

**INSTITUTE OF ADVANCED STUDIES IN
EDUCATION (DEEMED UNIVERSITY)
GANDHI VIDYA MANDIR
SARDARSHAHR**

**DETAILED SYLLABUS
FOR DISTANCE EDUCATION**

**MCA
(Master of Computer Application)
(SEMESTER SYSTEM)
(Three years Post Graduate Degree Programme)**

First Semester

COURSE TITLE	Paper Code	MARKS		
		THEORY	PRACTICAL	TOTAL
Mathematical foundation of computer science	MCA-110	50	50	100
Introduction to IT	MCA -120	50	50	100
Computer programming using C	MCA-130	50	50	100
Data Base Management System	MCA- 140	50	50	100
Management Information System	MCA- 150	50	50	100
Lab (Programming in C)	MCA- 160 P	00	100	100

Second Semester

COURSE TITLE	Paper Code	MARKS		
		THEORY	PRACTICAL	TOTAL
Java Programming	MCA-210	50	50	100
Object oriented programming using C++	MCA -220	50	50	100
Data structure	MCA-230	50	50	100
System software	MCA- 240	50	50	100
Internet & Web technology	MCA- 250	50	50	100
Lab (Data Structure programming in C++)	MCA- 260 P	00	100	100

Third Semester

COURSE TITLE	Paper Code	MARKS		
		THEORY	PRACTICAL	TOTAL
Theory of computation	MCA-310	50	50	100
Software Engineering	MCA -320	50	50	100
Analysis & Design of Algorithm	MCA-330	50	50	100
Visual programming with VB	MCA- 340	50	50	100
. Net Framework & C#	MCA- 350	50	50	100
Lab (Programming in Java)	MCA- 360 P	00	100	100

Fourth Semester

COURSE TITLE	Paper Code	MARKS		
		THEORY	PRACTICAL	TOTAL
Operating System	MCA-410	50	50	100
Computer organization and architecture	MCA -420	50	50	100
Software Verification Validation And Testing	MCA-430	50	50	100
Computer Graphics	MCA- 440	50	50	100
Lab(DBMS)	MCA- 450 P	00	100	100
ELECTIVE-I*	MCA- 460			100

ELECTIVE-I

COURSE TITLE	Paper Code	MARKS		
		THEORY	PRACTICAL	TOTAL
Object oriented design	MCA –(460) E I	50	50	100
E-Commerce	MCA –(460) E II	50	50	100
Numerical Method	MCA-(460) E III	50	50	100

Fifth Semester

COURSE TITLE	Paper Code	MARKS		
		THEORY	PRACTICAL	TOTAL
Computer networks & internet	MCA-510	50	50	100
Artificial intelligence	MCA -520	50	50	100
Java enterprise	MCA-530	50	50	100
Programming lab- v (with java enterprise)	MCA- 540 P	00	100	100

Sixth Semester

COURSE TITLE	Paper Code	MARKS		
		THEORY	PRACTICAL	TOTAL
Project	MCA-610 P	00	100	100
Elective I*	MCA -620			100
Elective II**	MCA-630			100

Elective I*

COURSE TITLE	Paper Code	MARKS		
		THEORY	PRACTICAL	TOTAL
Wireless communication	MCA-620 E 1	00	100	100
Fuzzy logic and neural networks	MCA–620 E2			100
Mathematics	MCA-620 E 3			100

Elective II**

COURSE TITLE	Paper Code	MARKS		
		THEORY	PRACTICAL	TOTAL
Compiler design	MCA-620 E 1	00	100	100
Distributed Operating system	MCA –620 E 2			100
Graph Theory	MCA-620 E 3			100

Note:

Theory Paper : 30% Continuous Internal Assessment and 70% University examination.

Practical Paper : 30% Continuous Internal Assessment and 70% University examination

Continuous Internal Assessment:

- 1) Two or three tests out of which minimum two will be considered for Assessment
60% of Continuous Internal Assessment
- 2) Seminars/Assignments/Quizzes
30% of Continuous Internal Assessment
- 3) Attendance, class participation and behavior
10% of Continuous Internal Assessment

FIRST SEMESTER

MCA- 110 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

A) Instructions for paper-setter

The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section E will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION – A

Sets and Elements, universal set and Empty set, subsets, Venn Diagrams, Set Operations, Algebra of sets, Cartesian product, Relations, mappings, Countable and Uncountable sets, Domain and range, propositional logic, FOPL, Logical equivalences, Quantifiers.

Section – B

Partially ordered sets, Extremal elements of partial ordered sets, least upper bound and greatest lower bound, Finite Boolean algebra, Functions on Boolean algebra, Lattices, Bounded lattices, Distributive lattices, complemented lattices.

Section – C

Matrices, Matrix addition and scalar multiplication, Matrix multiplication, Transpose, Inverse, Determinants, Eigen values and Eigen vectors.
Permutations, Combinations, Pigeon hole principle, Elements of Probability, Conditional probability, Baye's Theorem.

Section – D

Tree, Binary tree, traversals, Huffman's algorithm, Minimum spanning trees, Euler graph, Hamiltonian cycle, Cutsets, Matching, Coloring.

Reference:-

1. C. L. Liu, "Elements of Discrete Mathematics", TMH
2. Lipschutz & Seymour, "Discrete Mathematics", (2Th Edition), Schaum's outlines,.
3. Trembley Manohar, "Discrete Mathematical Structures with Application to computer science", TMH.

MCA- 120 INTRODUCTION TO INFORMATION TECHNOLOGY

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

A) Instructions for paper-setter

The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section E will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Definition of Information Technology, Use of IT, Definition of information system, need of information system, definition of knowledge, Range of application : Scientific, business, educational, whether forecasting, and remote sensing, planning, e-commerce, web publishing, Management Information System, Decision Support System, inventory control, medical, industrial control, banks, railways, etc.

SECTION B

Computer Fundamentals: Block structure of computer, Characteristics of computers, Problem solving with computers, Generation of computers, Classification of computers.

Number System : Bit, Byte, Binary, Decimal, Hexadecimal, and Octal system, Conversion from one system to the other, Error detecting codes, Representation of characters, Integers and fractions.

Binary Arithmetic : Addition, Subtraction and Multiplication.

SECTION C

Input and Output units : Their functional characteristics, main memory , cache memory read only memory, overview of storage devices – floppy disk, hard disk, compact disk, tape.

SECTION D

Computer Networks and Communication : Network types, Network topologies, Network communication devices, Physical communication media, TCP/IP.

Internet and its Applications : E-mail, Telnet, FTP, WWW, Internet chatting.

Reference:-

1. D. H. Sanders, “Computers Today”, McGraw Hill, 1988.
2. T. N. Trainer, “Computers” (4th Edition) McGraw Hill, 1994.
3. Kenneth C. Laudon, Jane P. Laudon “Management Information System”(7th Edition),
4. V. Rajaraman, “Fundamentals of Computers” (2nd Edition), Prentice Hall of India, New Delhi, 1996.
5. B. Ram, “Computer Fundamentals”, Wiley, 1997.

Maximum Time : 3 Hrs.**University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****A) Instructions for paper-setter**

The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section E will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Data types, constants, Variables, Arithmetic and logical expressions, Data input and output, Assignment statements, Conditional statements.

SECTION B

Iteration, Arrays, String processing, User-defined data types, functions, recursion, Parameter passing by reference & by value.

SECTION C

Structures, Multiple Structure, Array of Structure, Unions, Pointers, Character pointers, Pointers to arrays, Array of pointers, Pointers to structures.

SECTION D

File handling, Opening & closing file Binary files, Structured programming concepts, Top down & Bottom-Up design approaches.

Reference:-

1. Rajarman V., "Fundamentals of Computers", (PHI, 1992).
2. D.Dromey, "How to solve it by Computer", Prentice-Hall, 1985.
3. E. Balguruswami "Programming in C" Tata McGraw Hill.
4. Kanetkar, "Let Us C", BPB Publications.

Maximum Time : 3 Hrs.**University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****(A) Instructions for the Paper setter:**

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Database V/s File system, Architecture of DBMS(External, Conceptual, Internal), Data Independence (Logical Physical) DBA and his responsibility, DBMS structure (DDL Compiler, Data manager, File manager, Disk Manager, Query Processor).

SECTION B

Entity, Entity Set, Attributes Keys(Primary, Secondary, Candidate, Super, Alternate), Mapping cardinalities, N-ary relationships, E-R- Diagram, Hierarchical Model ,Relational Model, Network Model, Object oriented Model, Mapping of E-R diagrams to tables.

SECTION C

Anomalies in Design, Functional Dependency, Logical implications, Closure of FD, Canonical Core, Full and Partial FD, Prime and Non-prime attributes, 1-NF, 2-NF, 3-NF, BCNF, Decompositions, lossless and Dependency preservance.

SECTION D

Integrity rules (Entity integrity, Referential Integrity) Union, Difference, Intersection, Cartesian product Division, Projection, Selection, Joins.

Type calculus, Type calculus Formula, Domain calculus, SQL, Basic data retrieval, Data manipulation and table study comments, views,

Recovery techniques, check points, concurrency control, View & conflict serializability, Lock, based concurrency control, strict two phase locking, multiple granularity locking, time stamp based concurrency control.

References:

1. Bipin C. Desai, "An Introduction to Database Systems", Galgotia Publications Nt. Ltd.
2. Elmarni Navathe, "Fundamental of Database Systems", Pearson Edition.
3. C.J. Date, "An Introduction to Database System"(7th Edition) Pearson Edition.

MCA- 150**MANAGEMENT INFORMATION SYSTEM****Maximum Time : 3 Hrs.****University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****A) Instructions for paper-setter**

The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section E will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Organisation, Management and Network Enterprises :- Information system in enterprises, Information system, Organisation, Management and Strategy : The changing role of Information system in organization, Decision making, Business strategy.

SECTION B

Information technology Infrastructure: Computer hardware & Information technology infrastructure, Storage input and output technology, Categories of computer and Computer system, what is software, System software telecommunication and Networks.

SECTION C

Managing knowledge : Knowledge management in organization, Information and knowledge work system. Enhancing management decision making : Decision support system (MIS & DSS, Types of DSS, DSS application and Digital term), Group Discussion Support System (GDSS) What is GDSS, Characteristics of GDSS.

SECTION D

Redesigning the organization with Information system : - Business process reengineering and Total quality management.

Managing international information system : The growth of international information system, Organising international information system managing global system.

Reference:-

1. Management information system (7th Edition) by Kenneth C. Laudon Jone & P. Laudon.

MCA-160 P**PROGRAMMING LAB- (PROGRAMMING IN C)****Maximum Time : 3 Hrs.****University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%**

This laboratory course will mainly comprise of exercises on what is learnt under paper : MCA-130 (Computer Programming using C).

SECOND SEMESTER

MCA- 210

JAVA PROGRAMMING

Maximum Time : 3 Hrs. University Examination : 70 Marks
Total Marks : 100 Continuous Internal Assessment : 30 Marks
Minimum Pass Marks : 40%

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Introduction to Java: Features of Java, difference between Java and C++, data types, variables, arrays, operators-arithmetic, bitwise, relational, Boolean, various control statements.

SECTION B

Introduction to Classes: Class fundamentals, declaring objects, methods, constructors, garbage collection, passing parameters to methods, recursion, access control, static, final and finally method, Array Single dimensional, Multidimensional array.

SECTION C

Inheritance, super, multilevel hierarchy, abstract methods and classes. Packages and interfaces, importing packages, exception handling. Exception types, try, catch, finally, throw and throws, creating exception subclasses. Multithread programming, thread priorities, synchronization, messaging, creating multiple threads, inter thread communication.

SECTION D

Networking, socket overview, client/server, reserved sockets, proxy servers, Internet addressing, Java and the Net, TCP/IP client sockets. An introduction to AWT, GUI graphics, fonts, colours, Introduction of servlet, servlet lifecycle, JSP, JSP lifecycle.

References:

1. Patrick Naughton and Herbert Schildt, "The Complete Reference Java 2", Tata McGraw Hill, 1999.
2. E. Balaguru Swami, "Programming with Java"(2nd Edition), TMH.

Maximum Time : 3 Hrs.**University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****A) Instructions for paper-setter**

The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section E will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

OOP paradigm, Advantages of OOP, Comparison between functional programming and OOP approach, characteristics of Object oriented Language objects, Class, Inheritance, Polymorphism, and abstraction, encapsulation, Dynamic Binding, Message passing.

Introduction to C++, Identifier and keywords, constants, C++ Operators, Type conversion, variable declaration, Statement, expressions, User defined data types, Conditional expression (For, While, Do-while) loop statements, breaking control statements (Break, Continue).

SECTION B

Defining a function, types of functions, Inline functions, Call by value & Call by reference, Pre-processor, Header files and standard functions, Structures, Pointers and structures, Unions, Enumeration.

SECTION C

Classes, Member functions, Objects, Array of objects, Nested classes, Constructors, Copy constructors, Destructors, Inline member functions, Static class member, friend functions, Dynamic memory allocation.

Inheritance: Single inheritance, Multi-level inheritance, Hierarchical, Virtual base class, Abstract classes, Constructors in Derived classes, Nesting of classes.

SECTION D

Function overloading, Operator overloading, Polymorphism, Early binding, Polymorphism with pointers, Virtual functions, Late binding, Pure virtual functions, Opening and closing of files, Stream member functions, Binary file operations, Structures and file operations, classes and file operations, Random access file processing.

Reference:-

1. D. Ravichandran "Programming with C++" TMH, 1996.
2. Robert Lafore, "Object oriented programming in Turbo C++", Galgotia publications, 1994.
3. Bjarne strautrup, "The C++ Programming Language", Addison Welsly publication co. 1995.
4. Yashvant Kanetkar, "Let us C++", BPB.

Maximum Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks : 40%

University Examination : 70 Marks
Continuous Internal Assessment : 30 Marks

A) Instructions for paper-setter

The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section E will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Space and time complexity, Asymptotic notations ($\Omega, \theta, O, \omega, \circ$), Arrays :- One Dimension and two Dimensional Arrays (Storage in Row – major & column major order).

Queue Structures: Insertion, deletion, Priority Queue, D-Queue.

Stack:- Push, Pop operations, Polish notation, Algorithm for Infix to Postfix conversion, Evaluation of Postfix expression.

Link lists, singly link list, Doubly link list, advantage and disadvantage.

SECTION B

Tree basic concept, Tree representation by link list and by arrays, Binary tree, Binary search tree (Operations:- Insertion, Deletion, Traversals), Heap sort, AVL, B-tree.

SECTION C

Graph concepts, Adjacency list and adjacency matrix representation, DFS, BFS, Topological sorting, strongly connected components, Prim's & Kruskal's algorithm, Dijkstra's algorithm, Warshall's algorithm.

SECTION D

Linear search, Binary search, Bubble sort, selection sort, Insertion sort, Quick sort, Heap sort, Merge sort, Bucket sort, Radix sort and their Comparison in terms of space & time complexity.

Reference:

1. Sartaj Sahni, "Data structures Algorithms and Applications in C++", TMH.

Maximum Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks : 40%

University Examination : 70 Marks
Continuous Internal Assessment : 30 Marks

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Introduction to systems software : Definition, features of system programming, system programming V/s Application programming, Types of system programmes.

SECTION B

Assembler : Single pass assembler, two-pass assembler, and general design procedure of assembler.

Macro Processor : Macro language and its features, macro instructions, features of macro facility, implementation, one pass macro processor, two pass macro processor, macro assemblers.

SECTION C

Compilers : Overview of compilation process, lexical analysis, syntax analysis, semantic analysis, and intermediate code generation and code optimization techniques, compiler V/s Interpreter.

Linkers & Loaders : Simple linkers, Loaders, and design and implementation of direct linking loader.

Introduction to device drivers, Functions and structure of text editor.

Software tool:- Software tools for program development, Editors, Debug monitors, Programming Environment, User Interface.

SECTION D

Operating system : Basic concepts of an operating system, Functions of operating system as resource manager, I/O management, Memory management, Processor management, Information management, Types of operating system – Batch processing, Multiprogramming, Multitasking, time sharing, parallel, Distributed Operating System (With Examples).

References:

1. Donovan, "System programming", (McGraw-Hill), 1991.
2. Aho and Ulman, "Principle of Compilers", Narosa Publishing House, 1986
3. DM Dhamdhare, "System Programming and Operating Systems", (2nd Edition), TMH.

MCA-250

INTERNET & WEB TECHNOLOGY

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Definition of Internet, Internet organisation and committees, Internet, Growth of Internet, Anatomy of Internet, Internet Application, Portals, Introduction about WWW, Definition of DNS (Domain Name System), IP Addressing.

SECTION B

Definition of Networks, Types of Network, Topologies, PSTN, PSDN, VAN, ISDN, PDNs, Wide Area Network, Introduction about search engines (Mozilla, Netscape, Opra) Email, Introduction about mail protocol (SMTP, MME), X.25, Frame relay, PPP, NNTP, SMTP, etc.

SECTION C

OSI Reference method, TCP/IP model, FTP, HHTP, HTTPS, Addressing in Internet (Class A,B,C,D,E) Definition of Ethernet, Intranet, Telnet, Wireless communication, Virtual Circuits, ISDN model, CSMA/CD, Explanation of all layers of OSI and TCP/IP model.

SECTION D

Introduction about HTML, Tag, Types of Tags, Forms, Tables, Images insertion in web page, Introduction about DMTL, CGI, Introduction about XML.

Reference:-

1. A.S. Tanenbaum, "Computer Networks"(3rd Edition), PHJ,1999
2. D.E.Comer, "Computer Networks and Internet"(2nd Edition), Addison wisely, 2000
3. D.Betsekas and R.Gallagar, "Data Networks"(2nd Edition), PHI, 1992
4. Frougan "Data Communications & Networks"(2nd Edition), TMH

MCA-260 P

**PROGRAMMING LAB- II
(DATA STRUCTURE PROGRAMMING IN C++)**

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

This laboratory course will mainly comprise of exercises on what is learnt under paper :
MCA-230 (Data structure)

s

THIRD SEMESTER

MCA-310

THEORY OF COMPUTATION

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Mealy, Moore machine, conversion of Moore machine to mealy machine and vice-versa, equivalence of NFA and DFA, minimization of states in DFA.

SECTION B

Regular expression, Removal of Null transitions, Arden's Theorem, Construction of Finite automata, equivalence of regular expression, Equivalence of two finite automata, Pumping lemma of Regular languages, closure properties of regular languages.

SECTION C

Ambiguity in CFG, Construction of reduced grammars, Elimination of NULL and Unit production, CNF, GNF, Pumping lemma for CFL, Properties of CFL, Construction of Push-Down Automata.

SECTION D

Turing machine model, construction of turing machines, Multitape – TM, Multi-track TM, Multi-head TM.

Post correspondence problem, Turing machine Halting problem.

Reference:-

1. Mishra Chandrasekran "Theory of computer Science"(3rd Edition), PHI
2. Hopcroft Motwani ullman "Introduction to Automata Theory Languages & Computation"(2nd Edition), Pearson Edition.
3. Kulkarni Sani, "A Mathematical Introduction to Automata Theory", Dhanpat rai & Co.

Maximum Time : 3 Hrs.**University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****(A) Instructions for the Paper setter:**

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Software : Characteristics, Components, Application, S/W Process, Software Process Models : Waterfall, spiral, Prototyping, Fourth Generation Techniques, Roll of Metrics & Measurements, S/W inspection : Communication skills for the system analyst.

Preview/Inspection Procedure : document, composition of inspection team, Checklist.

SECTION B

S/W Project Planning : Objectives, Decomposition techniques : S/W sizing, Problem-based estimation, Process based estimation, Cost estimation models : COCOMO Model, The S/W equation.

System Analysis : Structured analysis, Characteristics and components of SRS, DFD, Entity relationship diagram, Data dictionary, and metrics.

SECTION C

S/W Design : Objectives, Principles, Concepts, Design methodologies : structured design, Object-oriented approach, Design specification, Verification metrics.

User Interface Design: Design issues, Features of a Modern GUI : Metrics, Scaling Windows, Icons, Panels, Error manage etc.

SECTION D

User Manual: Contents, User profile, S/W Configuration management, Baseline, SCM process, Version control, changes control.

Computer aided S/W Engineering: CASE, Building Blocks, and Tools for project management, Support, Analysis, design and maintenance, Future of CASE.

References:

1. P. Jalota, "An Integrated Approach to Software Engineering", Narosa Publishing House, 1992
2. R.E.Fairley, "Software Engineering Concepts", McGraw-Hill, 1985
3. G.Meyers, "The Art of Software Engineering", Wiley-inter-Science, 1979
4. M. Shooman, "Software Engineering", McGraw-Hill, 1983

Maximum Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks : 40%

University Examination : 70 Marks
Continuous Internal Assessment : 30 Marks

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Complexity & Recurrences :- Space complexity, Time complexity, Asymptotic notation ($\Omega, \theta, O, \omega, \circ$), Solution of recurrence relations : recursion tree method, master method, Iteration method.

SECTION B

Divide & Conquer : General method, Binary search (Iterative & recursive), Merge sort, Quick sort, Selection, Strassen's matrix multiplication.

SECTION C

Greedy method :- General method, Fractional knapsack, Job sequencing with deadline, Prim's algorithm, Kruskal's algorithm, Dynamic Programming: General method, All pair shortest path, 0/1 Knapsack problem, Traveling salesman problem, Longest common subsequence, Matrix chain multiplication.

SECTION D

Backtracking Method : General method, 8-Queen's problem, Sum of subset, Graph coloring, Knapsack problem, Branch and Bound, LIFO search, FIFO search, LC search, 0/1 Knapsack, Traveling salesman problem, Comparison Trees : Ordered searching, sorting, selection, oracles and adversary arguments : Merging, Longest & Second longest selection.
 Lower bound through reduction : Disjoint set on-line medium, Multiplying triangular matrices.

Reference:-

1. Horowitz Sahni Rajasekaran, "Fundamentals of computer Algorithms", Galgotia.
2. LipSchutz, "Theory and problems of Data Structures"(Schaum's outline series), TMH.

Maximum Time : 3 Hrs.**University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****A) Instructions for paper-setter**

The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section E will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Introduction

- Visual Basic
- Visual Studio

SECTION B

Visual Basic Language and Syntax :- The Basics

- Data Types
- Variables
- Functions
- Subroutines
- Methods
- Properties
- Events

SECTION C

Visual Basic Language and Syntax (Continued)

- Program control
- File Input and Output
- Exception Handling
- Security Issues
- Database Access
- Report Writing
- Nomenclature specific for .NET and in relation to some other OO language.

SECTION D

Windows Forms

- Overview including Dynamic Windows forms
- Architecture and Design considerations: Create, Read, Insert, Update, Archive and Delete.
- Use of Windows forms V/s Web forms and Web services controls.

Reference:-

1. Sams Techmedia, “Visual Basic 6 in 21 days SAMS”, Techmedia.
2. Noel Jerbe, “The complete reference Visual Basic 6.”, Tata McGraw hill

MCA - 350**. NET FRAME WORK & C#**

Maximum Time : 3 Hrs. University Examination : 70 Marks
Total Marks : 100 Continuous Internal Assessment : 30 Marks
Minimum Pass Marks : 40%

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.

SECTION A

. Net framework, Common language runtime, Framework Base classes, User and Program Interfaces, Visual Studio. NET, NET languages, Benefits of . NET Application C# and . NET.

SECTION B

Name Spaces, Main Returning a value , Passing string objects write line method. Command line arguments, using mathematics functions, Literals, Variables, Operators, Expressions.

Decision making (if, if.....else, Nested if, else.... If ladder, Switch , ? : Operator) Looping (While, do , for , for each Jumps in loops)

SECTION C

Methods, Parameters, Pass by value, Pass by reference, Methods overloading, Arrays, Strings, Structures, Enumerations, Difference between class & structure.

Classes, access modifiers, accessing class members, constructors, overloaded constructors, copy constructors, destructors.

SECTION D

Classical Inheritance, Containment inheritance, Subclasses constructors, Multilevel, Hierarchical Inheritance, Abstract classes, Defining and Implementation of Interfaces, Interfaces and Inheritances, Overloading unary and binary operators.

Delegates and events, exceptions, multiple catches, finally statement, throwing and own exception.

Reference:-

1. E. Balguru swami, “Programming in C# .?”, TMH.
2. Shibi Panikkar and Kumar Sangeev, “Magic of C# with .NET FrameWork”, Laxmi Publication
3. Dev Prakash, “Understanding C#”, Gbe Tech Publications.

MCA-360 P PROGRAMMING LAB- (PROGRAMMING IN JAVA)

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

This laboratory course will mainly comprise of exercises on what is learnt under paper :
MCA-340(Java Programming).

FOURTH SEMESTER

MCA-410

OPERATING SYSTEMS

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Operating system as Resource Manager, Types of Operating system – Batch processing, Multiprogramming, Multitasking, Time sharing, Parallel, Distributed, Operating system structure, (Monolithic, Layered), System services, system calls, process states, process control block (PCB), Fork, EXEC, Cooperating process, Inter process communication. CPU scheduling algorithms, (FCFS,RR,SJF, Priority, Multilevel queue, Multilevel queue with feedback) Multiple processor scheduling & their comparison.

SECTION B

Process synchronization, Critical section problem, Semaphore, Binary semaphores, critical regions, Monitors, Dekker's algorithm, Bakery algorithm, Semaphore solution of Bounded buffer, Reader writer, Dining philosopher, Banker's algorithm. Deadlock, Necessary conditions, Prevention, Avoidance and detection methods & recovery. Disk scheduling (FCFS, SCAN,C-Scan, Look, C-Look) Access methods, directory structure, allocation methods, free space management, directory implementation.

SECTION C

Memory Management: Physical V/s Logical address, Dynamic linking, Dynamic loading, Swapping, contiguous allocation, paging, segmentation, and segmentation with paging. Virtual Memory, Demand paging, page replacement algorithms, thrashing, Distributed systems, topology network types, design strategies. Network operating structure, distributed operating system, remote services & design issues.

SECTION D

Distributed file system, naming and transparency, remote file access, remote file accesses, example systems – UNIX, Sun Network File System. Distributed co-ordinations, event ordering, mutual exclusion, atomicity, concurrency control, deadlock handling, election algorithms. Protection and security, goals of protection, domain of protection, access matrix, security problem authentication, password, programs threats, system threats, encryption, computer security classification, Model of Windows-NT.

References:

1. Silberschatz and Galvin “Operating system concepts”(5th edition), Addison-Welsey publishing, Co 1999
2. Hansen, Per Brinch, “Operating system Principles” Prentice-Hall, 1984.
3. N. Habermanb, “Introduction of Operating system design” Galgotia Publication 1986.

MCA-420 COMPUTER ORGANISATION AND ARCHITECTURE

Maximum Time	: 3 Hrs.	University Examination	: 70
Marks			
Total Marks	: 100	Continuous Internal Assessment	: 30
Marks			
Minimum Pass Marks	: 40%		

A) Instructions for paper-setter

The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section E will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Number system, Binary arithmetic, Gray code, BCD, Logical Gates, Boolean Algebra, K-Map simplification, SOP forms, POS forms, Half adder, Full adder, Flip-Flops (SR, JK, D & T), Counters, Registers.

SECTION B

Basic computer architecture, Functional Organisation, Register organization, Arithmetic and logic unit, Pipeline, Central processing unit, Instruction formats, Addressing modes, Data transfer and manipulation, Interrupts, RISC/CISC architecture.

SECTION C

Register transfer and micro-operations, Register transfer language (RTL), Arithmetic, Logic and Shift micro-operations, Micro-program Control Organisation; Control memory, Address sequencing, Micro-program sequencer, Addressing Mode.

SECTION D

Memory and storage ; Processor V/s Memory speed, High-speed memories; Cache memory, Direct mapping, Set Associative Mapping, Fully Associative Mapping, Associative memory, Interleaved memory, Virtual memory and Memory management hardware. Input/Output Organisation: Peripheral devices, I/O interface, Asynchronous Data Transfer : Strobe control, Handshaking Data transfer schemes (Programmed, Interrupt Initiated, DMA transfer), I/O Processor.

References :

1. A. S. Tanenbaum, "Structured Computer Organisation", PHI, 1990.
2. M. M. Mano, "Computer System Architecture", Prentice-Hall, 1976.
3. S. Stone, "Introduction to Computer Architecture", Galgotia Publications, 2nd Ed. 1986.
4. J.P. Hayes, "Computer Architecture and Organisation", McGraw Hill, 1988.
5. C. William Gear, "Computer Organisation and Programming", McGraw-Hill, 1985.

MCA-430**SOFTWARE VERIFICATION VALIDATION AND TESTING****Maximum Time : 3 Hrs.****University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****(A) Instructions for the Paper setter:**

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Definition of testing, goals, psychology, model for testing, effective testing, limitations of testing,

Definition of testing Definition of failure faults or bug, error incident, test case, test ware, life cycle of bug, bug effects, bug classification, test case design, testing methodology, development of test strategy, verification, validation, testing life cycle model, testing techniques, testing principles.

SECTION B

Verification activities, verification of requirements, verification of HL design, verification of data design, verification of architectural design, verification of UI design, verification of LL design, intro. To validation activities.

Boundary value analysis, equivalence class partitioning, state table based testing, decision table based, grappling, error guessing

SECTION C

Logic coverage criteria, basic path testing, graph matrices, loop testing, mutation testing.

Types of static testing, technical reviews, inspections, inspection process, structured walk through, walk through process, advantage of static testing.

SECTION D

Unit testing drivers stubs, integration testing, methods, effect of module coupling and cohesion, functional testing, system testing, recovery testing, security testing, stress testing, performance testing, usability testing.

S/W measurement and testing, testing metrics, tools debugging, design of practical test cases, reducing No. of test cases, regression testing and test case management.

Reference:-

1. P. Jalota “ An Intrgrated Approach to software engineering”, Narosa Publising House 1992
2. M.Shooman “Software Engineering”,TMA 1983
3. Roger S. Prersman, “ Software Engineering –A practioners Approach”, 3rd Edition, TMH 1992.

MCA-440

COMPUTER GRAPHICS

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.

SECTION A

Input device - Keyboard, Touch Panel, Light pens, Graphic tablets, Joysticks, Touch balls, Image scanner, Mouse. Handy copy device :- Zero impact and Non impact printers, Dot matrix, Laser printer, Inkjet printer, Dectrostate, flatted and drum platters. Video display devices :- Cathode ray tube, Resistance, Resolution, aspect ration vertical and horizontal, colour CRT monitors, Direct view storage tube, Flat panel displays, LCD, virtual reality, Faster scan system, random scan system. Memory device :- Memory (RAM,ROM), CD, Floppy Disk, Magnetic tapes, Magnetic disks.

SECTION B

Scan conversion algorithm for line (DDA & Bresenham’s algorithm) midpoint circle, circle & ellipse, Midpoint ellipse, Bresenham’s algorithms, area filling techniques, Scan line polygon fill, Boundary fill character generation. 2-dimensional Graphics:- Cartesian & Homogeneous coordinate system, Geometric transformations (Translation, Scaling, Rotation, Reflection, Shearing), Composite transformations, Affine transformation, Viewing pipeline, Two dimensional viewing transformation and clipping (Line, Polygon and Text).

SECTION C

Three dimensional Graphics :- Geometric transformation (translation, scaling, rotation, reflection, shearing) Composite transformations, Mathematics of projections (parallel & perspective), view pipeline, 3-D viewing transformations and clipping(normalized view volumes, view port, clipping)

SECTION D

Hidden line and surface elimination algorithms, Z-buffer, Scan-line, Sub-division, Painter's algorithm. Illumination Models : Diffuse reflection, Specular reflection, refracted light, texture surface patterns, Half toning, Dithering. Surface rendering methods : Constant intensity method, Gouraud shading, Phong shading. Colour Model : Introduction to RGB, CMY & HSV colour models.

Reference:-

1. D. Hearn and M.P. Baker "Computer Graphics" PHI New Delhi 2nd edition 1995.
2. J.D. Foley, A.V. Dam, S.K. Feiner, J.F.Hughes, R.L. Phillips, "Introduction to computer Graphics" Addison-Wesley Publishing company, N.Y. 2nd edition 1994
3. R.K. Plastock and G. Kalley " Computer Graphics " McGraw Hill, 1986.

MCA-450P

PROGRAMMING LAB- (DBMS)

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

This laboratory course will mainly comprise of exercises on what is learnt under paper : MCA-140 Data Base Management system.

MCA-460- EII**E-COMMERCE**

Maximum Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks : 40%

University Examination : 70 Marks
Continuous Internal Assessment : 30 Marks

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.

SECTION A

Electronic commerce framework, Electronic commerce and media convergence, The anatomy of e-commerce applications.

Market forces influencing the I-way, Components of the I-Way, Network access equipment, Global information distribution networks, Public policy issues shaping the I-way.

SECTION B

Client-Server Network Security, Emerging client-server security threats, Firewalls and Network security, Data and message security, challenge response system, Encrypted documents and electronic mail, U. S. Government regulations and encryption, Summary.

Architectural framework for electronic commerce , WWW as the architecture, Web background : Hypertext publishing, Technology Behind the web, security and the Web, summary.

SECTION C

Consumer-oriented applications, Mercantile process models, mercantile models from the consumer's perspective, mercantile models from the merchant's perspective, summary.

SECTION D

Types of electronic payment systems, digital token-based electronic payment systems, smart cards and electronic payment systems, credit card-based electronic payment systems, risk and electronic payment systems, designing electronic payment systems, summary.

Reference:-

1. Ravi Kalkota : Frontiers of Electronic commerce, Addison Wesley.
2. Kamlesh K. Bajaj & Debjani Nag, E-commerce, The cutting edge of business, Tata McGraw Hill.
3. Pete Losuin and A. Murphy, Electronic commerce, A Jaico book.
4. Green Stein "Understanding electronic commerce" PHI.
5. Kosiur, "Understanding electronic commerce" PHI.
6. Kienan, "Managing your E-commerce Business, PHI.

MCA-460- EIII COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHOD

Maximum Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks : 40%

University Examination : 70 Marks
Continuous Internal Assessment : 30 Marks

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.

SECTION A

Solution of transcendental equation : Bi-section method, Regula Falsi method, Newton Raphson method, and secant method.

System of simultaneously non-linear and algebraic equation :- Gauss elimination method, Gauss seidel alternative method, Gauss Jordan's method, Jacobi's iteration.

SECTION B

Operation, E , Δ , ∇ , Algebraic properties of E and Δ , Relation between operators, differences table, Forward Difference, Backward Difference, Central difference factorial Notation, Divided Differences, Lagrange's Interpolation formula for unequal intervals.

SECTION C

Numerical Integration :- The trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 Weddle's rule.

Numerical Solution of differential equation : Euler's method, Taylor's series, Runge-kutta method.

SECTION D

Introduction to Statistics :- Meaning, scope of statistics, Mean, Mode, Median, Standard Deviation, Variance.

Bivariate data: Correlation, Karl's pearson coefficient, Rank correlation, Numerical based on regression lines (using least square method)

Reference:-

1. A. R. Vasishtha, "Numerical Analysis", John wiley & sons.
2. B.S. Grewal, "Engineering Mathematic", Khanna.
3. S.S. Sastry, "Numerical Methods".

Maximum Time : 3 Hrs.**University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****(A) Instructions for the Paper setter:**

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Computer Networks: Uses of Computer Network, Network Hardware, Network Software, Goals and Applications of Computer networks, Computer Network Structure and Architecture. Reference Models: OSI Reference Model, TCP/IP reference Model, Comparison of OSI and TCP Reference Model, Introduction of Novell Netware, ARPANET.

SECTION B

Local Area Network: IEEE standards 802 for LAN's and MAN's (802.2, 802.3, 802.4, 802.5, 802.6). Bridge-bridges from 802.x to 802.y, transparent bridges, source routing bridges, remote bridges, comparison of 802 bridges, High speed LANs – FDDI, Fast Ethernet, HIPPI, Fibre channel, Satellite network Polling, ALOHA, FDM, TDM, CDM.

SECTION C

The Internet Protocol - Introduction to Internetworking, The IP protocol, IP Addresses, Subnets, Internet Control Protocol, Interior and Exterior gateway routing protocol., internet multicasting mobile IP, CIDR, IPv6.

The Transport Protocol – Elements of transport protocol, A simple transport protocol, TCP-Service model, TCP protocol, Segment header, Connection management, Transmission policy, Congestion control, timer management, UDP.

SECTION D

Internet Applications: Domain Name System, Electronic mail, The World Wide Web, Multimedia - Audio, Video, Data compression, File Transfer Protocol, TFTP, Simple Mail Transfer Protocol, Telnet, HTTP.

References:

1. A.S. Tannenbaum, "Computer Networks", Third Edition, PHI Publications, 1999.
2. D.E. Corner, "Computer Networks and Internets", 2nd Edition, Addison-Wesley Publication, 2000.
3. D.E. Corner and D.L. Stevens, "Inter-networking with TCP_IP : Design, Implementation and Internals", Vol. II, Prentice Hall, 1990.
4. Frougan "Data communication an Networking", TMH.

Maximum Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks : 40%

University Examination : 70 Marks
Continuous Internal Assessment : 30 Marks

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Turing test, characteristic of AI approach for problem solving, problem representation in AI, State space Representation, Problem reduction, Automated reasoning with propositional logic and predicate logic, refutation, resolution, modus Ponens, modus Tollens, WFF.

SECTION B

AI searching techniques : Breadth first, Depth first search, Hill climbing, Problem of Hill climbing, Best first search , A*, AO*, Beam Search, Constraint Satisfaction.

Knowledge Representation :- Frames, scripts, Semantic nets, production systems , procedural representation.

SECTION C

Natural language processing :- Need, Problem of NLP, Keyword analysis, syntactic Driver, RTN, ATN, Game playing : AI and Game playing generator, minimal, adding α - β cutoffs, Roles of α , Role of β Horizon effect, Optimal mere equation.

SECTION D

Expert system :- Representation and using domain knowledge, characteristic of Expert system, Architecture of ES, Knowledge Base, Inference Engine (Forward & Backward chaining) Production system, User interface, Knowledge acquisition facility, External Interface, Pattern Recognition :- Concepts, Recognition & classification process, Learning classification patterns, recognizing & understanding speech.

Reference:

1. E. Rich & Knight, "Artificial Intelligence", Tata McGraw Hill.
2. Dan W. Petterson, "Introduction to Artificial Intelligence and expert system", AddisonWesley Publishing Company.
3. E. Charnaik and D. McDermott, "Introduction to artificial Intelligence", AddisonWesley Publishing Company.
4. Nils J. Nilson "Principles of Artificial Intelligence", Narosa Publishing Co.

Maximum Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks : 40%

University Examination : 70 Marks
Continuous Internal Assessment : 30 Marks

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Introduction to Java Enterprise, Java enterprise, API, JDBC, Architecture, basics, drivers, connecting to databases, statements, results, errors, prepared statements, metadata, transaction, stored procedures, escape requires.

SECTION B

RMI, Defining remote objects, accessing remote objects as clients, dynamically loaded classes, remote object activation, RMI and native method calls.

SECTION C

Java servlets, servlet life cycle, JSP, JSP life cycle, basics, chaining, Initialization, thread safety, server-side, includes, cookies, session tracking, databases and Non-HTML contents.

JNDI, Architecture, Introducing context, looking up objects in a context, Naming shell application, listing the children of a context, binding objects, accessing and modifying directory entries.

SECTION D

Enterprise Javabeans, JB Doles, Transaction management implementing basic EJB objects implementing sessions beans, implementing entity beans, deploying objects.

Modelling components with COBRA, COBRA overview, The OTB, GIOP & IIOP, services facilities and business objects, ID, objects by values, COBRA communication.

Reference:-

1. David flangan, Jim Farley, W. Crawford and kris Magnusson, "Java Enterprise in a nutshell", Shroff Publishers, Calcutta, 2000
2. P.J. Perrone and V.S.R.R. Chaganti, "Building Java Enterprise systems with J2EE", SAMS, BPB Publications, 2000.
3. E. Balaguru Swami, "Programming in Java", TMH.
4. Patrick Naughton and Herbert Schildt, "The complete Reference Java 2", TMH, 1999.

MCA-620 E-I MOBILE & WIRELESS COMMUNICATION

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Application, History, Market, reference model and overview, Wireless Transmission Frequencies, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular system.

SECTION B

MAC and Telecommunication system :

Specialized MAC, SDMA, FDMA, TDMA – fixed TDM, Classical ALOHA, slotted, ALOHA, CSMA, DAMA, PKMA, Reservation TDMA, Collision avoidance, Polling inhibit sense multiple access. (DMA, Comparison, CSM-Mobile services, Architecture radio interface, Protocol, Localization, Calling, Handover, Security, New Data services, Introduction to WLL.

SECTION C

SATELLITE & BROADCAST SYSTEM :

History, Applications, GLO, LLO, MLO, Routing, Localization, Handover in satellite.

Wireless LAN: -

IEEE 802.11- Systems and Protocol architecture, Physical layer, MAC layered management, Bluetooth-user scenarios, Physical Layer, MAC layer, Networking security and link management.

SECTION D

Mobile Network Layers

Mobile IP Goals, Assumption, requirement, entities, terminology, IP packet delivery, Agent advertisement and discovery, registration, tunneling, encapsulation, optimization, reverse tunneling, IPV6.

DFCP, ADHOC Network :- Routing, destination sequences distance vector, dynamic source routing, hierarchical algorithm, alternative metric.

Reference:-

1. Raj Pandya, “Mobile and personal communication system and services” , PHI

Maximum Time : 3 Hrs. University Examination : 70 Marks
Total Marks : 100 Continuous Internal Assessment : 30 Marks
Minimum Pass Marks : 40%

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Neural Network :- History, overview of biological Neuro-system, Mathematical models of neurons, ANN architecture, Learning rules, learning paradigms- Supervised, Unsupervised and reinforcement learning, ANN training algorithms-perceptions, Training rules, Delta, Back Propagation algorithm, Multilayer perception model, Training rules, Delta, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

SECTION B

Fuzzy Logic :- Introduction to Fuzzy Logic, Classical and fuzzy sets : Overview of classical sets, Membership function, Fuzzy rule generation.
Operations on Fuzzy sets : compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

SECTION C

Fuzzy Arithmetic : Fuzzy Number Linguistic variables, Arithmetic Operations on intervals & Numbers, Lattice on Fuzzy Numbers, Fuzzy equations.
Fuzzy Logic : Classical logic, Multivalued logic, Fuzzy propositions, Fuzzy qualifiers, linguistic hedges.

SECTION D

Uncertainty based information : Information & Uncertainty, Nonspecificity of Fuzzy & crisp sets, Fuzziness of Fuzzy sets.

Reference:-

1. J.Klir and George “Fuzzy sets and Fuzzy logic”, PHI
2. E.Rich & K.night “Artificial Intelligence”, TMH.

Maximum Time : 3 Hrs.

University Examination : 70 Marks

Total Marks : 100

Continuous Internal Assessment : 30 Marks

Minimum Pass Marks : 40%

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Matrix – Matrix addition, subtraction, Multiplication, transpose, Adjoint of Matrix, Inverse of Matrix, Matrix method, Determinant, Properties of Determinant, Skew symmetric, Hermitian, Skew-Hermitian, Orthogonal Matrix.

SECTION B

Function, Limit, Continuity, Different type of function, Differentiation :- First Principle, Polynomial differentiation, Trigonometric function development, Inverse Trigonometric function, deviation, Application of Derivatives Tangent, Normal, Maxima, Rolle's Theorem, LMV Theorem.

SECTION C

Integration :- Polynomial Integration, Substitution method, By parts, Trigonometric function integration, Inverse trigonometric function integration, standard integral, Definite integral, area under the curve.

Differential equation :- Order and degree of differential equation, Variable separable, Homogenous equation, Linear equation (Integration factor).

SECTION D

Regression and correlation, Karl's person coefficient, Solution of regression lines, Probability, Binomial distribution, Poisson distribution, Normal distribution.

Vector :- Vector arithmetic, Triangle law, Parallelogram law, Scalar product, vector product, triple product (Scalar, Vector)

References:

1. B.S. Grewal, "Engineering Mathematic".
2. R.D. Sharma, "Mathematics by".
3. Parmanand Gupta, "Comprehensive Mathematics by", Laxmi Publication.

Maximum Time : 3 Hrs.**University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****(A) Instructions for the Paper setter:**

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 15% of the total marks (12 marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Role of lexical analyzer, Input buffering, specification of tokens, Recognition of tokens, from regular expression to NFA, DFA based pattern matching.

SECTION B

Role of parser, recursive descent parser, predictive parser, operator precedence parser , LR parsing (SLR, CLR, LALR).

SECTION C

Syntax directed definitions, construction of syntax trees, Bottom up evaluation of S-attributed definitions ; attributed definitions, top-down translators, Bottom up evaluation of inherited attributed.

Intermediate code generation, declarations, assignment statements, Boolean expressions, Back-patching.

SECTION D

Code generation, issues, basic blocks & flow graph, Next an information, Dag representation basic blocks, Generating code from Dags.

Code optimization techniques, Principle source of optimization, (function preserving transformations, common subexpressions, Copy propagation, Dead lock elimination, Loop optimization, code motion, Reduction in strength.)

Reference:-

1. Aho and Ulman "Principle of compiler", Narosa Publishing House,1986
2. Aho and Ulman, Sethi : "Compiler, Principles, Techniques and tools" Addison coesley Publishing co. 1988.

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(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Distributed V/s Network O.S

Issues in distributed operating system, Global knowledge, Naming, Scalability, Compatibility, Process synchronization, Reserve management, Securing, structuring, compatibility, Process synchronization, Reserve management, securing, structuring, Lamport's logical clock, conditions satisfied by Lamport's clock. Virtual time V/s Physical time, limitation of Lamport's clocks, Vector clock.

SECTION B

Casual ordering of messages : Birman- Schipher – Stephonson protocol , Schiper-egglisandoz protocol.

Mutual exclusion, Requirements of mutual exclusion, performance measurement, token & Non token based algorithm, Lamport's algorithm, Ricort– Agrawala algorithm, Mackawa's algorithm.

SECTION C

Goals of Distributed file system, Architecture of Distributed file system, mechanisms for building file systems (Mounting, Hint, Bulk transfer, Encryption), Design issues.

SECTION D

Access control matrix, Limitations of access matrix, capabilities capability based addressing, advantages & disadvantages of capabilities, Access control list method, key-lock method, take-grant model, Bel-lapadula model.

Reference:-

1. Sasikeemar Shikhane and prekash, "Introduction to parallel toparallel processing", PHI 2000
2. Silberschaty and Galvin, "Operating system Concepts"(5th Edition), Addison wisely Publihing co.1999.
3. R.K. Sinha, "Discribed Operating system", PHI,1998

Maximum Time : 3 Hrs.**University Examination : 70 Marks****Total Marks : 100****Continuous Internal Assessment : 30 Marks****Minimum Pass Marks : 40%****(A) Instructions for the Paper setter:**

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(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Definition of Graph, Types of Graph, Application of Graph, Finite and Infinite Graph, Incidence & Degree.

Path & Circuit :- Isomorphism, Sub graph, walks, Path and Circuits, Connected Graph, connectivity, Component, Euler graph, Operation on graph, Hamiltonian path & circuit, traveling salesman problem.

SECTION B

Tree & fundamental circuit : Tree, Properties of Tree, Pendant vertices in a tree, Distance, Radius & Centre in Tree, Rooted Binary tree, Spanning tree, Fundamental circuit.

Cut set & Cut-Vertices :- cut sets, Properties of cutset, Fundamental circuit & cut set.

SECTION C

Planner and Dual Graph :- Combinational V/s Geometrical Graph, Planner Graph, Kuratowski's two graph, Detection of Planarity.

SECTION D

Matrix representation of Graph: - Incidence Matrix, path matrix, coloring, covering, Partitioning, Chromatic number, Chromatic Partitioning, Polynomial, Matching covering, The four colour problem, Introduction about directed graph.

Reference:-

1. Narsing Deo, "Graph Theory", PHI Pvt. Ltd., 1997
2. Lipschutz, "Data Structures", TMA
3. Sartaj Sahni, "Data Structures Algorithms and application in C++", TMH