features, TCP Segment Header, TCP Connection management, TCP State Transition Diagram, Flow Control, Error Control, Silly Window Syndrome, TCP Congestion control, TCP timer management.

Module IV

Domain Name System(DNS) :- Name space, Domain name space, Distribution of name space, DNS in the Internet, Resolution, DNS messages, Types of Records, Compression, DDNS.

TELNET:- Concept, Network Virtual Terminal, Embedding.

File Transfer Protocol(FTP):- Connections, communication, File Transfer, Anonymous FTP.

Trivial File Transfer Protocol (TFTP): Messages, Connection, Data Transfer.

Electronic Mail: Architecture, User agent - Sending Mail, Receiving Mail. Multipurpose Internet Mail Extensions (MIME). Mail transfer agent: SMTP. Mail access protocols: POP and IMAP. Web-based Mail.

World Wide Web- Hypertext and Hypermedia- Browser Architecture- Static documents- HTML- Dynamic Documents- Common Gateway Interface(CGI)- Active Documents.

HTTP:- Transactions, Request messages, Response message, Headers, Some other features.

WAP – Architecture, protocol stack and features.

Module V

Multimedia:- Digitizing Audio and Video, Audio and Video compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real –Time interactive Audio/Video- Real Time Transport Protocol (RTP), Real Time Transport Control Protocol (RTCP), Video On Demand, Voice Over IP.

References

Behrouz A. Forouzan - TCP/IP Protocol Suite- Third Edition- Tata McGraw Hill

Andrew S Tanenbaum- Computer Networks- PHI- Fourth Edition.

Behrouz A. Forouzan – Data Communications and Networking- Fourth Edition- Tata McGraw Hill

William Stallings- Data and computer communications- PHI- Seventh Edition.

- Douglas E. Comer- Internetworking with TCP/IP- Volume I- PHI- Third Edition.
- Comer, Douglas. The Internet Book: Everything you need to know about computer networking and how the Internet works, 4th Ed., 2007

MCA 503 COMPUTER GRAPHICS

(All the Graphics techniques specified should be implemented using OpenGL)

Module I

Introduction: Applications of Computer graphics-Image processing and Graphics-Interactive Graphics- Input devices-Display Methods-Hardware and software – Standard Graphics pipeline-drawing primitives. Basic raster graphics algorithms-filling- line clipping – polygon clipping.

Module II

Transformations: Basic 2D transformations - Reflection, Shear, Composite Transformations. Window to viewport transformation-changing coordinate systems-Surface normal-Plane equation. Modeling a 3D object – Data structure for object representation

Module III

Projection: 3D Geometric transformations- Translation, Scaling, Rotation. Perspective parallel Matrix representation – 3D viewing – 3D clipping

Module IV

Representations of 3D Objects :Representation of curves and surfaces –Parametric, Quadric- Bezier, B-Splines, NURBS. Representing surfaces using polygon meshes- Sweep representations, Boundary representations, Spatial-partitioning representations, Constructive solid geometry.

Module V

Visible surface detection methods- Shading-diffused, specular - Illumination - Gouraud, Phong. Comparison of different shading methods-Ray tracing.

References

- Hearn D., Baker M.P., *Computer Graphics(using OpenGL)*, Prentice- Hall of India 2006.
- Foley J.D. , Andries van Dam, *Computer Graphics(latest) - Principles and Practice*, , Addison-Wesley.
- Angel, Edward. *Interactive Computer Graphics- A Top-down Approach with OpenGL*, Addison-Wesley,1996.
- Computer Graphics using OpenGL F S Hill – Prentice Hall
- Goemetric tools for Computer Graphics – Philip J. Schneider and David H. Eberly – The Morgan Kaufman series in Compter Graphics & Modeling

MCA 504 DATA MINING

Module I - Introduction to Data mining & Date Warehouse

What is Data mining, Data mining -On What kinds of Data, Data mining Functionalities, Classification of Data mining Systems, Data Mining Task Primitives, Integration of Data mining systems, Major issues of Data mining, What is Data Warehouse, Multidimensional Data Model, A three-tier Data Warehousing Architecture.

Module II–Data Preprocessing and Mining Frequent Patterns

Data Preprocessing

Data Cleaning, Data Integration and Transformation, Data Reduction, Data discretization and concept hierarchy generation.

Association Rules

Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods : Apriori Algorithm, Generating association Rules from Frequent Item sets, Improving the Efficiency of Apriori. Mining Frequent item-sets without Candidate Generation.

Module III-Classification and Prediction

Introduction to Classification and Prediction, Issues Regarding Classification and Prediction

Classification by Decision Tree Induction: Decision Tree induction, Attribute Selection Measures, Tree Pruning, **Bayesian Classification:** Bayes' theorem, Naïve Bayesian Classification, **Rule Based Algorithms:** Using If - Then rules of Classification, Rule Extraction from a Decision Tree, Rule Induction Using a Sequential Covering algorithm,

K- Nearest Neighbour Classifiers.

Prediction : Linear Regression, Nonlinear Regression, Other Regression-Based Methods

Module IV - Clustering

What is Cluster Analysis, Requirements of Cluster Analysis' Types of Data in Cluster Analysis, Categorization of Major Clustering Methods, **Partitioning Methods** :k-Means and k- Medoids, From K-Medoids to CLARANS , **Hierarchical Method** : Agglomerative and Divisive Hierarchical Clustering, BIRCH, ROCK, Chameleon, **Density-Based Method:** DBSCAN, **Grid Based Methods:** STING: Statistical Information Grid, Wave Cluster, **Model based Methods-**Expectation-Maximization, Conceptual Clustering, Neural Network Approach.

Module V-Applications and Trends in Data Mining

Data Mining Applications : Data Mining for Financial Data Analysis, Data Mining for the Retail Industry, Data Mining for the Telecommunication Industry, Data Mining for Biological Data Analysis, Data Mining in Other Scientific Applications, Data Mining for Intrusion Detection, Social Impacts of Data Mining, Trends in Data Mining.

References

- Data Mining Concepts and Techniques – Jiawei Han and Micheline Kamber, Second Edition, Elsevier, 2006
- Data Mining – BPB Editorial Board, BPB Publications, First Edition, 2004
- Data Warehousing , Data Mining, & OLAP – Alex Berson, Stephen J Smith, Tata McGraw Hill, 2004
- Data Warehousing, Sinha, Thomson Learning , First Edn.

MCA 506 COMPUTER GRAPHICS Lab (using OpenGL)

Lab directives

OpenGL libraries-installation in your computer-getting familiar with OpenGL commands-Running simple programs downloaded from the site specified in the reference books or *Official guide*

Display drawing primitives – Draw Polygon surfaces, filling with colors–shading, scale, rotate and translate a triangle with 3 colors at 3 vertices. Animate the triangle. Draw a circle and an ellipse. Draw a cuboid with different colors on its sides. Implement projections using the cuboid.

Draw a sphere model with constant color. Draw a cone scale rotate and translate it. Animate two objects on same screen.

Simulate solar system. Display Bazier and B-Spline surfaces. Implement Constructive solid geometry techniques. Display a scene with and without back face culling.

MCA 505 (1) USER INTERFACE DESIGN

Module I

Introduction

Introduction-Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles

Module II

Human Computer Interaction

User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design - structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus.

Module III

Windows

Windows: Characteristics-components-presentation styles-types-managements-organizations-operations-web systems-device-based controls: characteristics-Screen-based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.

Module IV

Multimedia

Text for web pages - effective feedback-guidance & assistance-Internationalization- accesssibility-Icons-Image-Multimedia -coloring.

Module V

Windows Layout - Test

Windows layout-test :prototypes - kinds of tests - retest - Information search - visualization - Hypermedia - www - Software tools.

References

- Wilbent. O. Galitz ,“The Essential Guide to User Interface Design”, John Wiley& Sons, 2001.
- Ben Sheiderman, “Design the User Interface”, Pearson Education, 1998.
- Alan Cooper, “The Essential of User Interface Design”, Wiley – Dream Tech Ltd., 2002.

MCA 505(2) BIOINFORMATICS

Module I

Fundamental of Biological Systems: Cell- cell organelles- Eukaryotic, Prokaryotic cell- Cell division- Mitosis- Meiosis- Macromolecules: Carbohydrates- Protein- Lipids- Nucleic acid- Structure of DNA and RNA, Genomic Organization in Prokaryotes and Eukaryotes, Chromosome and Chromatin Structure of Human

Module II

Fundamentals of Bioinformatics: Definition- Bioinformatics in industrial applications- Importance of Bioinformatics- Advantages and breakthroughs of HGP, Ethical Issues related to Human Genome Project, Genomics, Gene prediction in Prokaryotes and Eukaryotes, ORF prediction Proteomics levels of protein structure: primary, secondary, Tertiary and quaternary structures, Structure Prediction Tools , Molecular Visualization-Rasmol & SPDBV

Module III

Biological Databases: Biological Databases: Nature and diversity of data, classification and importance of Biological Databases, Nucleic Acid databases- Primary Sequence Databases and secondary sequence Databases, NCBI, Protein databases-sequence databases and structural databases

Module IV

Biological sequence Analysis: Concept of sequence Alignment, Scoring matrices: PAM & Blosum, Alignment of Pairs of sequences: Dot Plot; Alignment Algorithms- Needleman and Wunsch Algorithm, Smith Waterman Algorithm, Search for Homologous sequences using BLAST & FASTA programs

Multiple Sequence Alignment: Dynamic Programming and progressive alignment.

Tools: ClustalW, Concept of Molecular Phylogeny, Phylip

Module V

Advances in Bioinformatics: Microarray based technique – Analysis of gene expression, DNA Fingerprinting & DNA Foot printing, SNP Maps in population studies. Chemoinformatics, Pharmacogenomics, Personalized Medicine and ethical issues in Pharmacogenomics

References

- The Cell – A Molecular Approach, Geoffrey M. Cooper, Robert E. Hausman
Cell & Molecular Biology Gerald Karp
- Bioinformatics : Sequence & Genome Analysis, David W Mount
- Fundamental Concepts of Bioinformatics, Dan E Krane, Michael L Raymer
- Introduction to Bioinformatics – Sunderarajan & Balaji
- Microarray Bioinformatics- Dav Stakel
- Bioinformatics Concepts Skills & Applications, Rastogi Sc, Namita Mendiratta,
Parag Rastogi
- Pharmacogenomics in Drug Discovery and Development, Yan and Qing

MCA 505(3) Digital Image Processing

Module I (DIGITAL IMAGE FUNDAMENTALS)

Elements of digital image processing systems, Elements of visual perception, psycho visual model, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals -RGB,HSI models, Image acquisition and sampling, Quantization, Image file formats, Two-dimensional convolution, correlation, and frequency responses.

Module II (IMAGE TRANSFORMS)

1D DFT, 2D transforms – DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Radon, and Wavelet Transform.

Module III (IMAGE ENHANCEMENT AND RESTORATION)

Histogram modification and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contra harmonic filters, Homomorphic filtering, Color image enhancement. Image Restoration – degradation model, Unconstrained and Constrained restoration, Inverse filtering, Wiener filtering, Geometric transformations – spatial transformations, Gray-Level interpolation.

Module IV (IMAGE SEGMENTATION AND RECOGNITION)

Edge detection. Image segmentation by region growing, region splitting and merging, edge linking, Morphological operators: dilation, erosion, opening, and closing. Image Recognition – Patterns and pattern classes, matching by minimum distance classifier, Statistical Classifier. Matching by correlation, Neural network application for image recognition.

Module V (IMAGE COMPRESSION)

Need for image compression, Huffman, Run Length Encoding, Arithmetic coding, Vector Quantization, Block Truncation Coding. Transform Coding – DCT and Wavelet. Image compression standards.

References

- Rafael C. Gonzalez, Richard E. Woods, ‘Digital Image Processing’, Pearson Education, Inc., Second Edition, 2004.
- Anil K.Jain, ‘Fundamentals of Digital Image Processing’, Prentice Hall of India, 2002.
- David Salomon : Data Compression – The Complete Reference, Springer Verlag New York Inc., 2nd Edition, 2001

- Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, ‘ Digital Image Processing using MATLAB’, Pearson Education, Inc., 2004.
- William K.Pratt, ‘ Digital Image Processing’, John Wiley, NewYork, 2002.
- Milman Sonka, Vaclav Hlavac, Roger Boyle, ‘Image Processing, Analysis, and Machine Vision’, Brooks/Cole, Vikas Publishing House, II ed., 1999.
- Sid Ahmed, M.A., ‘Image Processing Theory, Algorithms and Architectures’, McGrawHill, 1995.
- Lim, J.S., ‘Two Dimensional Signal and Image Processing’, Prentice-Hall.

MCA 505(4) ADVANCED COMPUTING PARADIGMS

Module I Grid Computing

Overview, Definition of Grid , Basic Building Blocks , Issues in Management of Grid Models: Evolution of Grid Models,. Architecture- Requirements concerning abstractions, behaviors, resources, connectivity and protocols,

Module II Overview of Grid Computing Environment

Programming models, Middleware for building grid computing environments, Language support (MPI- G, MPI-G2, etc) for grid computing, Meta models for grid programming, Security. Monitoring and evaluation. Monitoring, Scheduling, Performance tuning, Debugging and performance diagnostic issues:

Module III Cloud Computing

Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS

Module IV Cloud Computing Security Architecture

Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures, Identity Management and Access control-Identity management, Access control, Autonomic Security

Module V Issues in Cloud Computing

Issues in cloud computing, Implementing real time application over cloud platform
Issues in Intercloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. in Cloud

References

- The Grid: Blueprint for a New Computing Infrastructure (2nd edition) by Ian Foster (Editor), Carl Kesselman (Editor) Publisher : Morgan Kaufmann, 2nd edition
- Enterprise Cloud Computing by Gautam Shroff,Cambridge

- Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India
- Grid Computing: Making the Global Infrastructure a Reality by Fran Berman (Editor), Geoffrey Fox (Editor), Tony Hey (Editor) Publisher: John Wiley & Sons, (April 8, 2003) ISBN: 0-470-85319-0.
- Grid Resource Management : State of the Art and Future Trends by Jarek Nabrzyski (Editor), Jennifer M. Schopf (Editor) , Jon Weglarz (Editor) Publisher: Kluwer Academic Publishers: (September 2003) ISBN: 1-402-07575-8
- Cloud Computing for Dummies by Judith Hurwitz, R. Bloor, M. Kanfman, F. Halper (Wiley India Edition)
- Grid Computing: A research: monograph: D .Janakiram, Tata McGrawhill Publication.

MCA 505(5) XML and Web Services

Module I XML Technology Family

XML – Benefits – Advantages of XML over HTML – EDI – Databases – XML Based standards – Structuring with schemas – DTD – XML schemas – XML processing – DOM – SAX – Presentation technologies – XSL – XFORMS – XHTML – transformation – XSLT – XLINK – XPATH – Xquery

Module II Architecting Web Services

Business motivations for web services – B2B – B2C – Technical motivations – Limitations CORBA and DCOM – Service Oriented Architecture (SOA) – Architecting web services – Implementation view – Web services technology stack – Logical view – Composition of web services – Deployment view – From application server to peer to peer – Process view – Life in the runtime.

Module III Web Services Building Blocks

Transport protocols for web services – Messaging with web services – Protocols – SOAP – Describing web services – WSDL – Anatomy of WSDL – Manipulating WSDL – Web service policy – Discovering web services – UDDI – Anatomy of UDDI – Web service inspection – Ad hoc discovery – Securing web services.

Module IV Implementing XML in E-Business

B2B – B2C applications – Different types of B2B interaction – Components of E -Business XML systems – EBXML – RosettaNet – Applied XML in vertical industry – Web services for mobile devices.

Module V XML Content Management and Security

Semantic web – Role of meta data in web content – Resource description framework – RDF schema – Architecture of semantic web – Content management workflow – XLANG – WSFL – Securing web services

References

- Ron Schmelzer and Travis Vandersypen, “XML and Web Services unleashed”, Pearson Education
- Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education
- David Chappell, “Understanding .NET A Tutorial and Analysis”, Addison Wesley
- Kennard Scibner and Mark C. Stiver, “Understanding SOAP”, SAMS Publishing
- Alexander Nakhimovsky and Tom Myers, “XML Programming: Web Applications and Web Services with JSP and ASP”, Apress

MCA 505(6) Distributed Computing

Module I

Introduction to distributed systems – definition, goals, types. Architectures- System architectures, architectures versus middle ware, self management. Processes – Threads, Virtualisation, Clients, Servers, Code Migration

Module II

Communication – RPC, Message oriented, Stream oriented. Naming – flat naming, structured naming, attribute based naming. Synchronization – Clock synchronization, Logical Clocks, Election Algorithms, Mutual Exclusion

Module III

Consistency and replication – Data centric consistency, client centric consistency, consistency protocols. Fault Tolerance – introduction, process resilience, reliable client-server communication, reliable group communication, distributed commit.

Module IV

Security – Threats, cryptography, Secure Channels, access control mechanisms, security management

Module V

Distributed File Systems – Network File System, CODA, XFS, Secure File System. Distributed Coordination based Systems – TIB/Rendezvous, JINI

References

- Distributed Systems – Principles and Paradigm, Tanenbaum & Van Steen, 2nd Edition, PHI Publications
- Elements of Distributed Computing, Garg, Wiley Publications
- Distributed Operating System, Pradeep K Sinha, PHI Publications

MCA 505(7) EMBEDDED SYSTEMS

Module I Introduction

Examples of Embedded systems, Major Application areas, Hardware fundamentals.

Module II Hardware and Software

Advanced hardware details, Interrupts, Software Architectures, Embedded Development Environment.

Module III Operating System

Introduction to Real Time Operating Systems, Operating System services, Basic design using a Real Time Operating System.

Module IV Tools

Embedded Software Development Tools, Debugging Tools and Techniques.

Module V Embedded Microcontrollers

Introduction, Programming Microcontrollers, Microcontroller Hardware and I/O.

References

- David E. Simon, *An Embedded Software Primer*, Addison Wesley, 2001.
- Todd D. Morton, *Embedded Microcontrollers*, Pearson 2011.
- Mazidi M. Ali, *The 8051 Microcontroller and Embedded Systems*, Pearson Education Asia, 2002.

