SCHEME OF EXAMINATION

&

DETAILED SYLLABUS

(w. e. f. Academic Year 2010-2011)

For

MASTER OF COMPUTER APPLICATIONS (MCA) DEGREE

GURU GOBIND SINGH
INDRAPRASTHA UNIVERSITY
KASHMERE GATE, DELHI

Master of Computer Applications

FIRST SEMESTER EXAMINATION

Paper ID	Paper Code	Paper	L	T/P	Credit
044101	MCA 101	Fundamentals of Information Technology	3	1	4
044103	MCA 103	Programming in C	3	1	4
044105	MCA 105	Discrete Mathematics	3	1	4
044107	MCA 107	Computer Organization	3	1	4
044109	MCA 109	Principles and Practices of Management	3	1	4
Practical					
044151	MCA 151	Fundamentals of IT Lab.	0	2	1
044153	MCA 153	Programming in C Lab	0	4	2
044155	MCA 155	Computer Organization Lab.	0	4	2
NUES					
044161	MCA 161	General Proficiency – I* (It is suggested to have Personality Development and Communication Skills - I Course)	0	2	1
		Total	**15**	**17**	**26**

*** Non-University Examination System (NUES)**

Master of Computer Applications

SECOND SEMESTER EXAMINATION

Paper ID	Paper Code	Paper	L	T/P	Credit
044102	MCA 102	Data and File Structures	3	1	4
044104	MCA 104	Object Oriented Programming in C++	3	1	4
044106	MCA 106	Operating Systems	3	1	4
044108	MCA 108	Database Management Systems	3	1	4
044110	MCA 110	Software Engineering	3	1	4
Practical					
044152	MCA 152	Data and File Structures Lab	0	2	1
044154	MCA 154	Object Oriented Programming in C++ Lab	0	4	2
044156	MCA 156	Database Management Systems Lab	0	2	1
044158	MCA 158	Software Engineering Lab.	0	2	1
NUES					
044162	MCA 162	General Proficiency – II* (It is suggested to have Personality Development and Communication Skills – II Course)	0	2	1
		Total	**15**	**17**	**26**

*** Non-University Examination System (NUES)**

Master of Computer Applications

THIRD SEMESTER EXAMINATION

Paper ID	Paper Code	Paper	L	T/P	Credit
044201	MCA 201	Theory of Computation	3	1	4
044203	MCA 203	Computer Graphics	3	1	4
044205	MCA 205	Java Programming	3	1	4
044207	MCA 207	Data Communications and Networking	3	1	4
044209	MCA 209	C# Programming	3	1	4
Practical					
044251	MCA 251	Computer Graphics Lab	0	2	1
044253	MCA 253	Java Programming Lab	0	4	2
044255	MCA 255	C# Programming Lab.	0	4	2
NUES					
044261	MCA 261	General Proficiency – III* (It is suggested to have Technical Paper Writing Course)	0	2	1
		Total	**15**	**17**	**26**

*** Non-University Examination System (NUES)**

Master of Computer Applications

FOURTH SEMESTER EXAMINATION

Paper ID	Paper Code	Paper	L	T/P	Credit
044202	MCA 202	Design and Analysis of Algorithms	3	1	4
044204	MCA 204	Data Warehousing and Data Mining	3	1	4
044206	MCA 206	Advanced Computer Networks	3	1	4
044208	MCA 208	Object Oriented Analysis and Design	3	1	4
044210	MCA 210	Web Technologies	3	1	4
		Practical			
044252	MCA 252	Design and Analysis of Algorithms Lab	0	2	1
044254	MCA 254	Data Warehousing and Data Mining Lab	0	2	1
044256	MCA 256	Advanced Computer Networks Lab	0	2	1
044258	MCA 258	Object Oriented Analysis and Design Lab	0	2	1
044260	MCA 260	Web Technologies Lab	0	2	1
NUES					
044262	MCA 262	General Proficiency – IV* (It is suggested to have Process Modeling Management Oriented Course)	0	2	1
		Total	**15**	**17**	**26**

*** Non-University Examination System (NUES)**

Master of Computer Applications

FIFTH SEMESTER EXAMINATION

Paper ID	Paper Code	Paper	L	T/P	Credit
044301	MCA 301	Linux Programming	3	1	4
044303	MCA 303	Software Testing	3	1	4
044305	MCA 305	Enterprise Computing with Java	3	1	4
Elective - I ***(Choose any One)***					
044307	MCA 307	Advanced Database Management Systems	3	1	4
044309	MCA 309	Numerical and Scientific Computing			
044311	MCA 311	Software Project Management			
044313	MCA 313	Multimedia Technologies			
044315	MCA 315	Mobile Computing			
044317	MCA 317	Artificial Intelligence			
044319	MCA 319	Microprocessors			
044321	MCA 321	Compiler Design			
Elective - II ***(Choose any One)***					
044323	MCA 323	Operational Research	3	1	4
044325	MCA 325	Distributed DBMS and Object oriented Databases			
044327	MCA 327	Financial Accounting			
044329	MCA 329	Organizational Behavior and Management Principles			
044331	MCA 331	Advanced Computer Architecture			
044333	MCA 333	Software Quality Management			
044335	MCA 335	Digital Signal Processing			
044337	MCA 337	Research Project			
Practical					
044351	MCA 351	Linux Programming Lab	0	2	1
044353	MCA 353	Software Testing Lab	0	2	1
044355	MCA 355	Enterprise Computing with Java Lab	0	4	2
044357	MCA 357	Lab based on Elective - I	0	2	1
NUES					
044361	MCA 361	General Proficiency – V* (It is suggested to have Intellectual Property Rights - Software Systems Oriented Course)	0	2	1
		Total	**15**	**17**	**26**

*** Non-University Examination System (NUES)**

Master of Computer Applications

SIXTH SEMESTER EXAMINATION

Paper ID	Paper Code	Paper	L	T/P	Credit
044302	MCA 302	Dissertation	-	-	26
NUES					
044362	MCA 362	General Proficiency – VI* (Seminar and Progress Report)	-	-	4
		Total	**-**	**-**	**30**

*** Non-University Examination System (NUES)**

The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

Note:

1. The total number of the credits of the MCA programme = 160.
2. Each student shall be required to appear for examinations in all courses. However, for the award of the degree a student shall be required to earn the minimum of 150 credits

Code No.: MCA 101 **L T C**
Paper: Fundamentals of Information Technology **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *This course is an introductory course in information technology. Topics include foundations in hardware, software, data and an overview of the use of information technology in organizations. Topics include basics of graphics, systems development, database design and networking. Upon completion of this course the student should be able to:*

- *Describe the major components of information technology applications:*
- *Hardware, computer networks, software, data, processes, and people.*
- *Describe the different components of a computer network.*
- *Demonstrate an understanding of different types of networks.*
- *Define "Software Engineering".*
- *Demonstrate an understanding of the importance of algorithms in the development of IT applications.*
- *Discuss the role of databases in IT applications.*

PRE-REQUISITE:

- None

UNIT – I

Digital Signals and Logic gates, Number systems: Binary, octal and hexadecimal number systems, signed binary number, binary arithmetic, 2's complement arithmetic, Microprocessors: Introduction, System Bus, Architecture and operation of 8085 microprocessor and instruction set.

[No. of Hrs: 10]

UNIT – II

Introduction to software: Software types and Software Development activities (Requirement, Design (algorithm, flowchart, decision table and tree), Coding, Testing, Installation, Maintenance). Low and high level languages, assemblers, compilers, interpreters, linkers. **Introduction to Graphics primitives:** Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Plasma Display, Liquid Crystal Display, Plotters, Printers, Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet and Digitizing Camera. External Storage devices.

[No. of Hrs: 12]

UNIT - III

Introduction to Operating system, Different types of operating systems and its working, DOS commands, File Structure and Storage, Introduction to process management: process, threads, scheduling and synchronization. Introduction to Database Management System and its types.

[No. of Hrs: 10]

UNIT – IV

Basic elements of a Communication System, Data transmission media, Digital and Analog Transmission, Network topologies, Network Types (LAN, WAN and MAN), Introduction to Communication protocols, Inter networking tools. **[No. of Hrs: 10]**

TEXT BOOKS:

1. Alex Leon and Mathews Leon, “Fundamentals of Information Technology”, Leon Techworld, 2007.
2. P. K. Sinha and Priti Sinha , “Computer Fundamentals”, BPB Publications, 2007.
3. Malvino and Leach, “Digital Principles and Application”, TMH, 1999.
4. Ramesh S. Gaonkar, "Microprocessor Architecture Programming and Application with 8085”, PHI, 2001.

REFERENCES:

1. Alex Leon and Mathews Leon, “Introduction to Computers”, Vikas Publishing House, 2007.
2. Norton Peter, “Introduction to computers”, TMH, 4th Ed., 2006.
3. Simon Haykins, “Communication System”, John Wiley & Sons, 2006.
4. B. Basaraj, “Digital Fundamentals”, Vikas Publications, 1999.
5. V. Rajaraman, “Introduction to Information Technology”, PHI, 2006.
6. V. Rajaraman, “Fundamentals of Computers”, PHI, 5th Ed., 2006.
7. David Anfinson and Ken Quamme, “IT Essentials PC Hardware and Software Component on Guide”, Pearson, 3rd Ed., 2008.

Code No.: MCA 103 **L T C**
Paper: Programming in C **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES *: After covering the core C in about 25 lectures the course shall aim to aquaint the students about advanced features of the language the following features are listed as suggested guideline for the teacher.*

- *Passing by value and pass by reference*
- *Difference between array names and pointers*
- *Allocating memory over the heap to two dimesional array (Matrices application could be taken as a case study)*
- *Pointer and pointer operations(Linked lists , doubly linked lists circular linked lists can be taken as a case study*
- *Pointers to functions and call back functions*
- *Bitwise operations and a case based upon these operations*
- *MACROs and their pitfalls*
- *Final case study could be an application making extensive handling of binary files.*

PRE-REQUISTE:

- Basic Programming

UNIT- I

Introduction: GCC, Using MAKE Utility, GDB, **C Basics:** History of C, Characteristics of C, C Program Structure, Variables, Defining Global Variables, Printing Out and Inputting Variables, Constants, Arithmetic Operations, Comparison Operators, Logical Operators, Order of Precedence, Conditionals (The if statement , The ? operator, The switch statement) Looping and Iteration (The for statement, The while statement, The do-while statement, break and continue) Arrays and Strings (Single and Multi-dimensional Arrays, Strings) Functions (Function Prototyping, passing parameters, returning values, recursion) Storage classes (auto, extern, static, register) **[No. of Hrs. : 10 Hrs]**

UNIT-II

Further Data Types: Defining New Data Types, Structures, Unions, Type-Casting, Enumerated Types, Low Level Operators and Bit Fields (Bitwise Operators, Bit Fields)

Pointers: Pointers arithmetic and Arrays, const pointers, void pointers, near, far and huge pointers

Dynamic Memory Allocation and Dynamic Structures: (malloc, calloc and realloc; sizeof, free, introduction to Linked Lists and dynamic 2- dimensional arrays)

Advanced Pointer Topics: (Pointers to Pointers, Pointer to array, Array of pointers, Command line input, Pointers to a Function, Implementing Callbacks) **[No. of Hrs. : 12 Hrs]**

UNIT -III

The C Preprocessor: (#define, #undef, #include, #if -- Conditional inclusion, Other Preprocessor Commands) **C, Linux and Standard Libraries:** (Advantages of using Linux with C, Using

Linux System Calls and Library Functions) Integer Functions, Random Number, String Conversion, Searching and Sorting: <stdlib.h> Mathematics: <math.h> (Math Functions, Math Constants), Input and Output (I/O):stdio.h Reporting Errors (perror(), errno, exit()) Streams (Predefined Streams, Redirection) Basic I/O (Formatted I/O, printf, scanf), String Handling: <string.h> (Basic String Handling Functions and safety issues, String Searching), Character conversions and testing: ctype.h, **Files** Character and Line Based I/O, Formatted I/O, Block I/O, File Positioning, Status Functions, Deletion and Renaming, Temporary Files

[No. of Hrs. : 11 Hrs]

UNIT -IV

File Accessibility and Directories (access, stat, chmod, chown …, chdir, chroot…), **Process Control**: (Running Linux Commands from C, fork(), the exec family, wait(), exit()), Thread creation-a simple implementation. **[No. of Hrs: 09 Hrs]**

TEXT BOOKS:

1. Yashwant Kanetkar, "Let us C", BPB Publications, 2002.
2. Mark Mitchell, Jeffrey Oldham, and Alex Samuel, "Advanced Linux Programming**",** New Riders Publishing, 2001.
3. B. Kernighan and D. Ritchie, "The ANSI C Programming Language", PHI., 2000

REFERENECES:

1. Yashwant Kanetkar, "Pointers in C", BPB Publications, 2002.
2. Paul Deitel and Harvey Dietel, "How to Program", PHI, 6th Ed., 2010.
3. Behrouz A. Forouzan and Richard F. Gilberg, "Computer Science A Structured Programming Approach Using C", PHI, 3rd Ed., 2007.
4. Jeri R. Hanly and Elliot B. Koffman, "Problem Solving and Programming in C", Pearson, 5th Ed. 2007.
5. Rama N. Reddy and Carol A. Ziegler, "C Programming for Scientist and Engineers with Applications", Jones and Bartlet, 2010.

Code No. MCA 105 **L T C**

Paper: Discrete Mathematics **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *This course covered the mathematical topics most directly related to computer science. Learning Outcome of this course is to prepare students to take courses related with Data Structure, Algorithm analysis and Cryptography. This course develops ability to write independent mathematical Proofs.*

PRE-REQUISITE:

- Basic Mathematics

UNIT – I

Formal Logic: Statement, Symbolic Representation and Tautologies, Quantifiers, Predicates and validity, Normal forms. Propositional Logic, Predicate Logic. Direct Proof, Proof by Contraposition, Proof by exhaustive cases and proof by contradiction, principle of mathematical induction, principle of complete induction., pigeonhole principle, permutation and combination, pascal's triangles, binominal theorem. Sets, Subsets, power set, binary and unary operations on a set, set operations/set identities, fundamental counting principles, principle of inclusion and exclusion Relation, properties of binary relation, closures, partial ordering, equivalence relation, properties of function, composition of function, inverse. **[No. of Hrs: 12]**

UNIT – II

Lattices: sub lattices, direct product, definition of Boolean algebra, properties, isomorphic structures (in particulars, structures with binary operations) sub algebra, direct product and homo-morphism, Boolean function, Boolean expression, representation & minimization of Boolean function. Principle of Well Ordering Recursive definitions, solution methods for linear, first-order recurrence relations with constant coefficients. **[No. of Hrs: 08]**

UNIT – III

GCD, LCM, Permutation function, composition of cycles. Fundamental Theorem of Arithmetic, primes, Congruence, Euler Phi function, Fermat's Little Theorem, Primality and Factoring, Simple Cryptosystems, RSA Cryptosystem. Groups, Group identity and uniqueness, inverse and its uniqueness, isomorphism and homomorphism, subgroups, Cosets and Lagrange's theorem, Permutation group and Cayley 's theorem (without proof), Error Correcting codes and groups, Normal subgroup and quotient groups. **[No. of Hrs: 12]**

UNIT – IV

Graph Terminology, Isomorphism, Isomorphism as relations, Cut-Vertices, Planar graphs, Euler's formula (proof), four color problem and the chromatic number of a graph, Eu ler graphs, Hamiltonian graphs, five color theorem, Vertex Coloring, Edge Coloring. Trees terminology, in order, preorder & post order trees traversal algorithms, directed graphs, Computer representation of graphs. **[No. of Hrs: 10]**

TEXT BOOKS:

1. Kenneth Bogart Clifford and Stein Robert Drysdale, “Discrete Mathematics for computer science" Springer, 2006.
2. J. P. Tremblay and R. Manohar, “Discrete Mathematical Structure with Application to Computer Science”, TMH, New Delhi, 2000.
3. David J. Hunter “Essentials of Discrete Mathematics” Johns and Bertlett, 2008.
4. Kolman, Busby and Ross “Discrete Mathematical Structures” PHI/Pearson., 6th Ed., 2009.
5. D. S. Malik and M. K. Sen, “Discrete Mathematical Structures”, Cengage Publication, 2006.
6. Swapan Kumar Sarkar, “Discrete Mathematics”, S. Chand, 4th Ed., 2006.
7. Kenneth H. Rosen, “Discrete Mathematics & Applications”, TMH, 6th Ed., 2007.

REFERENCES:

1. C. L. Liu, “Elements of Discrete Mathematics”, McGraw Hill Book Company, 2nd Ed., 1985.
2. Vinay Kumar, “Discrete Mathematics”, BPB Publications, 1998.
3. G. Haggard, J. Schlipf and S. Whitesides, “Discrete Mathematics for Computer Science”, Thomson Learning, 2006.
4. J. L. Hein, “Discrete Structures, Logic and Computabili ty”, Narosa, 3rd Ed., 2009.
5. Neal Koblitz, “A course in number theory and cryptography ”, Springer – Verlag, 2nd Ed., 2004.
6. V. Shoup, “A Computational Introduction to Number Theory and Algebra”, CUP, 2nd Ed., 2008.
7. S. Santha, “Discrete Mathematics with Combinatorics and Graph Theory”, Cengage Learning, 2009.
8. T. Sengadir, “Discrete Mathematics and Combinationatorics”, Pearson, 2009.
9. David J. Hunter, “Essentials of Discrete Mathematics”, Jones and Bartlett, 2010.
10. Narsingh Deo, “Graph Theory”, PHI, 24th Indian Print, 2003.

Code No.: MCA 107 **L T C**
Paper: Computer Organization **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *The main objective of the syllabus is to make students understand the relevance Computer Organization in the software oriented course. It aims at introducing basic digital concepts and then use them to explain details of computer organization.*

PRE-REQUISITE:

- Basics of Digital Electronics
- Internal Components of the CPU

UNIT – I

Introduction and overview: Multiplexes, Demultiplexers, Decoders, Adders, Flip-flops : S-R, J-K, D, T, Master Slave and Edge triggered, Registers, shift registers, Bi-direction shift registers.
Register Transfer and Microoperation: Register transfer language, register transfer, bus and memory transfer, arithmetic microoperations, logic microoperations, shift microoperations.
[No. of Hrs: 12]

UNIT – II

Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing & control, instruction cycle, memory reference instructions, input-output and interrupts, design of basic computer, design of accumulator logic.
Microprogrammed Control Unit: Control memory, address sequencing.
Central Processing Unit: Introduction, general register organization, stack organization, instruction formats, addressing modes. **[No. of Hrs: 11]**

UNIT – III

Pipeline and Vector processing: Parallel Processing, pipelining, arithmetic pipeline, RISC Pipeline, Vector Processing, Array Processors.
Input-Output Organization: Peripheral devices, input-output interface, asynchronous data transfer, modes of data transfer, priority interrupt, direct memory access, input-output processor.
[No. of Hrs: 10]

UNIT – IV

Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.
Multiprocessors: Characteristics of multiprocessor, Interconnection Structure, Interprocessor Communication & Synchronization. **[No. of Hrs: 09]**

TEXT BOOKS:

1. Mano M, "Computer System and Architecture", Pearson, 3rd Ed., 2009
2. Stallings W, "Computer Organization & Architecture", PHI, 8th Ed., 2010.

REFERENCES:

1. Malvino, “Digital Computer Electronics: An Introduction to Microcomputers”, McGraw Hill, 1993.
2. Hayes, J. P. “Computer Architecture and Organization”, McGraw Hill, 1998.
3. Andrew S. Tanenbaum, “Structured Computer Organization”, PHI, 5th Ed., 2006.
4. P. V. S Rao, “Computer System Architecture”, PHI, 5th Ed., 2009.
5. Anthony J. Dos Reis, “Assembly Language and Computer Architecture using C++ and Java”, Cengage Learning, 2004.

Code No.: MCA 109 **L T C**
Paper: Principles and Practices of Management **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *The purpose of this course is to expose the student to the basic concepts of management in order to aid the student in understanding how an organization functions, and in understanding the complexity and wide variety of issues managers face in today's business firms.*

PRE-REQUISITE:

- None

UNIT – I

Management: Concept, Nature, Importance; Management: Art and Science, Management As a Profession, Management Vs. Administration, Management Skills, Levels of Management, Characteristics of Quality Managers. Evolution of Management: Early contributions, Taylor and Scientific Management, Fayol's Administrative Management, Bureaucracy, Hawthorne Experiments and Human Relations, Social System Approach, Decision Theory Approach. Business Ethics and Social Responsibility: Concept, Shift to Ethics, Tools of Ethics **[No. of Hrs : 11]**

UNIT – II

Introduction to Functions of Management, Planning: Nature, Scope, Objectives and Significance of Planning, Types of Planning, Process of Planning, Barriers to Effective Planning, Planning Premises and Forecasting, Key to Planning, Decision Making.

Organizing: Concept, Organization Theories, Forms of Organizational Structure, Combining Jobs: Departmentation, Span of Control, Delegation of Authority, Authority & Responsibility, Organizational Design. **[No. of Hrs.: 10]**

UNIT – III

Staffing: Concept, System Approach, Manpower Planning, Job Design, Recruitment & Selection, Training & Development, Performance Appraisal, Directing: Concept, Direction and Supervision, Motivation: Concept, Motivation and Performance, Theories Of Motivation, Approaches for Improving Motivation, Pay and Job Performance, Quality of Work Life, Morale Building. **[No. of Hrs.: 10]**

UNIT – IV

Leadership: The Core of Leadership: Influence, Functions of Leaders, Leadership Style, Leadership Development.Communication: Communication Process, Importance of Communication, Communication Channels, Barriers to Communication. Controlling: Concept, Types of Control, Methods: Pre-control: Concurrent Control: Post-control, An Integrated Control System, The Quality Concept Factors affecting Quality, Developing a Quality Control System, Total Quality Control, Pre-control of Inputs, Concurrent Control of Operations. Post Control of Outputs. Change and Development: Model for Managing Change, Forces for Change, Need for Change, Alternative Change Techniques, New Trends in Organisational Change. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Stoner, Freeman and Gilbert Jr., "Management", PHI, 6th Ed.
2. Koontz , "Principles of Management", Tata Mc Graw Hill, 1st Ed., 2008.
3. Robbins and Coulter, "Management", PHI, 8th Ed.

REFERNCES:

1. Robbins S. P. and Decenzo David, "A. - Fundamentals of Management: Essential Concepts and Applications", Pearson Education, 5th Ed.
2. Hillier Frederick S. and Hillier Mark S. - Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets, Tata Mc Graw Hill, 2nd Ed., 2008.
3. Weihrich Heinz and Koontz Harold, "Management: A Global and Entrepreneurial Perspective", Mc Graw Hill, 12th Ed., 2008.
4. R. Satya Raju and A. Parthasarathy, "Management Text and Classes", PHI, 2nd Ed., 2009.

There will be following Practical:

1. Fundamentals of IT Lab **MCA 151**
2. Problem Solving Using C Lab **MCA 153**
3. Computer Organization Lab **MCA 155**

Code No. : MCA 161
Paper: General Proficiency – I*

It is suggested to have a fundamental course on Personality Development and Communication Skills – I in this semester.

This paper is under Non University Examination system its detail content will be decided by the respective Institute, under approval of the coordination committee based on the requirement of individual institution.

***Non University Examination Scheme (NUES)**

There will not be any external examination of the university. The performance of the candidates should continuously be evaluated by an internal committee. The committee may conduct viva-voce at the end for the award of the marks.

Code No.: MCA 102 **L T C**
Paper: Data and File Structures **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *In this course student will become familiar with Algorithm analysis: Trees, Graphs, searching and sorting and files.*

PRE-REQUISITES:

- C Programming
- Basic Concepts in Data Structure
- Prelims of Trees and Graphs Functionality of Group Theory

UNIT – I

Fundamentals of algorithm analysis Big 'O' notations, Time and space complexity of algorithms, linked lists: singly and doubly linked lists, stacks, queues, double stack, multistacks and multiqueues, deques, polynomial arithmetic, infix, postfix and prefix arithmetic expression conversion and evaluations. **[No. of Hrs: 08]**

UNIT – II

Trees: Binary trees: Definition, Binary Search Tree basic operations, Tree Traversals (recursive and stack based non-recursive), Heaps and priority queues, Threaded binary tree, AVL Trees B-Tree: need, properties, creation, uses. B+ tree, B* tree. **[No. of Hrs: 10]**

UNIT – III

Graphs: Representation (Matrix and Linked), Traversals, Connected components, Spanning trees, Shortest path and Transitive closure, Topological sort, Activity network, Critical path, Path enumeration. Dijkstra's Algorithm, Floyd Warshall's Algorithm, Coloring of Graphs, Spanning Tree, Minimum Spanning Tree Algorithms (Kruskal's Algorithm, Prim's Algorithm)

Searching & Sorting: Binary search, Hash function, Hash table, Search tree. Internal sort: Radixsort, Insertion sort, Selection sort, Shell sort, Quick sort, Merge sort, Heap sort.

[No. of Hrs: 16]

UNIT – IV

Files: Sequential file organization, creating updating retrieving from sequential files advantages and disadvantages of sequential file organization. Data representation and denisity, parity and error control techniques, devices and channels, double buffering and block buffering, handling sequential files in C language, seeking, positioning, reading and writing binary files in C. External Sorting and merging files k way and polyphase merge **[No. of Hrs: 08]**

TEXT BOOKS:

1. E. Horowitz and S. Sahani, "Fundamentals of Data Structures in C", 2nd Edition, Universities Press, 2008.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition Addison-Wesley, 1997.

REFERENCES:

1. Schaum's Outline Series, "Data Structure", TMH, Special Indian Ed., Seventeenth Reprint, 2009.
2. Y. Langsam et. al., "Data Structures using C and C++", PHI, 1999.
3. N. Dale and S.C. Lilly, D.C. Heath and Co., "Data Structures", 1995.
4. R. S. Salaria, Khanna, "Data Structure & Algorithms", Book Publishing Co. (P) Ltd., 2002.
5. Richard F. Gilberg and Behrouz A. Forouzan, "Data Structure A Pseudocode Approach with C", Cengage Learning, 2nd Ed., 2005.
6. Mary E. S. Loomes, "Data Management and File Structure", PHI, 2nd Ed., 1989.

Code No.: MCA 104 **L T C**
Paper: Object Oriented Programming in C++ **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *After covering the core C++ in about 25 lectures the course shall aim to aquaint the students about advanced features of the language the following features are as suggested guideline for the teacher.*

- *Copy construtor, Deep and shallow coping, assignment operator and destrutors, when the programmer must implement these*
- *Static and late binding. Run time and comile time polymorphism, virtual functions and VTABLE*
- *Implementing ADT with C++ classes. Stacks Queues and Linked Lists as cases*
- *Implementing Trees and Graph and all comparison based sorting algorithms*
- *Function objects and call backs*
- *Templates and Generics Stack Queses should be implemented in the practicals*
- *Extensive coverage of all the three components of STL namely containers, iterators and algorithms throgh suitable pratical caseletts*
- *Final case study could be an application making extensive handling files.streams classes*

PRE-REQUISITES:

- Data Structure Concept
- Real Programming Experience with C Language
- UNIT-III of MCA-102 should be finished before start of Unit-IV of this paper

UNIT – I

OOP Paradigm: Comparison of Programming paradigms, Characteristics of Object-Oriented Programming Languages, Object-based programming languages **C++**: Brief History of C++, Structure of a C++ program, Difference between C and C++ - cin, cout, new, delete operators, ANSI/ISO Standard C++, Comments, Working with Variables and const Qualifiers. Enumeration, Arrays and Pointer.

Implementing oops concepts in c++ Objects, Classes, Encapsulation, Data Abstraction, Inheritance, Polymorphism, Dynamic Binding, Message Passing, Default Parameter Value, Using Reference variables with Functions. **[No. of Hrs: 09]**

UNIT – II

Abstract data types, Class Component, Object & Class, Constructors Default and Copy Constructor, Assignment operator deep and shallow coping, Access modifiers – private, public and protected. Implementing Class Functions within Class declaration or outside the Class declaration. instantiation of objects, Scope resolution operator, Working with Friend Functions, Using Static Class members. Understanding Compile Time Polymorphism function overloading Rules of Operator Overloading (Unary and Binary) as member function/friend function, Implementation of operator overloading of Arithmetic Operators, Overloading Output/Input,

Prefix/ Postfix Increment and decrement Operators, Overloading comparison operators, Assignment, subscript and function call Operator , concepts of namespaces. **[No. of Hrs. 10]**

UNIT – III

Inheritance: Inheritance, Types of Inheritance, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors and Destructor in derived classes. Multiple Inheritance.

Polymorphism: Polymorphism, Type of Polymorphism – compile time and runtime, Understanding Dynamic polymorphism: Pointer to objects, Virtual Functions (concept of VTABLE) , pure virtual functions, Abstract Class.

Advanced Input/Output, Exception Handling and Manipulating strings, Using istream / ostream member functions, Using Manipulators, Creating Manipulator Functions, Understanding Implementation of Files, Writing and Reading Objects. Understanding of working and implementation of Exception Handling. **[No. of Hrs: 11]**

UNIT – IV

Generic Programming: and mastering STL Understanding Generic Functions with implementation of searching sorting algorithm. Overloading of Function Templates. Understanding Class Templates using Implementation of Generic stack, linked lists: singly and doubly linked lists, Binary Search Tree basic operations. Understanding Inheritance with Generic Class.

Standard Template Library:– Understanding Components of Standard Template Library, Working of Containers, Algorithms, Iteraters and Other STL Elements. Implementation of Sequence and Associative containers for different Algorithms using their Iterator. Understanding of Algorithms Requiring Operations on the element using function objects. Implementing graph algorithm dfs, bfs, minimum spanning tree , dijkastra etc using STL **[No. of Hrs: 12]**

TEXT BOOKS:

1. A. R. Venugopal, Rajkumar, and T. Ravishanker “Mastering C++”, TMH, 1997.
2. S. B. Lippman and J. Lajoie, “C++ Primer”, 3rd Edition, Addison Wesley, 2000.
3. Bruce Eckel, “Thinking in C++”, President, Mindview Inc., Prentice Hall, 2nd Ed.

REFERENCE:

1. D . Parasons, “Object Oriented Programming with C++”, BPB Publication.
2. Bjarne Stroustrup , “The C++ Programming Language”, Addison Welsley, 3rd Ed.
3. Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication.
4. Schildt Herbert, “C++: The Complete Reference”, Tata McGraw Hill, 4th Ed., 1999.
5. Behrouz A. Forouan, Richrad F. Gilberg, Computer Science - A Structural Approach Using C++”, Cengage Learning, 2004.
6. Nell Dale, “C++ Plus Data Structure”, Jones and Bartlett, 4th Ed., 2010.
7. Nell Dale, Chips Weens, “Programming and Problem Solving with C++”, Jones and Bartlett , 5th Ed., 2010.

Code No.: MCA 106 **L T C**
Paper: Operating Systems **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *The objectives of this course are to:*

- *Help students become familiar with the fundamental concepts of operating system.*
- *Help students become competent in recognizing operating systems features and issues.*
- *Provide students with sufficient understanding of operating system design and how it impacts application systems design and performance.*

Upon successful completion of this course, the student shall be able to:

- *Exhibit familiarity with the fundamental concepts of operating systems.*
- *Exhibit competence in recognizing operating systems features and issues.*
- *Apply a mature understanding of operating system design and how it impacts application systems design and performance.*

PRE-REQUISTES:

- Basics of Computer System Architecture
- C/C++ Programming Skills

UNIT – I

Operating System: Introduction, Role, Types of OS; Batch Systems, multi programming, time–sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls.

Processes: Process Concept, Process Scheduling, Operation on Processes, Cooperating Processes, Threads.

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Algorithm Evaluation. **[No. of Hrs.:10]**

UNIT – II

Interprocess Communication and Synchronization: Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Message Passing.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock Handling.

Memory Management: Background, Logical vs. Physical Address space, swapping, Contiguous allocation, Paging, Segmentation, Segmentation with Paging.

Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations, Demand Segmentation. **[No. of Hrs: 11]**

UNIT – III

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Device Characteristics-Hardware Consideration, Channels and Control Units,

Independent Device Operation, Buffering, Multiple Paths, Block Multiplexing, Device Allocation Consideration

Secondary-Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability. **[No. of Hrs.: 12]**

UNIT – IV

File-System Interface: File Concept, Access Methods, Directory Structure.

File-System Implementation: Introduction, File-System Structure, Basic File System, Allocation Methods, Free-Space Management, Directory Implementation.

Security : The Security problem, Goals of protection, Access matrix, Authentication, Program threats, System threats, Intrusion detection , Cryptography.

Case Study: Linux Operating System and Windows XP. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. Silbersachatz and Galvin, "Operating System Concepts", John Wiley, 8th Ed., 2009.
2. Milan Kovic., "Operating Systems", Tata McGraw Hill, 2001
3. Deitel, Deitel and Choffnes, "Operating Systems", Pearson ,3rd Edition

REFERENCES:

1. Tannenbaum, "Operating Systems", PHI, 4th Ed., 2000.
2. Madnick E. and Donovan J., "Operating Systems", Tata McGraw Hill, 2001.
3. Flynn McHoes, "Operating System", Cengage Learning, 2006.
4. Pbitra Pal Choudhury, "Operating System Principles and Design", PHI, 2009.
5. Sibsankar Halder and Alex A. Aravind, "Operating System", Pearson, 2009.
6. William Stallings, "Operating Systems Internals & Design Principles", Pearson Education, 6th Ed., 2009.

Code No. MCA 108 **L T C**
Paper: Data Base Management Systems **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *The purpose of this course is to enable the students know about the fundamental concepts necessary for designing, using and implementing database systems and applications. It also covers advanced techniques and technologies.*

PRE-REQUISITE:

- Elementary Maths (Sets, Relations)
- Basic Data Structure Concepts

UNIT - I

Basic concepts: database & database users, characteristics of the database, database systems, concepts and architecture, date models, schemas & instances, DBMS architecture & data independence, database languages & interfaces, data modeling using the entity-relationship approach. Overview of hierarchical, Network & Relational Data Base Management Systems**.**

[No. of Hrs. 9]

UNIT - II

Relational model, languages & systems: relational data model & relational algebra: relational model concepts, relational model constraints, relational algebra, SQL- a relational database language: date definition in SQL, view and queries in SQL, specifying constraints and indexes in sql. **[No. of Hrs. 12]**

UNIT - III

Oracle Architecture, Logical Data Structures Physical Data Structure, Instances, Table Spaces, Types of Tablespaces, Internal Memory Structure, Background Processes, Data Types, Roles & Privileges, Stored Procedures, User Defined Functions, Cursors, Error Handling, Triggers.

[No. of Hrs. 10]

UNIT - IV

Relational data base design: function dependencies & normalization for relational databases: functional dependencies, normal forms based on primary keys, (1NF, 2NF, 3NF & BCNF), lossless join and dependency preserving decomposition. Concurrency control & recovery techniques: concurrency control techniques, locking techniques, time stamp ordering, granularity of data items, recovery techniques: recovery concepts, database backup and recovery from catastrophic failures. Concepts of object oriented database management systems, Distributed Data Base Management Systems. **[No. of Hrs. 11]**

TEXT BOOKS:

1. Elmsari and Navathe, "Fundamentals of Database Systems", Pearson Education, 5th Ed., 2006.
2. Korth, Silberschatz, "Fundamentals of Database System Concepts", TMH, 6th Ed., 2010.
3. Desai, B., "An Introduction to Database Concepts", Galgotia.
4. Sham Tickoo and Sunil Raina, "Oracle 11g with PL/SQL Approach", Pearson, 2010.

REFERENCES:

1. Date C. J., "An Introduction to Database Systems", Narosa Publishing, 7th Ed., 2005.
2. S. K. Singh, "Database Systems: Concept, Design, and Applications", Pearson's Education, 1st Ed., 2008.
3. Kiffer, "Database Systems: An Application oriented Approach", Pearson.
4. Ullman J. D., "Principals of database systems", Galgotia .
5. Shio Kumar Singh, "Databases Systems Concepts, Design and Applications," Pearson, 2006.

Code No. MCA 110 **L T C**
Paper: Software Engineering **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *Course is intended to help students to develop skills that will enable them to construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain. The concept covered in syllabus are*

- *The software development process.*
- *Software requirements and specifications.*
- *Software design techniques.*
- *Techniques for developing large software systems.*
- *CASE tools and software development environments.*
- *Software testing, documentation and maintenance.*

PRE-REQUISITE:

- Program Development
- Basic Concepts of Data Management

UNIT-I

Introduction: Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models.

Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD & Use case approach, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS, Requirement Management, IEEE Std. for SRS. **[No. of Hrs.: 10]**

UNIT-II

Software Project Planning: Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, Putnam resource allocation model, Validating Software Estimates, Risk Management.

Software Design: Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design. **[No. of Hrs.: 12]**

UNIT-III

Software Metrics: Software measurements: What & Why, Token Count, Halstead Software Science Measures, Data Structure Metrics, Information Flow Metrics.

Software Reliability: Importance, Hardware Reliability & Software Reliability, Failure and Faults, Reliability Models- Basic Model, Logarithmic Poisson Model, Software Quality Models, CMM & ISO 9001. **[No. of Hrs.: 10]**

UNIT-IV

Software Testing: Testing process, Design of test cases, Introduction to functional testing & Structural testing, Unit Testing, Integration and System Testing, Debugging, Alpha & Beta Testing.

Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Regression Testing, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International, 3rd Ed., 2005.
2. R. S. Pressman, "Software Engineering – A Practitioner's Approach", McGraw Hill Int. , 5th Ed., 2001.
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa, 3rd Ed., 2005.

REFERENCES:

1. Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
2. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons.
3. I. Sommerville, "Software Engineering", Addison Wesley,8th Ed., 2009.
4. Frank Tsui and Orlando Karan, "Essentials of Software Engineering", Joes and Bartlett, 2nd Ed., 2010.
5. Kassem A. Saleh, "Software Engineering", Cengage Learning, 2009.
6. Rajib Mall, "Fundamrntal of Software Engineering", PHI, 3rd Ed., 2009.
7. Carlo Ghizzi , Mehdi Jazayeri and Dino Mandrioli, " Fundamental of Software Engineering", PHI, 2nd Ed.,2003.
8. Carol L. Hoover, Mel Rosso-Llopart and Gil Taran, "Evaluating Project Decision Case Studies in Software Engineering", Pearson, 2010.

There will be following Practical:

1. Data and File Structure Lab **MCA 152**
2. Object Oriented Programming in C++ Lab **MCA 154**
3. Database Management System Lab **MCA 156**
4. Software Engineering Lab **MCA 158**

Code No. : MCA 162
Paper: General Proficiency – II*

It is suggested to have a fundamental course on Personality Development and Communication Skills – II in this semester.

This paper is under Non University Examination system its detail content will be decided by the respective Institute, under approval of the coordination committee based on the requirement of individual institution.

***Non University Examination Scheme (NUES)**

There will not be any external examination of the university. The performance of the candidates should continuously be evaluated by an internal committee. The committee may conduct viva-voce at the end for the award of the marks.

Code No. MCA 201 **L T C**
Paper: Theory of Computation **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES:

This course is extensive and theoretical treatment of issues in Computability and Complexity; Topics include Automata and Language Theory, Computability Theory, and Complexity Theory. Learning outcome of this course will be theoretical treatment of following

- *What can be computed and how fast it can be done?*
- *Use of Automata and Language theory in the development of different modules of a compiler as a case study.*

PRE-REQUISITE:

- Discrete Mathematics
- Skills in writing Formal Mathematical Proofs

UNIT - I

Automata and Language Theory: Overview of Theoretical Computer Science (including computationally intractable problems) , Introduction to System software including various phases / Modules in the design of a typical compiler , Chomsky Classification, Finite Automata, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA),statement of Kleen's Theorem, Regular Expressions, Equivalence of DFAs, NFAs and Regular Expressions, Closure properties of Regular Language, Non-Regular Languages, Pumping Lemma. Myhill Nerode Theorem, Use of Regular expressions in the Design of scanner (lexical analyzer). Introduction to JFLAP Simulation. **[No. of Hr: 12]**

UNIT - II

Context Free Languages: Context Free Grammar (CFG), Parse Trees, Push Down Automata (deterministic and nondeterministic) (PDA), Equivalence of CFGs and PDAs, Closure properties of CFLs, Pumping Lemma, Parsing (including LL(1) , SLR and LR(1) Parsing Method).

[No. of Hr.: 12]

UNIT - III

Turing Machines and Computability Theory: Definition of Turing Machine, Extensions of Turing machines, Non – deterministic Turing machines, Equivalence of various Turing Machine Formalisms, Church – Turing Thesis, Decidability, Halting Problem, Reducibility, Recursion Theorem. **[No. of Hr: 10]**

UNIT - IV

Complexity Theory: Time and Space measures, Hierarchy theorems, Complexity classes P, NP, space complexity , Savich theorem , L, NL, PSPACE complexity , Post correspondence problem, Probabilistic computation.

[No. of Hr: 6]

TEXT BOOKS:

1. J. C. Martin, "Introduction to Languages and the Theory of Computation", TMH, 3rd Ed. 2007.

2. M. Sipser, "Introduction to the Theory of Computation", Cengage Publication, 2006.

3. J. Hopcroft, R. Motwani, and J. Ullman, "Introduction to Automata Theory, Language and Computation", Pearson, 2nd Ed., 2006.

4. Wayne Goddard, "Introducing the Theory of Computation", Jones & Bartlett Student Ed.

REFERENCES:

1. Dexter C. Kozen "Theory of Computation ", Springer 2006.
2. H. R. Lewis and C. H. Papadimi Triou, "Elements of the Theory of Computation", Pearson, 2nd Ed., 1997.
3. D. Cohen, "Introduction to Computer Theory, Wiley, N. York, 2nd Ed., 2008.
4. K. L. Mishra and N. Chandrasekharan, "Theory of Computer Science Automata Language Computation", PHI, 3rd Ed., 2007.
5. Susan H. Rodger, "JFLAP: An interactive Formal Languages and Automata Package", Jones & Bartlett, 2009.
6. Peter Linz, "Introduction to Formal Languages and Automata", Narosa.
7. Sudkamp, "Languages and Machines", Pearson Education, 2007.
8. Bernard Moret, "Theory of Computation", Pearson Education, 2008.

Code No. MCA 203 **L T C**
Paper: Computer Graphics **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *Computer graphics is used in diverse applications from the visualization of complex scientific data to the special effects in computer games. The objective of this course is to introduce the programming principles of computer graphics. The course will cover Practical programming through C, and mathematical and theoretical foundations.*

PRE-REQUISITE:

- Mathematical Concepts

UNIT-I

Scan conversion: Scan converting a point, line (Bresenham's, *DDA)*, 2-D transformations (Rotation, Rotation about an arbitrary line, Scaling, Translation, Shearing, Reflection, and Reflection about an arbitrary line), circle and ellipse.

Transformation: 2D transformation, Basic Transformation, Various 2D and 3D Transformation matrices (Translation, Rotation, Scaling, Shearing and Reflection), Composite transformations: Reflection, Shearing and Transformation between coordinate Systems. Rotation about : (i) an arbitrary axis (ii)about an arbitrary point. **[No. of Hrs: 10]**

UNIT-II

Curves and Surfaces Bezier Curves, 4 point and 5 point Bezier curves using Bernstein Polynomials, Conditions for smoothly joining curve segments, Bezier bi-cubic surface patch, B-Spline Curves, Cubic B-Spline curves using uniform knot vectors, first and second order continuities, Effect of multiple control points at same location, Geometrical Construction, Computing control points given end slopes for a specified curve segment. **[No. of Hrs. : 10]**

UNIT-III

Transformations: 3-D Transformation, Computing location of V.P, 2-D viewing, Window-to-view port transformation

Clipping: Line Clipping; Sutherland Cohen clipping algorithms, Sutherland-Hodgeman.

Projection: Parallel and Perspective Projections

Solid Modeling: Sweeping a polygon or a surface patch along a path to form solids, Boundary Representation (B-Rep), octrees, CSG – Constructive Solid Geometry. **[No. of Hrs: 10]**

UNIT-IV

Shading: Shading, Illumination Model for diffused Reflection, Effect of ambient lighting & distances, Specular Reflection Model, Computing Reflection Vector, Curved Surfaces, Polygonal Approximations, Gourard Shading, Phong Model.

Hidden Surface Removal: Floating Horizon Method, Depth Buffer (Z-Buffer, A-Buffer) Method, Scan Line Method, Depth Sorting Method, BSP- tree Method, Area Subdivision Method. **[No. of Hrs: 12]**

TEXT BOOKS:

1. Foley James D, "Computer Graphics", AW 2nd Ed.
2. Rogers, "Procedural Element of Computer Graphics", McGraw Hill.
3. Donnald Hearn and M. Pauline Baker, "Computer Graphics", PHI.

REFERENECS:

1. Ven Harrington, "Computer Graphics: A programming Approach", TMH.
2. Newman and Sproul, "Principal of to Interactive Computer Graphics", McGraw Hill.
3. Roge and Adams, "Mathematics Element of Computer Graphics", McGraw Hill.
4. R. Plastock and G Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, Mc Graw Hill, 1986.
5. F. S. Hill, Jr. Stephen M. Kelley, "Computer Graphics using Open GL", PHI, 3rd Ed., 2009.
6. Malay K. Pakhira, "Computer Graphics Multimedia Animation", PHI, 2008.

Code No.: MCA 205 **L T C**
Paper: Java Programming **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *In this course student will become familiar with features of Java language, they will learn how to write Java code according to Object-Oriented Programming principles, how to design GUI applications and Applets using AWT, how to develop multithreaded and Networking applications and how to create dynamic pages.*

PRE-REQUISITES:

- Basic Object Oriented Programming Concepts

UNIT – I

Importance and features of Java, *Language Construct of java including* Keywords, constants, variables and looping and decision making construct, Classes and their implementation, Introduction to JVM and its architecture including set of instructions. Overview of JVM Programming . Internal and detailed explanation of a valid .class file format. Instrumentation of a .class file, Byte code engineering libraries, Overview of class loaders and Sandbox model of security.

Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance. Arrays and String: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

[No. of Hrs.: 12]

UNIT – II

Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions,

Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Runnable interface, inter thread Communication, suspending, resuming and stopping threads.

Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files.

Using Standard Java Packages (lang, util, io, net). Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming, RMI (Remote Method Invocation). **[No. of Hrs.: 10]**

UNIT – III

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet**.**

The Collection Framework: The Collection Interface, Collection Classes, Working with Maps & Sets

JDBC: Introduction to DBMS & RDBMS, DBC API, JDBC Application Architecture, Obtaining a Connection, JDBC Models: Two Tier and Three Tier Model, ResultSet, Prepared Statement, Callable Statement.

[No. of Hrs: 09]

UNIT – IV

RMI (Remote Method Invocation): Introduction, Steps in creating a Remote Object, Generating Stub & Skeleton, RMI Architecture, RMI packages.

Java Bean: Introduction, Bean Architecture, Using the Bean Development Kit, Creating simple bean-properties, methods and events, Packing beans- the manifest & the jar, Java bean package, Introduction to NetBean.

Swing : Introduction to JFC (Java Foundation Classes), Features of Swing, Comparison with AWT, Advanced Control. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Patrick Naughton and Herbertz Schildt, "Java-2: The Complete Reference", TMH, 1999.
2. Bill Vanners, "Inside Java Virtual Machine", TMH, 2nd Ed.
3. Rick Dranell, "HTML 4 unleashed", Techmedia Publication, 2000
4. Shelley Powers, "Dynamic Web Publishing", 2nd Ed., Techmedia, 1998.
5. Paul Dietel and Harvey Deitel, "Java How to Program", PHI, 8th Ed., 2010.

REFERENCES:

1. E. Balaguruswamy, "Programming with Java: A Primer", TMH, 1998.
2. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
3. Decker and Hirshfield, "Programming Java: A Introduction to Programming Using JAVA", Vikas Publication, 2000.
4. N.P Gopalan and J. Akilandeswari, "Web Technology- A Developer's Perspective", PHI, 2007.
5. Eric Jendrock, Jennfer Ball and Debbei Carson, "The Java #EE5 Tutorial", Pearson, 3rd Ed., 2007.
6. Daniel Liang, "Introduction to Java Programming", Pearson, 7th Ed., 2010.

Code No. MCA 207 **L T C**

Paper: Data Communications and Networking **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE:

This course covers theory and practice of data communication between computing devices. Topics include network architecture and topology, Basics of networking and protocols, OSI network layered models and Application layer protocols.

PRE-REQUISITE:

- Basic Networking
- Operating System Concepts

UNIT - I

Introductory Concepts: Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology.
Physical Layer: The Physical Layer, Theoretical Basis for Data Communication, Guided Transmission Media, Wireless Transmission, Communication Satellites Digital Signal Encoding Formats – NRZ-L, NRZI, bipolar-AMI, Manchester, Differential Manchester, Digital Modulation – ASK, FSK, PSK, PSK, Digitization – Sampling Theorem, PCM, DM, Analog Modulation – Introducing AM, FM, PM, The Mobile Telephone System. **[No of Hrs.: 11]**

UNIT - II

The Data Link Layer: Data Link Layer Design Issues, Error Detection and Correlation, Flow Control Protocols, Stop-and-wait Flow Control, Sliding – Window Flow Control, Error Control, Stop-and-wait ARQ, Go-back-N, Selective-repeat, Example of Data Link Protocols-HDLC **Medium access sub layer:** Channel allocations, ALOHA Protocols, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free protocols, Ethernet, wireless LANs, Blue Tooth, Data Link Layer Switching. **[No. of Hrs.: 11]**

UNIT - III

Network Layer: Point-to-Point network, routing algorithms, congestion control, internetworking, Quality Control, Internetworking, The Network Layer in the Internet, IP packet, IP addresses, IPv6.
[No of Hrs.: 10]

UNIT - IV

Transport Layer: Design Issue, connection management, TCP window management, User Datagram Protocol, Transmission Control Protocol, Performance Issues. **Application Layer:** DNS, Electronic Mail, WWW, MUTIMEDIA. **Network Security**: Cryptography and Compression Techniques**.** **[No of Hrs.: 10]**

TEXT BOOKS:

1. Forouzan, "Data Communication and Networking", TMH, 4th Edition.
2. A.S. Tanenbaum, "Computer Networks", PHI, 4th Edition.
3. W. Stallings, "Data and Computer Communication", Macmillan Press.
4. Comer, "Computer Networks and Internet", PHI.
5. Comer, "Internetworking with TCP/IP", PHI.

REFERNCES:

1. W. Stallings, "Data and Computer Communication", McMillan.
2. J. Martin, "Computer Network and Distributed Data Processing", PHI.
3. W. Stallings, "Local Networks", McMillan.
4. M.Schwertz, "Computer Communication Network Design and Analysis", PHI.
5. S. Keshav, "An Engineering Approach to Computer Networking, Pearson", 2001.

Code No.: MCA 209 **L T C**
Paper: C# Programming **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *In this course student will become familiar with an with C# language. This course will help to develop real life projects.*

PREREQUISITES:

- Basic Programming Language

UNIT - I

The CLR and .NET Framework: Understand the motivation behind the .NET platform, Common Language Infrastructure (CLI). Know the role of the Common Type System (CTS), the Common Language Specification (CLS) and the Common Language Runtime (CLR), Understand the assembly, metadata, namespace, type distinction, Contrast single-file and multi-file assemblies, Know the role of the Common Intermediate Language (CIL), Platform independent .NET(Mono / Portable .NET distributions). **[No. of Hrs.: 08]**

UNIT - II

Evolution of C# Language: Language Fundamentals, Reference and value Types, primitive types the Nullable and enum types, Classes and objects, Defining classes Creating objects, Using static members, Garbage Collector, Overloading Methods, Various Constructors. Encapsulating data, access modifiers, properties, indexers arrays and readonly fields. Handling errors and throwing exceptions The Root object class. Inheritance and polymorphism specialization and generalization, Abstract classes, nesting of classes. Structures. String and DateTime classes.

[No. of Hrs: 14]

UNIT - III

Event handling paradigm Delegates and events. Anonymous delegates and lambda expression FUNC and Action delegates.

Generics Collections Interfaces, overriding interface implementation. Explicit interface implementation. Collection, IEnumerable, IEnumerator, IList, IComparer and their Generic equivalent. Working with generic List, Stack, Dictionary and Queue.

Programming Window Forms Applications:. The notifies - subscribers paradigm for handling events. .NET framework for handling GUI events. Introduction to WPF and building an WPF application **[No. of Hrs: 10]**

UNIT - IV

Introducing LINQ and XML: XML A quick introduction. LINQ and C#. Defining and executing a Query. Implicitly typed local variables. Anonymous Types, Extension Methods and Lambda Expressions. Putting LINQ to work. LINQ to SQL Fundamentals of ADO.NET Updating retrieving and deleting data using LINQ to SQL. **[No. of Hrs: 10]**

TEXT BOOKS:

1. Jesse Liberty and Donald Xie , "Programming C# 3.0", O'REILLY.
2. J.G.R. Sathiaseelan, N Sasikaladevi, "Programming with C# .net", PHI, 2009.
3. Paul J. Deitel, Harvey Deitel, "C# 2008 for Programmers", Pearson, 3rd Ed., 2010.
4. Joseph Albahari and Ben Albhari, "C# 3.0/4.0 in NUTSHELL", O'REILLY.

REFERENCES:

1. Stephen C. Perry, Atul Kahate, Stephen Walther, Joseph Mayo, "Essential of .net and Related Technologies with a focus on C#, XML, ASP.net and ADO.net", Pearson, 2nd Ed. 2009.
2. Jon Skeet, "C# in Depth ", O'REILLY

Practical will be based on following:

1. Computer Graphics Lab **MCA 251**
2. Java Programming Lab **MCA 253**
3. C# Lab **MCA 255**

Code No. : MCA 261
Paper: General Proficiency – III*

It is suggested to have a fundamental course on Technical Paper Writing in this semester.

This paper is under Non University Examination system its detail content will be decided by the respective Institute, under approval of the coordination committee based on the requirement of individual institution.

***Non University Examination Scheme (NUES)**

There will not be any external examination of the university. The performance of the candidates should continuously be evaluated by an internal committee. The committee may conduct viva-voce at the end for the award of the marks.

Code No.: MCA 202 **L T C**
Paper: Design and Analysis of Algorithms **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *In this course, students will learn how:*

- *To design new algorithms based on standard algorithm-design strategies.*
- *To analyze the time and space usage and correctness of new algorithms based on standard algorithm-analysis techniques.*
- *To apply and adapt fundamental algorithms (sorting, searching, order statistics, graph algorithms) to new situations.*
- *To solve problems and to express your solutions using the language and concepts of algorithms and its mathematical tools.*

PRE-REQUISITES

- Programming in C
- Data Structure in C
- Discrete Mathematics

UNIT - I

Notion of Algorithm, Growth of functions, Summations, Recurrences: The substitution method, The iteration method, Asymptotic Notations and Basic Efficiency Classes. Use of Big O , θ, Ω in analysis .Mathematical Analysis of few Non-recursive and Recursive Algorithms , Proof of Correctness. **[No of Hrs.: 10]**

UNIT - II

Sorting and Searching Techniques , Selection Sort , Bubble Sort , Insertion Sort , Sequential Search Binary Search , Depth first Search and Breadth First Search. , Balanced Search trees , AVL Trees , Red-Black trees , Heaps and Heap sort , Hash Tables, disjoint set and their implementation , Divide and conquer Paradigm of Problem solving , complexity analysis and understanding of Merge sort , Quick Sort , Binary Search Trees, Sorting in linear time, Medians and Order statistics. **[No of Hrs.: 10]**

UNIT - III:

Greedy Techniques, Prim's Algorithm, Kruskal's Algorithm , Dijkstra's and Bellman Ford Algorithm , Huffman trees. Knapsack Problem , Dynamic Programming paradigm , Warshall 's and Floyd's Algorithm , Optimal Binary Search trees , Matrix multiplication Problem , 0/1 Knapsack Problem , maximum network flow problem , naive string matching algorithm , string matching with finite automata Knuth morris Pratt algorithm , The Rabin-Karp Algorithm.
[No of Hrs.: 10]

UNIT - IV

Backtracking, n-Queen's Problem, Hamiltonian Circuit problem, Subset-Sum problem, Branch and bound, Assignment problem, travelling salesman problem. Introduction to Computability, Polynomial-time verification, NP-Completeness and Reducibility, NP-Completeness Proof, NP-Complete problems, Proof of cook's theorem. **[No of Hrs.: 10]**

TEXT BOOKS

1. Jon Kleinberg and Eva Tardos, “Algorithm Design”, Pearson Edition, 2006.
2. Richard Neapolitan and Kumarss Naimipour, “Foundations of Algorithms”, Jones & Bartlett, 2004.
3. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, “Introduction to Algorithms” PHI, 3rd Ed., 2009.

REFERENCES:

1. Johnsonbaugh , “Algorithms”, Pearson, 2004.
2. Anany Levitin, “Introduction to the Design and Analysis of Algorithm”, Pearson Education, 2003.
3. Sara Baase and Allen Van Gelder, “Computer Algorithms - Introduction to Design and Analysis”, Pearson Education, 2003.
4. A.V. Aho, J. E. Hopcroft and J.D.Ullman, “The Design and Analysis of Computer Algorithms”, Pearson Education, 2003.
5. R. S. Salaria, Khanna, “Data Structure & Algorithms”, Book Publishing Co. (P) Ltd., 2002.
6. R. Panneerselvam, “Design and Analysis of Algorithm”, PHI, 2007.
7. Steven S. Skiena , “Algorithm Design Manual”, Springer, 1998.
8. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, “Fundamental of Computer Algorithms”, OrientLongman , 2006.

Code No.: MCA 204 **L T C**
Paper: Data Warehousing & Data Mining **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *This course is an attempt to provide you with the basic information about data ware house and their development. This course also provides the basic conceptual background necessary to design and develop data ware house applications.*

PRE-REQUISITE:

- Information System Concepts

UNIT- I

The Compelling Need for data warehousing: Escalating Need for strategic information, failures of Past decision-support systems, operational versus decision-support systems, data warehousing – the only viable solution, data warehouse defined Data warehouse – The building Blocks: Defining Features, data warehouses and data marts, overview of the components, metadata in the data warehouse Defining the business requirements: Dimensional analysis, OLAP operations : Drill-down and roll-up, slice-and-dice or rotation.

[No. of Hrs: 11]

UNIT- II

Principles of dimensional modeling: , the STAR schema, STAR Schema Keys, Advantages of the STAR Schema Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, aggregate fact tables, families of STARS ,Steps for the Design & Construction of Data warehouse : Framework , Architecture , Type of OLAP Servers : ROLAP , MOLAP , Data warehouse implementation tolls & techniques.

[No. of Hrs.: 10]

UNIT- III

Data Mining, Data Mining of what kind of Data , Knowledge discovery process (KDD) , What kind of patterns can be mined , OLAP versus data mining, data mining and the data warehouse, Data mining functionalities, classification Systems , Data processing : Cleaning , Integration & transformation, Reduction . Data Mining primitives: What defines a Data Mining Task.

[No. of Hrs.: 10]

UNIT- IV

Data Mining Query language (DMQL), Cluster Analysis : Partitioning , Hierarchical Density , Grid & Model based methods ., Major Data Mining Techniques, Cluster detection, decision trees, memory-based reasoning, link analysis, neural networks, genetic algorithms, moving into data mining, Data Mining Applications, Benefits of data mining & applications.

[No. of Hrs.: 11]

TEXT BOOKS:

1. Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2003.
2. W. H. Inmon, "Building the Operational Data Store",2nd Ed., John Wiley, 1999
3. Sam Anahony, "Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems", John Wiley, 2004.
4. Jarke, "Fundamentals of Data Warehouse", Springer

REFERENCES:

1. Kamber and Han, "Data Mining Concepts and Techniques", Hartcourt India P. Ltd., 2001.
2. G. K. Gupta, "Introduction to Data Mining with Case Studies", PHI, 2006.
3. A. B. M. Shawkat Ali, Saleh A. Wasimi, "Data Mining Methods and Techniques", Cengage Learning, 2009.
4. Pang - Ning, Michael- Steinbach, "Introduction to Data Mining", Pearson, 4th Ed., 2009.

Code No. MCA 206 **L T C**

Paper: Advanced Computer Networks **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE:

- *To grasp the current directions of computer networks research.*
- *To fill in gaps in students' networking knowledge.*
- *To better understand experimental methodology.*

PREREQUISITE:

- Data Communications and Networking

UNIT - I

Introduction : Overview of computer network, seven- layer architecture, TCP/IP suite of protocol, etc, Mac protocol for high speed LANS, MAN's & WIRLESS LANs (for example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet etc) Fast access technologies.(For example, ADSL, cable Modem Etc.), Wi Fi, Wimax. [**No. of hrs: 10]**

UNIT – II

IPV6: Why IPV6, basic protocol, extension & option, support for QS, Security, etc, neighbor discover, auto-configuration, routing, Change to other protocols, Application programming interface for IPV6.6 bone. **ATM:** Introduction, ATM reference Model, AAL layers, AAL0, AA1, AAL2, AAL3/4, AAL5 [**No. of hrs: 12]**

UNIT – III

Mobility in network, mobile, Security related issues. **IP Multicasting**: Multicasting routing protocols, address assignment, session discovery, etc. [**No. of hrs: 10]**

UNIT-IV

TCP extensions for high – speed networks, transaction – oriented application, other new option in TCP. **Network security at various layers**: Secure-HTTP, SSP, ESP, Authentication header, key distribution protocols, Digital signatures, digital certificates. [**No. of hrs: 10]**

TEXT BOOKS:

1. W. ER. Stevens, "TCP/IP illustrated, Volume 1: The protocols", Addison Wesley, 1994.
2. G. R. Wright, "TCP/IP illustrated volume 2. The Implementation", Addison Wesley , 1995.
3. Frouzan, "TCP/IP Protocol Suite", Tata Mc Grew Hill, 4th Ed., 2009.

REFERENCES:

1. William Stalling, "Cryptography and Network Security", Pearson Publication.
2. James Martin, Joseph Lebin, Kavanagh Chapman "Asynchronous Transfer Mode: ATM Architecture and Implementation", Prentice Hall PTR, Facsimile Ed.
3. Nader F. Mir, "Computer and Communication Networks", Pearson, 2009.

Code No. MCA 208 **L T C**
Paper: Object Oriented Analysis and Design **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *The objective of the course is to give students a detailed understanding of processes and techniques for building large object-oriented software systems. To develop skills to evolve object-oriented systems from analysis, to design, to implement and to understand most of the major object-oriented technologies including basic OO concepts, processes, languages, databases, user interfaces, frameworks, and design patterns.*

PRE-REQUISITE:

- Software Engineering Concepts
- Object Oriented Programming Concepts

UNIT - I

Review of Object modeling, new paradigm, object oriented thinking-rethinking, Objects and Classes. Links and association, Generalization and specialization, Inheritance, Grouping concepts, aggregation, composition , abstracts classes, Polymorphism, Metadata, Constraints, Reuse.

Object Oriented Lifecycle Model, Introduction to Object Oriented Methodology, Overview of various object oriented methodologies- OOD, HOOD, OMT, CRC, OOA, OOSA, OOSE, OOSD, OORASS. **[No. of Hrs.: 12]**

UNIT - II

Architecture: Introduction, System development is model building, model architecture, requirements model, analysis model, the design model, the implementation model, test model.

Analysis: Introduction, the requirements model, the analysis model**.** **[No. of Hrs.: 09]**

UNIT - III

Construction: Introduction, the design model, block design, working with construction.

Testing: introduction, on testing, unit testing, integration testing, system testing, the testing process. **[No. of Hrs.: 09]**

UNIT - IV

Modeling with UML: Origin of UML, 4+1 view architecture of UML, Basic Building Blocks of UML, A Conceptual Model of UML, Basic Structural Modeling, UML Diagrams.

Case Studies. **[No. of Hrs.: 12]**

TEXT BOOKS:

1. Ivar Jacobson, "Object Oriented Software Engineering", Seventh Impression , Pearson, 2009.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The UML User Guide", 2nd Edition, Pearson, 2008.

REFERENCES:

1. Stephen R. Scach, “Classical & Object Oriented Software Engineering with UML and Java”, McGraw Hill, 1999.
2. Richard C. Lee, William M. Tepfenhard, “UML and C++, A Practical guide to object-oriented Development”, Pearson.
3. Ivar Jacobson, Grady Booch & James Rumbaugh, “The Unified Software Development Process”, Pearson, Fifth Impression, 2009.
4. Bernd Bruegge, ”Object Oriented Software Engineering”, Pearson, 2nd Ed., 2008.
5. James R. Rumbaugh , Michael R. Blaha , William Lorensen , Frederick Eddy ,William Premerlani , “Object-Oriented Modeling and Design “, 2nd Edition, PHI, 2007.
6. Mahesh P. Matha, “Object Oriented Analysis and Design using UML”, PHI, 2008.
7. Michael R. Blaha, James R. Runbaugh, “Object Oriented Modeling and Design with UML”, Pearson, 2nd Ed.

Code No.: MCA 210 **L T C**
Paper: Web Technologies **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *In this course student will learn how to design and develop a dynamic website. This course also provides some basic knowledge of web services which are useful for the same.*

PRE-REQUISITE:

- Web Designing Tools
- Object-Orientated Paradigm
- Concept of a Namespace

UNIT-I

Overview of Internet and web, HTML Tags, Forms & Frames , Introduction to Java Script and Cascading Style Sheets, DHTML, Using various Web Design Tools like Dream Weaver , Gif Animator etc **[No. of Hrs 10]**

UNIT-II

ASP.Net, **Working with ASP.Net Web Forms:** Building ASP.Net Page, Building Forms with Web Server Controls, Performing Form Validation with Validation Control, Advanced Control Programming. **Working with ADO.Net:** Introduction to ADO.Net, Binding Data to web Control, Using the DataList and DataGrid Controls, Working with DataSets, Working with XML.

[No. of Hrs 10]

UNIT-III

Working with ASP.Net Applications: Creating ASP.Net Application, Tracking User Sessions, Caching ASP.Net Application, Application Tracking and Error Handling. Securing ASP.Net Applications: Using Form-Based Authentication, Using Windows-Based Authentication, Encrypting Data over the Network. **[No. of Hrs 10]**

UNIT-IV

Web Services: Introduction to Service-Oriented Architectures, XML basics, SOAP, SOAP message structure, WSDL, UDDI, Overview of Grid and Cloud Computing.
Latest trends in Web technologies. A Case Study for developing interactive web applications

[No. of Hrs 12]

TEXT BOOKS:

1. K. K. Sharma, “Web Technology”, A.B. Publication Delhi, First Edition, 2008.
2. Stephen Walther, “ASP.NET”, Pearson Education, Second Edition, 2004.
3. Ethan Cerami, “Web Services”, O'Reilly Media, 2002.
4. Achyut S Godbole and Atul Kahate, “Web Technologies”, Tata McGraw Hill.
5. Heith Morneau, “Active Server Pages “, Vikas Publishing House.

REFERENCES:

1. Raj Kamal , “Internet and Web Technologies”, TMH.
2. Deitel, “Internet & World Wide Web , How to Program”, PHI.
3. V. K. Jain, “Advanced programming in Web Design”, Cyber tech.
4. Rick Dranell, “HTML4 unleashed”, Techmedia Publication, 2000.
5. T. M. Ramachandran , “Internet & Web development”, Dhruv.
6. James L Mohler and Jon Duff, “Designing interactive web sites”, Delmar Thomson Learning.
7. Ivan Bay Ross, “HTML, DHTML, Java script, Perl CGI”, BPB.
8. Kathleen Kalata, “Web Application using ASP.net 2.0”, 2nd Ed. , 2009.
9. Anders Moller, Michael Schwartzcach, “An Introduction to XML and Web Technologies”, Pearson, 2009.
10. Malt. J. Crouch, “ASP.net and VB.net Web Programming”, Pearson, 2002.
11. Jeffrey C. Jackson, “Web Technologies- A Computer Science Perspective”, Pearson, 2005.

Practical will be based on following:

1. Design and Analysis of Algorithm Lab **MCA 252**
2. Data Warehousing and Data Mining Lab **MCA 254**
3. Advance Computer Networks Lab **MCA 256**
4. Object Oriented Analysis and Design **MCA 258**
5. Web Technologies Lab **MCA 260**

Code No. : MCA 262
Paper: General Proficiency – IV*

It is suggested to have a fundamental course on Process Modeling (Management Oriented) in this semester.

This paper is under Non University Examination system its detail content will be decided by the respective Institute, under approval of the coordination committee based on the requirement of individual institution.

***Non University Examination Scheme (NUES)**

There will not be any external examination of the university. The performance of the candidates should continuously be evaluated by an internal committee. The committee may conduct viva-voce at the end for the award of the marks.

Paper Code: MCA-301 **L T C**
Paper: Linux Programming **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *The main objective of this course is to provide Students*

- *A comprehensive overview of the Linux operating system along with Shell commands and shell scripting*
- *Implementation of Linux System programmes through GCC compiler.*
- *Understanding of basic concept of Socket programming (TCP and UDP)*

PRE-REQUISTE:

- Operating system
- Computer Network
- C /C++ Programming

UNIT – I

Linux – The Operating System: Linux history, Linux features, Linux distributions, Linux's relationship to Unix, Overview of Linux architecture, Installation, Start up scripts, system processes (an overview),Linux Security, The Ext2 and Ext3 File systems :General Characteristics of, The Ext3 File system, file permissions. User Management: Types of users, The powers of Root, managing users (adding and deleting): using the command line & GUI tools.

[No. of Hrs.: 10]

UNIT – II

Resource Management in Linux: file and directory management, system calls for files Process Management, Signals, IPC: Pipes, FIFOs, System V IPC, Message Queues, system calls for processes, Memory Management, library and system calls for memory. **[No. of Hrs.: 10]**

UNIT – III

Shell Programming:Available shells under Linux (viz. Bash, TCSH, Korn or so on), different Shell features, editors, shell commands, shell scripts: shell variables, environmental variables, purpose of shell scripts, writing, storing and executing scripts, Filters- The grep family, advanced filters-sed and awk. **[No. of Hrs.: 10]**

UNIT – IV

Networking in LINUX: Socket Introduction, Elementary TCP Sockets (Socket Function, Connect Function, Bind, Listen, Accept, Fork and Exec), TCP Client server Example, Elementary UDP Sockets. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. Arnold Robbins, "Linux Programming by Examples The Fundamentals", Pearson Education, 2nd Ed., 2008.
2. Cox K, "Red Hat Linux Administrator's Guide", PHI, 2009.
3. R. Stevens, "UNIX Network Programming", PHI, 3rd Ed., 2008.
4. Sumitabha Das, "Unix Concepts and Applications", TMH, 4th Ed., 2009.

REFERENCES:

1. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", O'Reilly Media, 6th Ed., 2009.
2. Neil Matthew, Richard Stones, Alan Cox, "Beginning Linux Programming", 3rd Ed., 2004.
3. Robert Love, "Linux System Programming" ,O'Reilly Media, 2nd Ed., 2007.
4. Yashwant Kanetkar , "Unix Shell Programming", BPB, 7th Ed., 2007.
5. Bach, "The Design of the Unix Kernel", PHI, 2000.
6. Christopher Diaz, "Introduction to Unix, Linux", Pearson 3rd Ed.2009.
7. Evi Nemeth, Garth Snyer, Trent R. Hein, "Linux Administrator Handbook", Pearson, 2nd Ed., 2007.
8. Mark G. Sobell, "A Practical Guide to Ubuntu Linux", Pearson, 2nd Ed., 2008.
9. Cox K, "Red Hat Linux Administrator's Guide", PHI, 2001.
10. Peterson Richard, "The Complete References Linux", 2nd Ed., Tata McGraw Hill, 2000.
11. Tammy Fox, "Red Hat Enterprise Linux 5.0 Administrator Unleashed", SAMS.

Code No. MCA 303 **L T C**
Paper: Software Testing **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *At the end of this course the student will be able to:*

- *Appreciate the fundamentals of software testing and its application through the software life cycle.*
- *Develop skills in designing and executing software tests suitable for different stages in the software life cycle.*
- *Understand and appreciate the role of software testing in systems development, deployment and maintenance.*
- *Develop a continuing interest in software testing, and obtain satisfaction from its study and practice.*
- *Appreciate the responsibilities of software testers within software projects, the profession and the wider community.*

PRE-REQUISITE:

- Software Engineering Concepts

UNIT - I

Introduction: What is software testing and why it is so hard?, Some Software Failures, Error, Fault, Failure, Incident, Test Cases, Testing Process, Limitations of Testing, V Shaped Software Life Cycle Model, No absolute proof of correctness, Overview of Graph Theory.

Verification Testing: Verification Methods, SRS Verification, Software Design Document Verification, Code Reviews, User Documentation Verification, Software Project Audits.

[No. of Hrs.: 08]

UNIT - II

Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.

Structural Testing: Identification of Independent Paths: Control Flow Graph, DD-Paths, Cyclomatic Complexity, Graph Matrix, Control Flow Testing, Data Flow Testing, Slice Based Testing, Mutation testing. **[No. of Hrs.: 10]**

UNIT - III

Use Case Testing: Use Case Diagrams and Use Cases, Generation of Test Cases from Use Cases, Applicability. Validity Checks: Strategy for Data Validity, Guidelines for Generating Validity Checks. Database testing.

Selection, Minimization, Prioritization of test cases for Regression Testing: Regression Testing, Regression Test Case Selection, Prioritization guidelines, Priority category Scheme, Code Coverage Techniques for Prioritization of Test Cases, Risk Analysis. **[No. of Hrs.: 12]**

UNIT - IV

Testing Activities: Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging

Object Oriented Testing: Issues in Object Oriented Testing, Path testing, Class Testing, state based testing, Object Oriented Integration and System Testing.

Metrics and Models in Software Testing: What are Software Metrics, categories of Metrics, object Oriented Metrics used in testing, What should we measure during testing?, Software Quality Attributes.

Prediction Model: Reliability Modes, Fault Prediction Model. **[No. of Hrs.: 12]**

TEXT BOOKS:

1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, Van Nostrand Reinhold, New York, 2nd Ed., 1995.
2. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Van Nostrand Reinhold, New York, 2nd Ed., 1993.
3. Boris Beizer, "Software Testing Techniques", Second Volume, Van Nostrand Reinhold, New York, . 2nd Ed., 1990.
4. Louise Tamres, "Software Testing", Pearson Education Asia, 2002.
5. Aditya P. Mathur, "Foundation of Software Testing", Pearson, 2008.

REFERENCES:

1. Paul C. Jorgenson, Software Testing A Craftsman's approach, CRC Press, 1997.
2. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", , McGraw-Hill International Edition, New Delhi, 5th Ed., 2001.
3. Boris Beizer, "Black-Box Testing – Techniques for Functional Testing of Software and Systems", John Wiley & Sons Inc., New York, 1995.
4. K. K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, New Delhi, 3rd Ed., 2003.
5. Marc Roper, "Software Testing", McGraw-Hill Book Co., London, 1994.
6. Gordon Schulmeyer, "Zero Defect Software", McGraw-Hill, New York, 1990.
7. Watts Humphrey, "Managing the Software Process", Addison Wesley Pub. Co. Inc., Massachusetts, 1989.
8. Boris Beizer, "Software System Testing and Quality Assurance", Van Nostrand Reinhold, New York, 1984.
9. Glenford Myers, "The Art of Software Testing", John Wiley & Sons Inc., New York, 1979.
10. Elfriede Dustin, "Effective Software Testing: 50 Specific ways to improve your Testing", Pearson, 2003.
11. Dorothy Graham, Erik Van Veenendaal, Isabel Evans and Rex Black, "Foundation of Software Testing, ISTQB Certification", PHI, 8th Ed., 2009.

Code No.: MCA 305 **L T C**
Paper: Enterprise Computing in Java **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *In this course student will learn about J2EE technology and will be able to develop dynamic websites. This course will explain how Enterprise JavaBeans (EJBs) contain the application's business logic and business data.*

PRE-REQUISITES:

- Core JAVA

UNIT I

Introduction to J2EE and building J2EE applications, MVC architecture, Introduction to servlets and it's life cycle , problems with cgi-perl interface , generic and http servlet , servlet configuration, various session tracking techniques, servlet context, servlet configuration, servlet colloboration. **[No. of Hrs. : 10 Hrs]**

UNIT II

JSP Basics and Architecture: JSP directives, Scripting elements, standard actions, implicit objects, jsp design strategies.

Struts**:** Introduction of Struts and its architecture, advantages and application of Struts.

[No. of Hrs. : 12 Hrs]

UNIT III

EJB fundamentals: Motivation for EJB, EJB Echo system, J2EE technologies, Enterprise beans and types, distributed objects and middleware, developing EJB components, remote local and home interface, bean class and deployment descriptor. **[No. of Hrs.: 10 Hrs]**

UNIT IV

Introducing session beans: Session beans life time, statefull and Stateless session beans beans, lifecycle of session beans.

Introducing Entity beans: persistence concepts, features of entitiy beans , entity context,

Introduction to JMS & Message driven beans. **[No. of Hrs. : 10 Hrs]**

TEXT BOOKS:

1. Ed Roman, Scott W Ambler, Tyler Jewell, "Mastering Enterprise Java Beans", Wiley, 2nd Ed., 2005.
2. Govind Sesadri , "Enterprise Java Computing: Application and Architectures", Cambridge University Publications, 1999.
3. Subrahamanyam Allamaraju, Cedric Buest, "Professional Java Server Programming, J2EE, Apress, 1.3 Ed., 2005.
3. Ivan Bayross and Sharanam Shah, "Java Server Programming" , Shroff .
4. John Hunt and Chris Loftus, "Guide to J2EE: Enterprise Java" Springer Verlag Publications.
5. Govind Seshadri, "Enterprise Java Computing: Application and Architectures", Cambridge University Press, 1999.

REFERENECES:

1. Ted Neward, “Effective Enterprise Java”, Eddison -Wesley, 2004.
2. Jim Farley, William Crawford, “ Java Enterprise in a Nutshell”, O’Reilly and Associates, 3rd Ed.
3. Austin Sincock , “Enterprise Java for SAP” , A Press Publications.
4. Joe Wigglesworth and McMilan Paula, “Java Programming: Advanced Topic”, Thomson, 3rd Ed., 2003.

Code No. MCA 307 **L T C**
Paper: Advanced Database Management System **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *This course is an attempt to provide you with the advanced information about database management system and their development. This course also provides the conceptual background necessary to design and develop distributed database system for real life applications.*

PRE-REQUISITE:

- Centralized Database Management System Concepts

UNIT -I

Review of traditional DBMS's, relational algebra and relational calculus, design principles, normalization, transaction and concurrency control, recovery management. **[No. of Hrs.: 10]**

UNIT -II

Design Process: Design process, design evaluation, modeling process, E-R model, and semantic data model, object oriented model, models and mapping normalization and denormalization. Data warehousing, OLAP and data mining. **[No. of Hrs.: 12]**

UNIT -III

Architecture: Architecture of SQL server, SQL server and Oracle sever tuning, SQL server tuning, Oracle server tuning, OS tuning (Microsoft OS's). **[No. of Hrs.; 08]**

UNIT-IV

Distributed Database Management Systems, Components, levels of data & process distribution, transparency features, data fragmentation, data replication, Client Server Systems, Principles, components, ODBC, ADO, JDBC and JSQL overview. **[No. of Hrs.: 12]**

TEXT BOOKS:

1. C. J. Date, "Introduction to Database Systems", AWL.
2. J. L. Warrington , "Object Oriented Database Design", Morgan Kaufman.
3. T. J. Tewrey, "Database Modeling and Design", Morgan Kaufman.

REFERENCES:

1. DB2, Oracle & SQL Server Documentation.

Code No. MCA 309 **L T C**
Paper: Numerical and Scientific Computing **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *This course responds to the needs of the engineering and physical sciences curricula by providing an applications-oriented introduction to numerical methods/analysis. Rather than a pure discussion and analysis of methods, we shall often integrate a discussion of the properties of engineering and physical problems with the discussion of methods by which such problems may be solved numerically. This approach is more "natural" and more like the one students actually follow when applying numerical methods within their areas of interest.*

PRE-REQUISITE:

- Basic of Mathematics

UNIT - I

Floating Point Arithmetic: Representation of floating point numbers: Operations, Normalization, Pitfalls of floating point representation. Errors in numerical computation. Solution of Transcendental and Polynomial Equations: Zeros of a single transcendental equation and zeros of a polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton-Raphson method. Rate of convergence of Iterative methods. Methods for finding complex roots. **[No. of Hrs.: 10]**

UNIT - II

Systems of Linear equations:Solutions of systems of Linear equations. Gauss Elimination: Direct method and pivoting. LU-decomposition method, Gauss Seidal iterative method, Rate of Convergence of Gaus Seidal method, Ill Conditioned system of equations, Refinement of solutions. Interpolation and Approximation:Langrange's Interpolation, Newton Divided difference method. Finite Differences, Polynomial Interpolation**:** Newton's forward and backward formula, Central Difference Formulae: Gauss forward and backward formula, , Everett's formula. Hermite's Interpolation. Approximation of function by Taylor's series and Chebyshev polynomial. **[No. of Hrs.: 10]**

UNIT - III

Numerical Differentiation and Integration:Introduction to Numerical Differentiation. Numerical Integration: Trapezoidal rule, Simpson's rules, Boole's Rule, Weddle's Rule, Gauss quadrature formulas, Romberg's integration,.Numerical Solution of Ordinary Differential Equations: Picard's Method, Taylor's series method, Euler's Method, Modified Euler's method, Runge-Kutta (RK) methods: second and fourth order RK methods, Automatic error monitoring, stability of solution. Boundary value problems: Finite Difference method. **[No. of Hrs.: 12]**

UNIT - IV

Method of least squares, fitting of straight lines, polynomials, exponential curves etc, Linear and Non-linear regression, Multiple regression, Moving averages, smoothening of curves. Random Sampling, Sampling distributions: Mean, Variance, Difference of Means, and Proportions. Parameter Estimation: method of Moments, Maximu m Likelihood Estimation, Interval Estimation. Hypothesis Testing: Mean, Variance,

Difference of Means, Proportions. Chi-square Test for best fit. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. Curtis F. Gerald and Patrick O. Wheatley, " Applied Numerical Analyses" , Prientice Hall, 1984.
2. D. Kincaid and W. Cheney, "Numerical Analysis: Mathematics of Scientific Computing", Thomson/Brooks Cole, 1991.
3. D. Kincaid and W. Cheney, "Numerical Analysis" , Thomson/Brooks-Cole., 2002.

REFERENCES:

1. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations ", New Age Int.
2. Grewal B. S., "Numerical methods in Engineering and Science", Khanna Publishers, Delhi.
3. T. Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods", TMH.
4. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH.
5. Francis Scheld, "Numerical Analysis", TMH.

Code No.: MCA 311 **L T C**
Paper: Software Project Management **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *Software Project Management provides insight to the importance of careful project management. Topics are presented in the same order that they appear in the progression of actual projects and covers the following concepts.*
The course will introduce and develop the concepts that are seen as central to the effective management of software projects.
Basic measurements are presented with examples from real-world projects, which show how a project can be monitored, controlled and assessed.

PRE-REQUISITE:

- Software Engineering Concepts
- Academic Project

UNIT - I
Introduction: Introduction to software project management and control Whether software projects are different from other types of projects. The scope of project management. The management of project life cycle. Defining effective project objectives where there are multiple stakeholders. Software Tools for Project Management.
Project Planning: Creation of a project plan -step by step approach, The analysis of project characteristics in order to select the best general approach, Plan Execution, Scope Management, Use of Software (Microsoft Project) to Assist in Project Planning Activities. **[No. of Hrs.: 10]**

UNIT - II
Project Scheduling: Time Management, Project Network Diagram, Critical path Analysis, PERT, Use of Software (Microsoft Project) to Assist in Project Scheduling.
Project Cost Management: Resource planning, Cost Estimation (Types, Expert Judgment, Estimation by Analogy, COCOMO). **[No. of Hrs.: 12]**

UNIT - III
Project Quality Management: Stages, Quality Planning, Quality Assurance, Quality Control, Quality Standards, Tools and Techniques for Quality Control.
Project Human Resource Management: Definition, Key to managing People, Organization Planning, Issues in Project Staff Acquisition and Team Development, Using Software to Assist in Human Resource Management, Communication Planning, Information Distribution, Performance Reporting. **[No. of Hrs.: 10]**

UNIT - IV
Project Risk Management: Common Sources of Risk in IT projects, Risk Identification, Risk Quantification, Risk Response Development and Control.
Project Procurement Management: Procurement Planning, Solicitation, Source Selection, Contract Administration.
Introduction to Project Management Process Groups, Project Controlling and Configuration

Management. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. Bob Hughes, Mike Cotterell, "Software Project Management" Tata McGraw-Hill, 3rd Ed.
2. Pankaj Jalote, " Software Project Management in Practice", Pearson Education, 3rd Ed. , 2010.
3. Kathy Schwalbe ,"Information Technology Project Management, THOMSON Course Technology, " International Student Edition, 2003.
4. Elaine Marmel, "Microsoft Office Project 2003 Bible", Wiley Publishing Inc.

REFERECES:

1. S.A. Kelkar, "Software Project Management - A Concise Study", PHI, Revised Edition, 2003.
2. Demarco T. and Lister T., " Peopleware: Productive Projects and Teams", Dorset House, 2nd Ed. ,1999.
3. Henry, J., "Software Project Management – A Real-World Guide to Success", Addison-Wesley, 2004.
4. Ince D., Sharp H. and Woodman M. , "Introduction to Software Project Management and Quality Assurance", McGraw-Hill., 1993.
5. Maylor, H., "Project Management", PHI, 3rd Ed., 2002.
6. Robert T. Futrell, "Quality Software Project Management", Pearson, 2010.
7. Bentley C. , "PRINCE2: A Practical Handbook", NCC Blackwell, 2002.
8. Robert T. Futrell, "Quality Software Project Management", Pearson, 2010.

Code No. MCA 313 **L T C**
Paper: Multimedia Technologies **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *As technology advances and hardware and software improves, it becomes much more feasible to integrate multimedia directly into classroom activities and the core curriculum. Understanding why, when, and where multimedia is appropriate and beneficial is the first step toward successful implementation.*

- *To study the graphics techniques and algorithms.*
- *To study the multimedia concepts and various I/O technologies.*
- *To enable the students to develop their creativity*

PRE-REQUISITE:

- Multimedia Application

UNIT – I

Introductory Concepts: Multimedia – Definitions, CD-ROM and the Multimedia Highway, Uses of Multimedia, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia, Multimedia skills and training, Training opportunities in Multimedia. Multimedia-Hardware and Software: Multimedia Hardware – Macintosh and Windows production Platforms, Hardware peripherals – Connections, Memory and storage devices, Media software – Basic tools, making instant multimedia, Multimedia software and Authoring tools. **[No. of Hrs.: 10]**

UNIT – II

Multimedia – making it work – multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression: Different algorithms concern to text, audio, video and images etc., Working Exposure on Tools like MAYA. **[No. of Hrs.: 16]**

UNIT – III

Multimedia and the Internet: History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW – Web Servers, Web Browsers, Web page makers and editors, Plug-Ins and Delivery Vehicles, VRML, Designing for Multimedia Applications – Media Communication. **[No. of Hrs.: 08]**

UNIT – IV

Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Assembling and delivering a project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM technology. **[No. of Hrs.: 08]**

TEXT BOOKS:

1. Steve Heath, "Multimedia & Communication Systems", Focal Press, UK, 1999.
2. Tay Vaughan, "Multimedia: Making it work", TMH, 1999.
3. K. Andleigh and K. Thakkar, "Multimedia System Design", PHI, PTR, 2000.

REFERENCES:

1. Keyes, "Multimedia Handbook", TMH, 2000.
2. Ralf Steinmetz and Klara Naharstedt, "Multimedia: Computing, Communications & Applications", Pearson, 2001.
3. Steve Rimmer, "Advanced Multimedia Programming", PHI, 2000.
4. Ze-Nian Li. and Mark S. Drew, "Fundamentals of Multimedia", PHI, 2010.

Code No. MCA 315 **L T C**
Paper: Mobile Computing **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *This course will cover a broad selection of topics in data communications, resource management, network protocols, distributed computing, information management, user interfaces, applications/services, and security. Students will learn the principles of Mobile Computing and its enabling technologies, and explore a young but rich body of exciting ideas, solutions, and paradigm shifts*.

PRE-REQUISITE:

- Operating Systems
- Networking
- Distributed Computing.
- Programming skill in C/C++

UNIT - I

Cellular Mobile Wireless Networks: Systems and Design Fundamentals, Propagation Models Description of Cellular system, Frequency Reuse, Co channel and Adjacent channel interference, Propagation Models for Wireless Networks, Multipart Effects in Mobile Communication, Models for Multipart Reception Evolution of Modern Mobile Wireless Communication System - First Generation Wireless Networks, Second Generation (2G) Wireless Cellular Networks, Major 2G standards, *2.5G* Wireless Networks, Third Generation 3G Wireless Networks, Wireless Local Area Networks (WLANs), All-IP Network: Vision for 4GIssues in Mobile computing, Wireless Multiple Access protocols , channel Allocation. **[No. of Hrs.: 12]**

UNIT – II

Data management issues: mobility, wireless communication and portability, data replication Schemes , basic concept of multihopping, Adaptive Clustering for mobile Network , Multicluster Architecture. **[No. of Hrs.: 10]**

UNIT – III

Location Management: Introduction**,** Location Based Services , Automatically Locating Mobile Users, Locating and Organizing Services, Is Use and future directions, mobile IP, Comparison of TCP wireless. **[No. of Hrs.: 10]**

UNIT - IV

Transaction management: Introduction, Data Dissemination, Cache Consistency, Mobile transaction processing, mobile database research directions, Security fault tolerance for mobile N/W. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. Schiller, “Mobile Communications”, Pearson.

2. Shambhu Upadhyaya, Abhjeet Chaudhary, Keviven Kwiat,Mark Weises, “Mobile Computing”, Kliuwer Acadmic Publishers.
3. UIWE Hansmann, Other Merk , Martin-S-Nickious, Thomas Stohe, “Principles of Mobile computing”, Springer international Edition.

REFERENCES:

1. C. K. TOH , “Mobile Adhoc Networks”, TMH.
2. Sipra DasBit, Biplab K. Sikdar, “Mobile Computing, PHI, 2009.
3. Kumkum Garg, “Mobile Computing”, Pearson.

Code No. MCA 317 **L T C**
Paper: Artificial Intelligence **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE:*This course covers the issues and techniques involved in the creation of computer systems that engage in intelligent behaviour. Students will explore problem-solving paradigms, logic and theorem proving, search and control methods, and learning.*
Learning outcome of this course is

- *Introducing students to the basic concepts and techniques of Artificial Intelligence.*
- *Learning AI by doing it, i.e. developing skills of using AI algorithms for solving Practical problems.*

PRE-REQUISITES:

- Discrete Mathematic
- Analysis of Algorithms

UNIT- I

Intelligent Agents – Agents and environments - Good behavior – The nature of environments – structure of agents - Problem Solving - problem solving agents – exa mple problems – searching for solutions – uniformed search strategies - avoiding repeated states – searching with partial information. **[No. of Hrs.: 10]**

UNIT- II

Informed search and exploration – Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments - Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems - Adversarial Search – Ga mes – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an elemen t of chance. **[No. of Hrs.: 12]**

UNIT- III

First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution – Knowledge representation - Ontological Engineering - Categories and objects – Actions - Simu lation and events - Mental events and mental objects. **[No. of Hrs.: 10]**

UNIT -IV

Learning from observations - forms of learning - Inductive learning - Learn ing decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning – Explanation base learning – Learn ing using relevant information – Inductive logic programming – Statis ical learning methods - Learn ing with complete data - Learn ing with hidden variable - EM algorithm – Insta ce based learning - Neural networks - Reinforcement learning – Passive reinforcement learning - Active r inforcement learning - Generalization in reinforcement learning.

[No. of Hrs.: 10]

TEXT BOOK:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach ", Pearson, 2nd Ed.
2. D. W. Paterson, "Introduction to Artificial Intelligence and Expert System", PHI, 2009.
3. George F. Luger, "Artificial Intelligence- Structures and Strategies For Complex Problem Solving", Pearson Education, 5th Ed., 2010.
4. Elaine Rich and Kevin Knight, "Artificial Intelligence ", Tata McGraw-Hill.
5. Michel Negneritsky, "Artificial Intelligence: A Guide to Intelligent System", Addison Wesley, 2nd Ed.

REFERENCES:

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis ", Narosa.
2. R. J. Schalloff, "Artificial Intelligence –An Engineering Approach", McGraw Hills, International Ed. , Singapore,1992.
3. M. Savi Kumar, S. Ramani, "Rule Base Expert System", Narosa Publishing House.
4. Rejendra Akerkar, "Introduction to Artificial Intelligence", PHI, 4th Ed., 2009.
5. Joseph C. Giarratano, Gary D. Riley, "Expert System Principles and Programming", Cengage Learning, 3rd Ed., 2009.

Code No. MCA 319 **L T C**
Paper: Microprocessors **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE:*The objective of this course is to introduce students to features and technology of microprocessor systems. Gain experience in assembly language programming of microproessor peripherals and interrupt service routines, as well as data processing tasks.At the end of the course the student should:*

- *Know basics of microprocessor-based Systems.*
- *Know basics of assembly language.*
- *Know the process of compilation from high level language to assembly language to machine language.*
- *Know interaction between hardware and software, i.e. `interfacing'.*

PRE-REQUISITE:

- Digital Systems Fundamentals
- Assembly Language Programming
- Electronics

UNIT – I

Computer Number Systems, Codes, and Digital Devices: Computer Number Systems and Codes, Microprocessor Evolution and Types, the 8086 microprocessor family-overview, 8086 internal architecture, introduction to programming the 8086, addressing modes of 8086.8086 Family Assembly Language Programming: Program Development Steps, Constructing the machine codes for 8086 instructions, writing programs for use with an assembler, assembly language program development tools. **[No. of Hrs.: 10]**

UNIT – II

Implementing Standard Program Structures in 8086 Assembly Language: Simple Sequence Programs, Jumps, Flags, and Conditional Jumps, If-Then, if-then-else, and multiple if-then else programs, while-do programs, while-do programs, repeat-until programs, instruction timing and delay loops Strings, Procedures, and macros: the 8086 string instructions, writing and using procedures, writing and using assembler macros 8086 Instruction Descriptions and Assembler Directives. **[No. of Hrs.: 11]**

UNIT – III

8086 System Connections, Timing, and Troubleshooting: A basic 8086 microcomputer System, An example Minimum-mode System, the SDK-86, Troubleshooting a simple 8086- based microcomputer, Timing Diagrams 8086 Interrupts and Interrupt Applications: 8086 interrupts and Interrupt Responses, Hardware Interrupt Applications. **[No. of Hrs.: 11]**

UNIT – IV

Interfacing 8086 with 8255, 8254, 8259, 8253, 8251, 8259, 8279.

Brief Introduction to Architecture of 80186, 80286, 80386, 80486, 8087 and Pentium architecture. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. D. V. Hall, "Microprocessors and Interfacing", TMH, 2nd Ed., 1999
2. Barry B, "The Intel Microproccessors Architecture, Programming and Interfacing", Pearson, 8th Ed., 2009.
3. John Uffenbeck, "The 8086 / 8088 Family Design Programming and Interfacing", PHI, 2009.

REFERENCES:

1. Peter Able, "IBM PC Assembly Language Programming", PHI, 1994.
2. James. L. Antonaks, "An Introduction to the Intel Family of Microprocessors", Addison Wesley, 1999.
3. Liu Gibson, "Microprocessor Systems: The 8086/8088 Family Architecture, Programming & Design", PHI, 1999.
4. Walter A. Triebel, Avtar Singh, "Programming Interfacing Software Hardware and Applications", Pearson, 4th Ed., 2009.
5. Frank Tsui, Orlando Karan, "Essentials of Software Engineering", Jones and Bartletts, 2nd. Ed., 2010.

Code No. MCA 321 **L T C**

Paper: Compiler Design **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *This course develops the mathematical basis for syntax specification and translation and shows how this basis can be used to design and implement compilers? Learning outcomes of this course are:*

- *To stimulate deeper learning of algorithms and data structures by practicing compiler writing algorithm.*
- *To develop Skills to use Tools like Lex and YACC in writing scanners and parsers.*
- *To develop a cross-compiler.*

PRE-REQUISITES

- Programming Language
- Theory of Computation
- Design and Analysis of Algorithms
- Computer Organization

UNIT - I

Compiler Structure: Analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction. Lexical analysis: Interface with input parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, error reporting and implementation. Regular grammar & language definition, Transition diagrams, design of a typical scanner using LEX or Flex. **[No. of Hrs.: 10]**

UNIT - II

Syntax Analysis: Context free grammars, ambiguity, associability, precedence, top down parsing, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing LL(1) grammar, Nor LL(1) grammar, Bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), Design of a typical parser using YACCor Bison. **[No. of Hrs.: 10]**

UNIT - III

Syntax directed definitions: Inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions. Type checking: type: type system, type expressions, structural and name equivalence of types, type conversion, overloaded function and operators, polymorphic function. Run time system: storage organization, activation tree, activation record, parameter passing symbol table, dynamic storage allocation. Intermediate code generation: intermediate representation, translation of declarations, assignments, Intermediate Code generation for control flow, Boolean expressions and procedure calls, implementation issues. **[No. of Hrs.: 12]**

UNIT - IV

Code generation and instruction selection: Issues, basic blocks and flow graphs, register allocation, code generation, DAG representation of programs, code generation from DAGS, peep hole optimization, code generator generators, specification of machine.

Code optimization: source of optimizations, optimization of basic blocks, loops, global dataflow analysis, solution to iterative dataflow equations, code improving transformations, dealing with aliases, data flow analysis of structured flow graphs. **[No. of Hrs: 10]**

TEXT BOOKS:

1. K. C. Louden, "Compiler Construction, Principle and Practice", Cengage Publication 6th Ed. ,2009.
2. Alfred V. Aho, Ravi Sethi and Jeffrey, "Compilers Priciples, Techniques and Tools", D. Ullman, Pearson, 1998.
3. V.Raghvan, "Principles of compiler Design", TMH, 2009.
4. Levine, Mason and Brown, "Lex & Yacc", O' Reilly, 1998.

REFERENCES:

1. S. S. Muchnick Harcourt Asra, "Advanced Compiler Design implementation", Morgan Kaufman, 2006.
2. Allen,"Modern Compiler Implementation in C", Cambridge Uty. Press 1997.
3. Alan I. Holub, "Compiler Design in C", PHI, 2009.
4. VinuV. Das,"Compiler Design using FLEX and YACC", PHI, 2005.
5. Cooper, "Engineering a Compiler", Elsevier, 2005.
6. Fisher, "Crafting a Compiler in C", Pearson 2005.

Code No. MCA 323 **L T C**

Paper: Operational Research **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: *This course is to equip students with the ability of conceptualization of real life systems in the form of mathematical models. Learning Outcome of this course are:*

- *Understanding of Principles of model building and basic optimization concepts.*
- *To Develop skills to deploy these concepts indiverse fields of application in manufacturing /service/ distribution systems.*

PRE-REQUISITES:

- Design and Analysis of Algorithms
- Programming Language

UNIT-I

Introduction to operations research, Overview of OR modeling. Linear Programming (LP): Assumptions of LP models, LP problem formulation, Graphical_methods for solving LP problems. The Simplex method, Big M-method and Two-Phase simplex method, Duality: Definition of the dual problem, relationship between the primal and dual solutions, Economic interpretation of duality, the dual Simplex method, sensitivity analysis. Transportation and Assignment problems. Integer programming models, Cutting Plane method, Branch and Bound method.

[No. of Hrs: 11]

UNIT-II

JobSequencingModels:Sequencing problems, Johnson's algorithm for processing *n* jobs on two machines and *n* jobs on three machines, Processing 2 jobs on *n* machines using graphical method. Review of Network models, minimal spanning tree algorithm, and shortest route problems: Dijkstra's algorithm, Maximal flow model, maximal flow algorithm, min-cut, min-cut Max-flow theorem. **[No. of Hrs: 11]**

UNIT-III

Project Scheduling by CPM/PERT: Designing an activity network, Critical path calculations, Determination of floats, Program Evaluation and Review Technique (PERT). Cost-Time analysis of projects : crashing activities in a project. **[No. of Hrs: 10]**

UNIT-IV

Queuing systems, Elements of queuing model, role of exponential distribution, birth and death models, steady statemeasures of performance, single server models ,multiple-server models, machine servicing model, Pollaczek-Khintchine formula, queuing decision models. Multi criteria Decision making, Introduction to Game theory, Zero-sum Game. **[No. of Hrs: 10]**

TEXT BOOKS:

1. H. Taha, "Operations Research: An Introduction", PHI, 8th Ed., 2009.
2. Hilier and Liebermann, "Introduction to Operations Research", McGraw-Hill, 8th Ed., 2009.

3. Wayne Winston, “Operations Research: Applications and Algorithms”, Cengage, 4th Ed., 2009.

REFERENCES:

1. J. K. Sharma, “Operation Research Theory and Applications”, 3rd Edition, Macmillan, India.
2. Paul A. Jensen, “Operations Research Models and Methods”, John Wiley, 2003.
3. G. Srinivasan, “Operational Research Principles and Applications”, PHI, 2nd Ed., 2008.
4. A.M. Natarajan, P. Balasubramani, A. Tamilarasi, “Operational Research”, Pearson, 4th Ed., 2009.

Code No. MCA 325 **L T C**
Paper: Distributed DBMS And Object Oriented Databases **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIV: *An in-depth study of design and implementation issues in distributed database systems, together with a coverage of Database distribution architectures ,Distributed database design, Distributed query processing, Distributed query optimization, Distributed transaction management, Distributed concurrency control, Distributed reliability protocols and Multi-database systems.*

PRE-REQUISITE

- Database Management System
- Distributed Systems

UNIT – I

Distributed DBMS features and needs, Reference Architecture, Levels of Distribution Transparency, Replication, Distributed database design – Fragmentation, allocation criteria, Storage mechanisms, Translation of Global Queries / Global Query Optimization, Query Execution and access plan. **[No. of Hrs.: 12]**

UNIT – II

Concurrency control – 2 phase locks, distributed deadlocks, time based and quorum based protocols, comparison reliability – non-blocking commitment protocols, Partitioned networks, Check points and Cold starts. **[No. of Hrs.: 10]**

UNIT – III

Management of Distributed Transactions – 2 phase unit protocols, Architectural aspects, Node and link failure recoveries, Distributed data dictionary management, Distributed database administration. **[No. of Hrs.: 10]**

UNIT – IV

Heterogeneous database-federated database, reference architecture, loosely and tightly coupled, Alternative architectures, Development tasks, operation – global task management, Client server databases – SQL server, Open database connectivity, Constructing an Application.

Advance Database Concept:

Object Oriented Databases Introduction, Advantages and Disadvantages, Spatial Databases, Multimedia Databases, Deductive Databases, Temporal Databases. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. S. Ceri, G. Pelagatti, "Distributed Database: Principles and Systems", McGraw Hill, New York, 1985.
2. M. Tamer Ozsu, Patrick Valduriez, "Principles of Distributed Databases System", Pearson, 2nd Ed., 2009.

REFERENCES:

1. Lin Wujuan, Veeravalli Bhardwaj, "Object Management is Distributed Database Systems", Kluwer Academic Publishes, UK, 2003.
2. V. K. Jain, "Advanced DBMS", Cyber Tech Publications, 2001.
3. Mario Piattini, "Advanced Database Technology and Design", Artech House, UK, 2000.
4. Shivendra Goel, Divya Goel, " Distributed Database Management System", Sun India Publications, 2009.
5. Chhanda Ray, "Distributed Database System", Pearson, 2009.

Code No. MCA 327 **L T C**
Paper: Financial Accounting **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *Any organization that deals with money or money's worth needs to record every transaction that it enters into. The courses in this product give a complete understanding, right from scratch to preparation and analysis of financial statements. Th product is supplemented with a number of interactive exercises, in accordance with the 'learn by doing' approach.*
After completing this course you will be conversant with:

- *Accounting Concepts.*
- *Accounting Equation.*
- *Rules of Accounting.*
- *Recording the transactions.*
- *Adjusting & Rectifying the books.*
- *Preparation of Financial Statements.*
- *Analyzing Financial Statements.*
- *Reconciling the books.*

PRE-REQUISITE:

- Mathematical Concepts

UNIT - I

Meaning and Scope of Accounting: Need for Accounting, Definition and Functions of Accounting, Book Keeping and Accounting, Is Accounting Science or Art? End User of Accounting Information, Accounting and other Disciplines, Role of Accountant, Branches of Accounting, Difference between Management Accounting and Financial Accounting
Meaning of Accounting Principles: Accounting Concepts, Accounting Conventions, Introduction to Accounting Standards, Systems of Book Keeping, Systems of Accounting
Journalising Transactions: Journal, Rules of Debit and Credit, Compound Journal Entry, Opening Entry
Ledger Posting and Trial Balance: Ledger, Posting, Relationship between Journal and Ledger, Rules Regarding Posting, Trial Balance
Sub-Division of Journal: Cash Journal, Petty Cash Book, Purchase Journal, Sales Journal, Sales Return Journal
Capital and Revenue: Classification of Income, Classification of Expenditure, Classification of Receipts
Rectification of Errors: Classification of Errors, Location of Errors, Suspense Account, Rectifying Accounting Entries, Effect on Profit **[No. of Hrs: 12]**

UNIT – II

Depreciation Provisions and Reserves: Concept of Depreciation, Causes of Depreciation, Basic Features of Depreciation, Meaning of Depreciation Accounting, Objectives of Providing Depreciation, Fixation of Depreciation Amount, Methods of Recording and Providing Depreciation, AS-6(Revised) Depreciation Accounting

Final Accounts: Manufacturing Account, Trading Account, Profit and Loss Account, Balance Sheet, Simple Adjustment Entries **[No. of Hrs: 10]**

UNIT – III

Inventory Valuation: Meaning of Inventory, Objectives of Inventory Valuation, Inventory Systems, Methods of Valuation of Inventories

Accounting Standard 2 (Revised): Valuation of Inventories

Accounts of Non-profit Making Organizations: Receipts and Payments Account, Income and Expenditure Account, Balance Sheet, Items Peculiar to Non-trading Concerns **[No. Of Hrs: 10]**

UNIT – IV

Company Final Accounts: Familiarity with the requirements of Schedule VI to the Companies Act 1956, Elementary Knowledge about Items in the Profit & Loss Account and Balance Sheet of a Company, (Preparation of Company Final Accounts not required)

Financial Statements - Analysis and Interpretation: Meaning and Types of Financial Statements, Nature of Financial Statements, Limitations of Financial Statements, Analysis and Interpretation of Financial Statements, Steps involved in Financial Statement Analysis, Ratio Analysis, Classification of Ratios, Profitability Ratios, Turnover Ratios, Financial Ratios, Advantages of Ratio Analysis, Limitations of Ratio Analysis. **[No. of Hrs: 10]**

TEXT BOOKS:

1. Dr. S. N. Maheshwari & Dr. S. K. Maheshwari, "An Introduction to Accountancy", Vikas Publication, 8th Ed. 2003.
2. R. L. Gupta & V.K. Gupta, "Principles and Practice of Accountancy", Sultan Chand & Sons, 1999.

REFERENCES:

1. R. N. Anthony & J. S. Reece "Accounting Principles", Homewood, Illinois, Richard D Irwin, 6TH Ed., 1995.
2. P. K. Ghosh and G. S. Gupta, "Fundamentals of Management Accounting", New Delhi, 1988.
3. Dr. S. N. Maheshwari & Dr. S. K. Maheshwari "Advanced Accountancy", Vikas Publishing House, 8th Ed., 1984.
4. L. E. Heitger and Serge Matulich, "Financial Accounting", New Delhi, McGraw Hill, 1990.
5. B. K. Baneyee, "Financial Accounting - A Dynamic Approach, PHI, 2nd Ed., 2010.
6. P. C. Tulsian, "Financial Accounting", Pearson, 4th Ed., 2009.
7. Charles Horngren, "Principles of Financial & Management Accounting", Englewood Cliffs, New Jersey, 9thEd., 2009.
8. Atkinson, Banker, Kaplam & Young, "Management Accounting", Prentice Hall, 5th Ed. 2009.
9. N.L. Hingorani an A.R. Ramanathan, "Management Accounting", New Delhi, Sultan Chand, 2009

Code No.: MCA 329 **L T C**
Paper: Organizational Behavior & Management Principles **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *Effective management of Human Resources is one of the prerequisites of a successful organization, especially in the present day context of an evolving changing and competitive environment. Organizational effectiveness depends largely on its ability to manage the human behavior. A proper understanding of organizational dynamics and the various management concepts is essential for every manager. The objective of this paper is to provide understanding to the participants in understanding, predicting, and managing people at workplace through motivation, leadership, culture, performance management, career planning & development and stress management. Upon completion of this course, the students should be able to:*

- *Explain and apply principles of organizational behavior and management.*
- *Understanding management and organizational behavior with reference to key organizations in the IT sector- Apple, Intel, Cisco, Infosys, Google, IBM.*
- *Identify individual and organizational practices for managing workplace stress.*
- *Understand group dynamics, and specifically the way individuals within a group work together to attain certain goals.*
- *Understand organizational culture and managing change in organizations.*

PRE-REQUISITE:

- Concept of Formal and Informal Organization Management

UNIT - I

Introduction to OB and Management Principles

Conceptual Framework; Challenges and Opportunities for OB ;Managerial Implications ;Evolution of Management Principles ; Scientific Management Theories ; Taylor and Scientific Management, Fayol's Administrative Management, Bureaucracy, Hawthorne Experiments and Human Relations, Social System Approach ;Management Vs. Administration, Management Skills, Levels of Management, Characteristics of Quality Managers. Evolution of Management: Early contributions. **[No. of Hrs : 12]**

Tutorial : [No. of Hrs: 04]
2 Article Review Presentations

UNIT - II

Planning: Types, Process & barriers, Management by Objectives; Organizational context of decisions, Types & process of decision making ; Controlling; Organizing: Concept, Organisation Theories, Forms of Organisational Structure, Combining Jobs: Departmentation, Span of Control, Delegation of Authority, Authority & Responsibility, Staffing: Concept, System Approach, Manpower Planning, Job Design, Recruitment & Selection, Training & Development

[No. of Hrs.; 10]

Tutorial : [No. of Hrs: 41
Case 1: HBS case John Chambers – CISCO's Driving Force.
Case 2 : Larry Ellison - The Source of Oracle Wisdom, HBS case.

UNIT - III

Organizational structure & Design, Organizational Designs; Emerging Design Options Different Organizational Structures; Organizational Culture (creation and sustenance of cultures) , Importance of Culture; Managing Culture; High performance culture, Learning organizations, Orgnaizational climate, Total Quality Management, Techniques of TQM, Re-engineering, Empowerment, Benchmarking, Downsizing, Controlling: Concept, Types of Control, Methods: Pre-control: Concurrent Control: Post-control, An Integrated Control System, Model for Managing Change, Forces for Change, resistance to change,Management of resistance.

[No. of Hrs.; 10]

Tutorial : [No. of Hrs: 04/week]

Case 1 : Case of Infosys (Learning Organisation) ICMR-LDEN003- ECCH-402-017-1

Case 2 : Case of Google culture.

Case 3: Article : Louis Gerstner The Man Who Turned IBM Around' ICMR LDEN007,ECCH-803-018-1 (2003).

Case 4 : Inside Intel Inside HBS-9-502-083 (October 2009).

UNIT - IV

Individual Determinants of organizational, Behaviours; Motivation, Motivation and Performance, Theories Of Motivation, Approaches for Improving Motivation, Pay and Job Performance, Quality of Work Life, Morale Building, Performance Appraisal, Job Anxiety & Stress, Analysing, Interpersonal relations, Group Dynamics, Management of Organizational Conflicts, Management of Change, Leadership Styles & Influence Ethics and leadership.

[No. of Hrs.; 10]

Tutorial : No. of Hrs: 04/week]

Case1 : Apple Inc. HBS (February 29, 2008) Yoggie David B. Sturd Michael ; N9-708-480

Case2: Article Review : Leadership the Bill Gates Way –HBS case. [No. of Hrs: 01]

TEXT BOOKS:

1. Stephen P. Robbins, David & Decenzo, "Fundamentals of Management", Pearson Education, 9th Ed. , 2008.
2. Singh & Chabra, "Organization Theory & Behavior", Educational & Technical Publisher, 2005.
3. T.N. Chhabra, R. K. Chopra and Archana Despande, "Leading Issues in Management & Organizational Behavior (Text & Cases)", Sun India Publications, 2009.
4. Prasad L. M, "Principles of Organizational Behavior and Management", 2001.
5. Robbins, S. P., Judge, T. A. and Sanghi. S, "Organizational Behavior", Pearson, 2009.

REFERENCES:

1. Stoner, et. al., "Management", PHI, 6th Ed., 2002.
2. J. S. Chandan, "Organizational Behavior", Vikas Publishing House, 2004.
3. Joseph W. Weiss, "Organizational Behavior & Change, Managing Diversity, Cross-Cultural Dynamics & Ethics", Vikas Publishing House, 2nd Ed. 2001.
4. Richard Pettinger, "Introduction to Management", Palgrave McMillan , 3rd Ed., 2002.
5. Udai Pareek, "Understanding Organizational Behavior", Oxford University Press 1st Ed., 2004.
6. Fred Luthans, "Organizational Behavior," McGraw Hill International Edition, 9th Ed., 2002.
7. Kavita Singh, "Organization Behavior Text and Cases", Pearson, 2010.

Code No. MCA 331 **L T C**
Paper: Advanced Computer Architecture **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *The objective of this course is to introduce the fundamental techniques on which high-performance computing is based, to develop the foundations for analysing the benefits of design options in computer architecture, and to give some experience of the application of these techniques. It should be noted t*hat the use of parallelism is secondary to the objective of achieving high performance.

PRE-REQUISITE :

- Computer Organization

UNIT – I

Parallel computer models: The state of computing , Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks
Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms. **[No. of Hrs.: 10]**

UNIT - II

System Interconnect Architectures: Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.
Processors and Memory Hierarchy: Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors.
Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology. **[No. of Hrs.: 11]**

UNIT - III

Backplane Bus System: Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, Direct mapping and associative caches.
Pipelining : Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines. **[No. of Hrs.: 11]**

UNIT - IV

Vector Processing Principles: Vector instruction types, Vector-access memory schemes.
Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. Kai Hwang, “Advanced computer architecture”; TMH, 2000.
2. M. J. Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”, Narosa Publishing, 1998.

REFERENCES:

1. J. P. Hayes, “Computer Architecture and Organization”, MGH, 1998.
2. D. A. Patterson, J. L. Hennessy, “Computer Architecture: A Quantitative Approach”, Morgan Kauffmann, 2002.
3. Hwang and Briggs, “Computer Architecture and Parallel Processing”, MGH.
4. Richard Y. Kain, “Advance Computer Architecture - A System Design Approach”, PHI, 1996.

Code No.: MCA 333 **L T C**
Paper: Software Quality Management **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE*: This course covers the issues and techniques related to the Quality Management of software. The course will be helpful for the students and to get acquaint with the industry prespective towards software Quality. The content covers:*

- *Basic Concepts of Software Quality.*
- *Software Quality Assurance.*
- *Formal Technical Reviews.*
- *How it can be implemented.*
- *Describe how to conduct formal technical reviews and why they are the most important SQA activity.*

PRE-REQUISITE:

- Concepts of Software Engineering

UNIT - 1

Concepts and Overview: Concepts of Software Quality, Quality Attributes, Software Quality Control and Software Quality Assurance, Evolution of SQA, Major SQA activities, Major SQA issues, Zero defect Software, Elements of a complete Software Quality System.
Software Quality Assurance: The Philosophy of Assurance, The Meaning of Quality, The Relationship of Assurance to the Software Life-Cycle, SQA Techniques. **[No. of Hrs.: 10]**

UNIT - II

Tailoring the Software Quality Assurance Program: Reviews, Walkthrough, Inspection, and Configuration Audits.
Evaluation: Software Requirements, Preliminary design, Detailed design, Coding and Unit Test, Integration and Testing, System Testing, types of Evaluations.
Testing: Types of testing, Test Planning and conduct, Who does the testing? **[No. of Hrs.: 12]**

UNIT - III

Configuration Management: Configuration Management Components, Maintaining Product Integrity, Change Management, Version Control, Metrics, Configuration Management Planning.
Error Reporting: Identification of Defect, Analysis of Defect, Correction of Defect, Implementation of Correction, Regression Testing, Categorization of Defect, Relationship of Development Phases. **[No. of Hrs.: 10]**

UNIT - IV

Defect Analysis: Analyzing concepts, Locating data, Defect Repair and closure, Selecting metrics, Collecting measurements, Quality tools, Implementing defect analysis, Program Unit Complexity.

Corrective Action as to Cause: Identifying the Requirement for Corrective Action, Determining the Action to be Taken, Implementing the Correcting the corrective Action, Periodic Review of Actions Taken.

Traceability, Records, Software Quality Program Planning, Software Quality System Plan, Software Documentation. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. Robert Dunn, "Software Quality Concepts and Plans", Prentice-Hall, 1990.
2. Alan Gillies, "Software Quality, Theory and Management", Chapman and Hall, 1992.
3. John W. Horch , "Practical Guide to Software Quality System", Artech House, 2003.

REFERENCE:

1. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, 3rd Ed., 2008.
2. Daniel Freedman, Gerald Weinberg, "Handbook of Walkthroughs, Inspections and Technical Reviews", Dorset House Publishing, 1990.
3. Tom Gilb, "Principles of Software Engineering Management", Addison-Wesley, 1988.
4. Tom Gilb, Dorothy Graham, "Software Inspection" Addison-Wesley, 1993.
5. Watts Humphrey, "Managing the Software Process", Addison-Wesley, 1990.
6. Watts Humphrey, "A Discipline for Software Engineering", Addison-Wesley, 1995.
7. Arthur Lowell, "Improving Software Quality An Insiders guide to TQM", Wiley & Sons,1993.
8. Mordechai Ben-Menachem, Gary S. Marless,"Software Quality Producing Practical Consistent Software", Cengage Learning, 2nd Ed., 2009.
9. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson, 2nd Ed., 2003.

Code No.: MCA 335 **L T C**
Paper: Digital Signal Processing **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE

This course is an introduction to DSP concepts and implementation. It starts by explaining the need for digital signal processing and DSP systems. A complete model of a DSP system is examined from the input transducer, through all the stages including: signal conditioning, anti-aliasing filter, analog-to-digital and digital-to-analog conversion, output smoothing filter, and output transducer. Correct acquisition of the signal is absolutely necessary for proper use of digital signal processing.

PREREQUISITE

- Digital Electronics
- Operating System

UNIT – I

Discrete time signals and systems, Z-transforms, structures for digital filters, design procedures for FIR and IIR filters. Frequency transformations: linear phase design; DFT. Methods for computing FFT. Noise analysis of digital filters, power spectrum estimation.

Signals and signal Processing: characterization & classification of signals, typical Signal Processing operations, example of typical Signals, typical Signals Processing applications.

Time Domain Representation of Signals & Systems: Discrete Time Signals, Operations on Sequences, the sampling process, Discrete-Time systems, Time-Domain characterization of LTI Discrete-Time systems. **[No. of Hrs: 10]**

UNIT – II

Transform-Domain Representation of Signals: the Discrete-Time Fourier Transform, Discrete Fourier Transform, DFT properties, computation of the DFT of real sequences, Linear Convolution using the DFT. Z-transforms, Inverse z-transform, properties of ztransform, transform domain representations of random signals, FFT.

Transform-Domain Representation of LTI Systems: the frequency response, the transfer function, types of transfer function, minimum-phase and maximum-Phase transfer functions.

[No. of Hrs: 12]

UNIT – III

Digital Processing of continuous-time signals: sampling of continuous signals, analog filter design, anti-aliasing, filter design, sample-and-hold circuits, A/D & D/A converter, reconstruction filter design.

Digital Filter Structure: Block Diagram representation, Signal Flow Graph Representation, Equivalent Structures, FIR Digital Filter Structures, IIR Filter Structures. transfer, modes of data transfer, priority interrupt, direct memory access, input-output processor. **[No. of Hrs: 10]**

UNIT – IV

Digital Filter Design: Impulse invariance method of IIR filter design, Bilinear Transform method of IIR Filter Design, Design of Digital IIR notch filters, FIR filter Design based on truncated

fonner sens, FIR filter design based on Frequency Sampling approach. Applications of DSP. **[No. of Hrs: 10]**

TEXT BOOKS:

1. Sanjit K. Mitra, “Digital Signal Processing a Computer based approach”, TMH, 2009.
2. Allan Y. Oppenhein & Ronald W. Schater , "Digital Signal Processing”, PHI, 1975.

REFERENCES:

1. Proakis Manodans, “Digital Signal Processing: Principles, Algorithms and Applications”, PHI, 2003.
2. Vijay K. Madisetti, “The Digital Signal Processing Hand Book”, Butterworth-Heinemann, USA, 1999.
3. Vinay K. Ingle, John G. Proaksis, “Digital Signal Processing - A MATLAB Based Approach”, Cengage Learning, 2009.

Practical will be based on following:

1. Linux Programming Lab **MCA 351**
2. Software Testing Lab **MCA 353**
3. Enterprising Lab **MCA 355**
4. Lab based on Elective-I **MCA 357**

Code No. : MCA 361
Paper: General Proficiency – V*

It is suggested to have a fundamental course Intellectual Property Rights (Software Systems Oriented) in this semester.

This paper is under Non University Examination system its detail content will be decided by the respective Institute, under approval of the coordination committee based on the requirement of individual institution.

***Non University Examination Scheme (NUES)**

There will not be any external examination of the university. The performance of the candidates should continuously be evaluated by an internal committee. The committee may conduct viva-voce at the end for the award of the marks.