



# ***FACULTY OF ENGINEERING***

***IASE University***

***Gandhi Vidya Mandir, Sardarshahr (Rajasthan) –331401,  
INDIA***

**Teaching and Examination Scheme and Syllabus**

for

**Master of Computer Applications  
(MCA)  
(Three-Year Full Time Degree Programme)  
(SEMESTER SCHEME)**

## **Rules And Guidelines For The Students**

1. The **MASTER OF COMPUTER APPLICATIONS (M. C. A.)** course is a Three year (Six Semester) full time integrated degree programme.

### **2. ELIGIBILITY FOR ADMISSION**

A candidate seeking admission to the first year of the **Master of Computer Applications (M. C. A.)** course shall be required to have passed Graduate examination in any discipline with mathematics at 10+2 level from any recognized University with at least 45% marks in aggregate for general category candidates, and 40% for SC/ST/OBC candidates.

### **3. ADMISSION PROCEDURE**

Admission to the first year **M.C.A.** course shall be made on the basis of marks scored by the candidates in his/her Graduation examination.

### **4. THE PROGRAMME**

The **Master of Computer Applications (M. C. A.)** is a three year (Six semesters) full time degree program .The course structure and program administration are as follows.

### **5. COURSE STRUCTURE**

The three year, six semester teaching consists of Theory (Lectures and Tutorials) and Practicals/Sessionals (Laboratory work and Project etc.).Examination will be held at the end of the each semester. Details of these are given in the Teaching & Examination Scheme.

### **6. PROGRAMME ADMINISTRATION**

#### **6.1 Medium of Instruction**

English shall be the medium of instruction and examination.

#### **6.2 EVALUATION**

(a) Each subject will be evaluated through a theory paper at the end of the semester carrying 100 marks along with continuous evaluation of sessional work, carrying 50 marks. The theory paper shall be of three hour duration. The sessional work will consist

of continuous assessment of student's performance by teachers in tutorial classes, and class tests.

(b) Three class tests will be organized in each semester as per the scheme. The higher two out of the marks scored in the three tests will be considered for the sessional marks.

(c) Evaluation of laboratory practical work will be through continuous assessment throughout the semester as well as examination at the end of the semester.

(d) At the end of the fifth semester the student will undergo practical training for a period of at least six month in an industry / research organization related to his / her field of Study. At the end of the training, the student will submit its report to the Head of the Department within two weeks of the completion of his/her project period. The work of the practical training will be evaluated by a board of two teachers appointed by the Head of the Department. The later will counter sign the marks awarded by the board.

(e) **Project:** The project work will be carried out in the VI semester. The topic of the project will be approved by the Head of the Department and the entire project work will be carried out under the guidance of a teacher of the department approved as project supervisor by the Head of the Department. The nature of the project work will consist of varying proportions of coding, designing, testing, and analysis of results. The project topic shall be taken from a live industrial problem. The report of the completed project shall be signed by the guide and submitted to the Head of the Department on or before the last working day of the sixth semester as announced by the Head of the Department. The evaluation of the project will be done by a board consisting of two examiners.

## **7. Promotion**

7.1 The maximum span period of a program is six years from the date of registration in the program.

7.2 The minimum marks for passing the examination for each semester shall be 50% in each practical/ sessional, 40% in End Semester Examination of each theory paper, 50% in training and project, and 45% in the aggregate of all the subjects (theory, sessional and project) of the semester.

7.3 A student will be permitted to attend the classes of the second/fourth/sixth semesters immediately after the examination of the first/third/fifth semester's examination, as the case may be, provided he/she has appeared in the first/third/fifth semester examination, respectively.

7.4 To be eligible for promotion to the 3<sup>rd</sup> semester of the program a student must have successfully cleared at least 09 subjects out of the 18 subjects including practicals of the first and second semesters taken together.

7.5 To be eligible for promotion to the 5<sup>th</sup> semester of the program a student must have successfully cleared at least 09 subjects out of the 18 subjects including practicals and sessionals of the third and fourth semesters taken together.

7.6 A student promoted to the third/fifth semesters, without having cleared all the papers, will have to appear and pass the backlog papers of the first/third semesters along with the regular examination of the first/third semesters and backlog papers of the second/fourth semesters along with the regular examination of the second/fourth semesters.

7.7 A candidate who has secured minimum marks to pass in each paper but has not secured the minimum marks required to pass in the aggregate for the semester concerned may take re-examination in not more than two papers to obtain the aggregate percentage required to pass the semester. The candidate will have to pay the requisite examination fee in order to be eligible for re- examination. In this case the marks secured by the candidate in the earlier examination in the paper concerned will be cancelled.

7.9 (a) Award of Division:

Securing 60% marks and above – I<sup>st</sup> division

Securing 50% and above but below 60% - II<sup>nd</sup> division

Securing 45% and above but below 50% - pass

- A student who has secured 75% marks and above shall be declared to have passed in first division with honors. However, for this division the student must

have cleared successfully all the subjects in **single attempt** in the final year period of his/her study.

- Similarly to be eligible for a gold medal on account of having secured first position, the student must have cleared all subjects in **single attempt** and passed them with first division.

7.10 If a student (who has successfully completed the programme) wishes to reappear in one or more theory papers of the first, second, third, fourth and fifth, semesters for the purpose of **improving** his/her **marks**, he/she will be permitted to do so on payment of requisite examination fee along with the regular examinations of that semester. However, the total number of such attempts shall not exceed **four** theory papers during the span period of the programme. For this his/her previous performance in the paper/papers concerned shall be treated as **cancelled**. The application for such reappearing/re-examination must be submitted before the next examination of the corresponding semester. However, such candidates shall not be considered for award of gold medal.

7.11 A student to be eligible for award of **degree** has to **clear all papers** offered during three-year programme within the **span period** of six years.

**8. Attendance:** All students are required to have 75% attendance in each subject and there must be 75% attendance of the student before he/she could be permitted to appear in the examination.

## 9. RULES FOR THE AWARD OF GRACE MARKS

Grace marks to the extent of 1% of the aggregate marks prescribed for an examination will be awarded to a candidate failing in not more than 25% of the total number of theory papers, practicals, sessionals, dissertation, viva-voce and the aggregate, as the case may be in which minimum pass marks have been prescribed; provided the candidate passes the examination by the award of such Grace marks. For the purpose of determining the number of 25% of the papers, only such theory papers practicals, dissertation, viva-voce etc. would be considered, of which, the examination is conducted by the University.

N.B.:- If 1% of the aggregate marks or 25% of the papers works out in fraction, the same will be raised to the next whole number. For example, if the aggregate marks prescribed for the examination are 450, grace marks to the extent of 5 will be awarded to the candidate, similarly, if 25% of the total papers is 3.2, the same will be raised to 4 papers which grace marks can be given.

### GENERAL:-

- A candidate passes in a paper/ practical or the aggregate by the award of grace marks will be deemed to have obtained the necessary minimum for a pass in that paper/ practical or in the aggregate and shown in the marks sheet to have passed by grace. Grace marks will not be added to the marks obtained by a candidate from the examiners nor will the marks obtained by the candidate be subject to any deduction due to award of grace marks in any other paper/ practical or aggregate.
- If a candidate passes the examination but misses First or Second Division by one mark, his aggregate will be raised by one mark so as to entitle him for the first or second division, as the case may be. This one mark will be added to the paper in which he gets the least marks and also in the aggregate by showing +1 in the tabulation register below the marks actually obtained by the candidate. The marks entered in the marks-sheet will be inclusive of one grace mark and it will not be shown separately.
- Non appearance of a candidate in any paper will make him ineligible for grace marks. The place of a passed candidate in the examination list will, however be determined by the aggregate marks he secures from the examiners, and he will not, by the award of grace marks, become entitled to a higher division.
- Distinction won in any subject at the examination is not to be forfeited on the score that a candidate has secured grace to pass the examination.

Note: - The Grace marks will be awarded only, if candidate appears in all the papers prescribed for the examination.

**TEACHING & EXAMINATION SCHEME**  
**for M.C.A. (Master of Computer Applications)–Three Year (6 Semester) Full Time**  
**Degree Programme**

**M.C.A. – First Year**

**Semester - I**

S.No.	Course No.	Subject	Period			Examination Scheme				
			L	T	P	Sessional Exam			ESE	TOTAL
						TA	CT	TOTAL		
(THEORY)										
1	MCA-101	Computer Architecture	3	1	-	30	20	50	100	150
2	MCA-102	Accounting and Financial Management	3	1	-	30	20	50	100	150
3	MCA-103	Database Management System	3	1	-	30	20	50	100	150
4	MCA-104	Programming in C	3	1	-	30	20	50	100	150
5	MCA-105	Discrete Mathematics	3	1	-	30	20	50	100	150
(PRACTICALS/SESSIONALS)										
6	MCA-106	Office management Lab	-	-	2	50	-	50	50	100
7	MCA-107	DBMS Lab	-	-	2	50	-	50	50	100
8	MCA-108	Programming in C Lab	-	-	2	50	-	50	50	100
9	MCA-109	Microprocessor Lab	-	-	2	50	-	50	50	100

TA- Teacher's Assessment

CT- Class Test

ESE- End Semester Examination

Total Contact Hours-28

Total Marks-1150

**TEACHING & EXAMINATION SCHEME**  
**for M.C.A. (Master of Computer Applications)–Three Year (6 Semester) Full Time**  
**Degree Programme**

**M.C.A. – First Year**

**Semester - II**

S.No.	Course No.	Subject	Period			Examination Scheme				
			L	T	P	Sessional Exam			ESE	TOTAL
						TA	CT	TOTAL		
(THEORY)										
1	MCA-201	C++ and Algorithm and Data Structure	3	1	-	30	20	50	100	150
2	MCA-202	Computer Oriented Numerical and Methods	3	1	-	30	20	50	100	150
3	MCA-203	Programming in Java	3	1	-	30	20	50	100	150
4	MCA-204	Operating System	3	1	-	30	20	50	100	150
5	MCA-205	Data Communications and Computer Networks	3	1	-	30	20	50	100	150
(PRACTICALS/SESSIONALS)										
6	MCA-206	Data Structure Lab	-	-	2	50	-	50	50	100
7	MCA-207	CONM Lab	-	-	2	50	-	50	50	100
8	MCA-208	Java Lab	-	-	2	50	-	50	50	100
9	MCA-209	Communication & Soft Skill Lab	-	-	2	50	-	50	50	100
10		Discipline and Co-curricular activities	-	-	-	-	-	-	-	100

TA- Teacher's Assessment

CT- Class Test

ESE- End Semester Examination

Total Contact Hours-28

Total Marks-1250

**TEACHING & EXAMINATION SCHEME**  
**for M.C.A. (Master of Computer Applications)–Three Year (6 Semester) Full Time**  
**Degree Programme**

**M.C.A. – Second Year**

**Semester - III**

S.No.	Course No.	Subject	Period			Examination Scheme				
			L	T	P	Sessional Exam			ESE	TOTAL
						TA	CT	TOTAL		
(THEORY)										
1	MCA-301	Java Technologies	3	1	-	30	20	50	100	150
2	MCA-302	Web Technologies and Development	3	1	-	30	20	50	100	150
3	MCA-303	Computer Graphics	3	1	-	30	20	50	100	150
4	MCA-304	Advanced Database System	3	1	-	30	20	50	100	150
5	MCA-305	System Analysis and Design	3	1	-	30	20	50	100	150
(PRACTICALS/SESSIONALS)										
6	MCA-306	Advanced Java Lab	-	-	2	50	-	50	50	100
7	MCA-307	Web Design Lab	-	-	2	50	-	50	50	100
8	MCA-308	Computer Graphics Lab	-	-	2	50	-	50	50	100
9	MCA-309	Advanced DBMS Lab (Oracle/DB2/MySQL)	-	-	2	50	-	50	50	100

TA- Teacher's Assessment

CT- Class Test

ESE- End Semester Examination

Total Contact Hours-28

Total Marks-1150

**TEACHING & EXAMINATION SCHEME**  
**for M.C.A. (Master of Computer Applications)–Three Year (6 Semester) Full Time**  
**Degree Programme**

**M.C.A. – Second Year**

**Semester - IV**

S.No.	Course No.	Subject	Period			Examination Scheme				
			L	T	P	Sessional Exam			ESE	TOTAL
						TA	CT	TOTAL		
(THEORY)										
1	MCA-401	Software Engineering	3	1	-	30	20	50	100	150
2	MCA-402	.Net Framework and Programming in ASP.Net	3	1	-	30	20	50	100	150
3	MCA-403	Open Source Operating System	3	1	-	30	20	50	100	150
4	MCA-404	Artificial Intelligence	3	1	-	30	20	50	100	150
5	MCA- —	Elective 1*	3	1	-	30	20	50	100	150
(PRACTICALS/SESSIONALS)										
6	MCA-408	System Design Project	-	-	2	50	-	50	50	100
7	MCA-409	.Net Lab	-	-	2	50	-	50	50	100
8	MCA-410	Advanced Java Lab	-	-	2	50	-	50	50	100
9	MCA-411	Colloquium (Group Discussion)	-	-	2	45	-	50	50	100
10		Discipline and Co-curricular activities	-	-	-	-	-	-	-	100
<b>*Elective 1</b>										
	MCA-405	E-Commerce								
	MCA-406	Compiler Design								
	MCA-407	Data Mining and Data Warehousing								

TA- Teacher's Assessment

CT- Class Test

ESE- End Semester Examination

Total Contact Hours-28

Total Marks-1250

**TEACHING & EXAMINATION SCHEME**  
**for M.C.A. (Master of Computer Applications)–Three Year (6 Semester) Full Time**  
**Degree Programme**

**M.C.A. –Third Year**

**Semester - V**

S.No	Course No.	Subject	Period			Examination Scheme				
			L	T	P	Sessional Exam			ESE	TOTAL
						TA	CT	TOTAL		
(THEORY)										
1	MCA-501	Object Oriented Software Engineering	3	1	-	30	20	50	100	150
2	MCA-502	Analysis and Design of Algorithms	3	1	-	30	20	50	100	150
3	MCA-503	Wireless Technologies	3	1	-	30	20	50	100	150
4	MCA-____	Elective 2*	3	1	-	30	20	50	100	150
5	MCA-____	Elective 3**	3	1	-	30	20	50	100	150
(PRACTICALS/SESSIONALS)										
6	MCA-510	Software Project	-	-	2	50	-	50	50	100
7	MCA-511	ADA Lab	-	-	2	50	-	50	50	100
8	MCA-512	Wireless Tech. Lab	-	-	2	50	-	50	50	100
9	MCA-513	Seminar	-	-	2	50	-	50	50	100
10		Discipline and Co-curricular activities	-	-	-	-	-	-	-	100
		<b>*Elective 2</b>								
	MCA-504	Bio-Informatics								
	MCA-505	Geo-Informatics								
	MCA-506	Information Protection and Security								
		<b>**Elective 3</b>								
	MCA-507	Embedded Systems								
	MCA-508	ERP Systems								
	MCA-509	Soft Computing								

TA- Teacher's Assessment

CT- Class Test

ESE- End Semester Examination

Total Contact Hours-28

Total Marks-1250

**TEACHING & EXAMINATION SCHEME**  
**for M.C.A. (Master of Computer Applications)–Three Year (6 Semester) Full Time**  
**Degree Programme**

**M.C.A. – Third Year**

**Semester - VI**

S.No.	Course No.	Subject	Period			Examination Scheme				
			L	T	P	Internal Assessment			ESE	TOTAL
						TA	CT	TOTAL		
		(PROJECT)								
1	MCA-601	Industrial Project	-	-	-	-	-	100	350	450

TA- Teacher's Assessment

CT- Class Test

ESE- End Semester Examination

Total Marks-450

## **MCA-101 COMPUTER ARCHITECTURE**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Combinational Digital Circuits: Gates, Boolean Functions and Expressions, Designing Gate Networks, Useful Combinational Parts, Programmable Combinational Parts, Timing and Control, Latches, Flip-Flops and Registers, Sequential Circuits, Useful Sequential Parts, Programmable Sequential Parts, Clocks and Timing of Events.

### **UNIT II**

Computer System Technology: Components to Applications, Computer Systems and their Parts, Generations, Processor and Memory Technologies, Peripherals I/O and Communications, Software Systems and Applications.

### **UNIT III**

Instruction and addressing, instruction formats, types, addressing modes. Assembly Language Programs, Assembler Directives, Pseudo Instructions, Macroinstructions, Linking and Loading,.8085 Instruction Set.

### **UNIT IV**

Arithmetic/Logic Unit: Number Representation, Arithmetic Operations, Floating-Point Arithmetic.  
Memory System Design: Main Memory Concepts, Cache Memory Organization, Mass Memory Concepts, Virtual Memory and Paging.

### **UNIT V**

Input/Output and Interfacing, Input/Output Devices, Input/Output Programming, Interrupts.  
Vector And Array Processing, Shared-Memory, Multiprocessing, Distributed Multi Computing.  
Programming in 8085 Microprocessor.

**MCA-102 ACCOUNTING AND FINANCIAL MANAGEMENT**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

**UNIT I**

Definition of Accounting and its advantages & limitations, Scope of accounting, Branches of Accounting – Financial Accounting – Cost Accounting – Management Accounting, users of Accounting information, Methods of Accounting, Double Entry Accounting System,

**UNIT II**

Types of Accounts and Rules for Debit and Credit. Cash and Credit Transaction, Cash discount and Trade discount. Preparation of Journal, Ledger and Trial Balance. Final Accounts and Accounting Ratios, Preparation of Final Accounts (Sole Proprietorship only), Preparation of Trading A/c, Profit & Loss A/c and Balance Sheet covering simple adjustments.

**UNIT III**

Accounting Ratios: Meaning, Advantages and Limitations of Accounting ratios Computation of following ratios only: Gross Profit Ratio, Net Profit Ratio, Stock Turnover Ratio, Operating Ratio, Current Ratio, Liquid Ratio, Debtors Ratio, Creditors Ratio, Return on Capital Employed, Earning Per Share, Return on shareholders fund.

**UNIT IV**

Cost Accounting: Meaning and definition of Cost Accounting – its Advantages & Limitations Budgetary Control, Definitions – Advantages – Limitations, Procedure for setting up Budgetary Control, Different types of budgets, Advantages and limitations of Cash Budget and preparation of Cash Budget.

**UNIT V**

Marginal Costing: Meaning-Advantages- Limitations, Break Even Point, Margin of Safety, Profit Volume Ratio, Application of Marginal Costing including simple problems on make or buy and product mix.

## MCA- 103 DATABASE MANAGEMENT SYSTEMS

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### UNIT I

Overview of DBMS, Basic DBMS terminology, data base system v/s file system, data independence. Architecture of a DBMS Introduction to data models: entity relationship model, hierarchical model: from network to hierarchical, relational model, comparison of network, hierarchical and relational models.

### UNIT II

Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization.

### UNIT III

Aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree. Relational model: storage organizations for relations, relational algebra, relational calculus.

### UNIT IV

Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

### UNIT V

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection, Minus in SQL.

## MCA- 104 PROGRAMMING IN C

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### UNIT I

Problem Solving with Computers: Algorithms, and Flowcharts. Data types, constants, variables, operators, data input and output, assignment statements, conditional statements, string and character handling, data validation examples.

### UNIT II

Iteration, arrays, strings processing, defining function, types of functions, function prototype, passing parameters, recursion.

### UNIT III

Storage class specifiers, pre-processor, header files and standard functions. Pointers: Definition and uses of pointers, pointer arithmetic, pointers and array, pointers and functions,

### UNIT IV

Structures, union, pointers to structures, user-defined data types, enumeration. Introduction to Dynamic Memory Allocation

### UNIT V

Data files: Opening, closing, creating, processing and unformatted data files, command line arguments, systems calls.

**MCA-105 DISCRETE MATHEMATICS**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

**UNIT I**

Introduction to Discrete Mathematical Structures, Formal Methods: Introduction and Analogy, Abstraction. Fundamentals: Sets & Relations- Sets, Types of Sets, Multi Sets, Operations on Sets, Relations and Properties of Relations, Representation of Relations, Equivalence Relation, Closures of Relations, Methods of Proof-Direct Proofs, Indirect Proofs, Mathematical Induction, Method of Contradiction.

**UNIT II**

Combinatorics: Permutations and Combinations, Pigeon Hole Principle, Principle of Inclusion and Exclusion, Sequence and Series, Generating Functions.

**UNIT III**

Mathematical Logic Posets and Lattices: Partial Order Set, Bounding Elements, Well Ordered Set, Topological Sorting, Lattices, Principle of Duality, Bounded, Distributed, and Complemented Lattices, Proposition and Propositional Calculus.

**UNIT IV**

Graphs and Group Theory: Basic Introduction of Graphs- Types of Graphs, Path and Circuits, Eulerian Path and Circuits, Hamiltonian Path and Circuits, Shortest Path Algorithms, Group, Definitions and Properties, Coset & Subgroup, Normal subgroup, Homomorphism of groups, Cyclic Group, Permutation Group.

**UNIT V**

Finite State Machines and Languages: Grammar and Languages- Phrase structure Grammar, Types of Grammars and Languages, Finite State Machines and Languages, Minimization of Finite State Machines.

## MCA--201 C++ AND ALGORITHM AND DATA STRUCTURE

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### UNIT I

Evolution of OOP, OOP Paradigm, advantages of OOP, Comparison between functional programming and OOP Approach, characteristics of object oriented language – objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading.

Introduction to C++, Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, input and output, conditional expression loop statements, breaking control statements.

Defining function, types of functions, storage class specifiers, recursion, pre-processor, header files and standard functions,

### UNIT II

Arrays, pointer arithmetic's, structures, pointers and structures, unions, bit fields typed, enumerations. Classes, member functions, objects, arrays of class objects, pointers and classes, nested classes, constructors, destructors, inline member functions, static class member, friend functions, dynamic memory allocation.

Inheritance, single inheritance, types of base classes, types of derivations, multiple inheritance, container classes, member access control, Function overloading, operator overloading, polymorphism, early binding, polymorphism with pointers,

### UNIT III

virtual functions, late binding, pure virtual functions, opening and closing of files, stream state member functions, binary file operations, structures and file operations, classes and file operations, random access file processing.

DATA STRUCTURE: Basic data structures such as arrays, stack and queues and their applications, linked and sequential representation. Linked list, representation of linked list, multi linked structures.

### UNIT IV

Trees: definitions and basic concepts, linked tree representation, representations in contiguous storage, binary trees, binary tree traversal, searching insertion and deletion in binary trees, heap tree and heap sort algorithm, AVL trees.

Graphs and their application, sequential and linked representation of graph – adjacency matrix, operations on graph, traversing a graph, Dijkstra's algorithm for shortest distance, DFS and BFS,

### UNIT V

Hashing, Searching and sorting, use of various data structures for searching and sorting, Linear and Binary search, Insertion sort, Selection sort, Merge sort, Radix sort, Bubble sort, Quick sort, Heap Sort.

## MCA-202 COMPUTER ORIENTED NUMERICAL AND METHODS

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

### **UNIT II**

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution.

Gauss Seidal iterative method, Rate of Convergence, Interpolation and approximation: Finite Differences, Difference tables,

### **UNIT III**

Polynomial Interpolation: Newton's forward and backward formula, Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula.

Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation, Approximation of function by Taylor's series and Chebyshev polynomial

### **UNIT IV**

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Weddle's Rule Euler- Maclaurin Formula.

### **UNIT V**

Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge- Kutta methods, Predictor-corrector method, Automatic error monitoring, stability of solution.

Curve fitting and Approximation: Method of least squares, fitting of straight lines, polynomials, exponential curves etc.

(Emphasis must be given to algorithmic approach)

## **MCA-203 PROGRAMMING IN JAVA**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Overview of Object Oriented Concepts in Java. Introduction Java & internet, Java applets and its applications, Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic. Data types and control structures, operators, array, Java methods and classes. Inheritance of procedures and Data, packages and interface, exception handling, multithreaded

### **UNIT II**

programming thread priorities, synchronization, messaging, creating and controlling of threads. I/O and applets. String handling and various string functions. Java utilities like java.lang, java.util and their uses, java.io, basics of networking using Java.

### **UNIT III**

Java applets and their use – Event Handling – AWT and working with Windows – Event Handling – Event Handling Mechanisms, Delegation Event Model, Event Class, Event Listener Interfaces, Adapter Classes, Inner Class. AWT and working with windows – AWT Classes, Window fundamentals, frame windows, frame window in An Applet, Working with Graphics, color, fonts and text.

### **UNIT IV**

Java Beans – BDK, JAR files, Introspection, Developing simple bean using BDK, Bound Properties, BeanInfo, Interface, Constrained properties, Persistence, Customizers Servlets - Life cycle of servlet, use of tomcat for servlet, servlet API, Javax.Servlet package, servlet parameters, Javax.Servlet.http package, Handling HTTP requests and Responses, Cookies.

### **UNIT V**

JDBC – JDBC API, JDBC Drivers, Products, JDBC Design considerations, Two Tier and Three Tier client server model, Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements, Resultset and Resultset MetaData Object.

## **MCA-204 OPERATING SYSTEM**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Introduction: Definition and types of operating systems, Batch Systems, multi programming, time-sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.

Process Management: Process concept, Process scheduling, Cooperating processes, Threads,

### **UNIT II**

Inter-process communication, CPU scheduling criteria, Scheduling algorithms, Multiprocessor scheduling, Real-time scheduling and Algorithm evaluation.

Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors,

### **UNIT III**

Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation,

### **UNIT IV**

File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management, Swap-Space management, Disk reliability.

### **UNIT V**

Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption.

Case study : Windows NT-Design principles, System components, Environmental subsystems, File system, Networking and program interface.

**MCA-205 DATA COMMUNICATIONS AND COMPUTER NETWORKS**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

**UNIT I**

Overview, evolution of computer networks, computer telephony, Data communications – advantages of digital communication, transmission media, fundamentals of digital communications, transmission media, modulation techniques and modems.

**UNIT II**

The OSI seven layer network model, LAN technologies – protocols and standards, LAN hardware, TCP/IP and the Internet, Internet Architecture, Internet protocol and datagrams.,

**UNIT III**

Routing protocols, UDP, Internet standard services, DNS. Networking Technologies, ISDN, Cable Modem System, DSL, SMDS, Frame relay, fast Ethernet, 100VG-anyLAN and Gigabit Ethernet, FDDI and CDDI, Asynchronous Transfer,

**UNIT IV**

SONET, DWDM Switching and Virtual LAN, Non-ATM Virtual LANs, IEEE 802.1Q VLAN standard, Network Performance, Analytical approaches, simulation, traffic monitoring.

**UNIT V**

Network Management – SNMP, RMON and RMNv2, TMN, Directory services and network management. Issues related to network reliability and security, SSL and VPN, Introduction only to firewalls and Kerberos, Cyber Laws.

**MCA-301 JAVA TECHNOLOGIES**

**(L: 3: T: 1)**

**Max.Marks:100**  
**Min.Marks:40**

**UNIT I**

Introduction to Java Enterprise, API JDBC, fundamentals, J2EE multi-tier architecture, Web Applications in J2EE.

**UNIT II**

Servlets fundamentals – architecture, life cycle of a servlet, initialization, threads, servlets and HTML, retrieving data in servlet, servicing the GET and POST requests,

**UNIT III**

Servlet sessions –session tracking, cookies, Servlets, JDBC and Inter servlet communications – JDBC, Driver types, JDBC servlet,

**UNIT IV**

JDBCconnection pool, inter servlet communication, servlet security and different packages of JSP and servlets.

**UNIT V**

JSP fundamentals – architecture, implicit objects, standard actions, JSP errors. J2ME – introduction, building MIDlets, creating a user interface, event handling with commands, tickers, screens, textbox, lists and forms.

## **MCA-302 WEB TECHNOLOGIES AND DEVELOPMENT**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

The internet: history of the world wide web, hardware and software trend, object technology – java script object, scripting for the web-browser portability.

Introduction of HTML: introduction, markup language, editing HTML : common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML tables : intermediate HTML tables and formatting : basic HTML forms, more complex HTML forms, internal linking, creating and using image maps.

### **UNIT II**

Java script – introduction to scripting: introduction- memory concepts- arithmetic- decision making. Java script control structures, Java script functions: introduction – program modules in java script - function definitions, duration of identifiers, scope rules, recursion, java script global functions.

Java script arrays: introduction, array-declaring and allocating arrays, references and reference parameters – passing arrays to functions, multiple subscripted arrays. Java script objects: introduction, math, string, data, boolean and number objects.

### **UNIT III**

Dynamic HTML : CSS : introduction – inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the box model, user style sheets.

Dynamic HTML: object model and collections: introduction, object referencing, collections all and children, dynamic style, dynamic positioning, using the frames collection, navigator object.

### **UNIT IV**

Dynamic HTML: event model : introduction, event ON CLICK, event ON LOAD – error handling with ON ERROR, tracking the mouse with event, more DHTML events.

Filters and Transitions: Dynamical HTML: Client side scripting with VB script: Introduction - operators- data types and control structures – VB script functions – arrays –string manipulation classes and objects.

### **UNIT V**

Introduction to PHP – Advantages of PHP – Functions – Data types – Arrays – SQL – Connecting Databases using ODBC – Files – Forms – Images –Imap objects.

## MCA-303 COMPUTER GRAPHICS

(L: 3: T: 1)

**Max.Marks:100**

**Min.Marks:40**

### UNIT I

Introduction: Elements of graphics workstation. Video Display Devices. Raster Scan Systems. Random Scan systems. Input devices. Graphics Software Coordinate Representations, Fundamental Problems in Geometry.

Algorithms: Line drawing algorithms- DDA Algorithm. Bresenham's Line Algorithm. Framebuffers. Circle and Eclipse generating algorithms. Midpoint Circle Algorithm. Scan-line polygon fill algorithm. Inside-Outside tests. Scan- Line fill of curved Boundary Areas. Boundary fill Algorithm. Flood fill Algorithm. Character generation. Attributes of lines, curves, filling, characters. etc.

### UNIT II

Graphics Primitives: Primitive Operations, The display file interpreter-Normalized Device Coordinates. Display- File structure. Display – file algorithm. Display control and Polygons/polygon representation.

Attributes of output primitives: Line attributes - Line type. Line width. Pen and Brush options. Line Color. Color and gray scale levels. Color-tables. Gray scale. Area- Fill Attributes- Fillstyles. Pattern fill. Soft fill. Character Attributes. Text attributes.

### UNIT III

Geometric Transformations: Matrices. Scaling Transformations. Sin and Cos Rotation. Homogeneous Coordinates and Translation. Co-ordinate Translations. Rotation about an arbitrary point. Inverse Transformations, Transformations Routines.

2-D Viewing- The viewing pipeline. Viewing co-ordinate, Reference Frame. Windows to view ports . co-ordinate transformation 2-D Viewing functions. Clipping operations point clipping.

Line clipping. Cohen- Sutherland. Line Clipping. Polygon clipping. Sutherland Hodge man clipping.

### UNIT IV

3-D concepts. Three dimensional Display Methods Parallel projection. Perspective projection. Visible line and surface identification. Surface rendering. Three Dimensional Object representations. Bezier curves and surfaces. B-Spline curves and surfaces. Visibility , Image and object precision Z- buffer algorithm. Floating horizons.

### UNIT V

Computer Animation: Design of Animation Sequences. General Computer Animation Functions-Raster Animations. Key Frame Systems, Morphing Simulating Accelerations. Motion Specifications. Kinematics and Dynamics.

**MCA-304 ADVANCED DATABASE SYSTEM**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

**UNIT I**

Object-based Databases: Object-Oriented Databases: Object-oriented data model, Object Oriented languages, Persistent Programming Languages. Object-Relational Databases: Nested Relations, Complex Types, Inheritance, Reference Types, Querying with Complex Types, Functions and Procedures Storage for Object Databases

**UNIT II**

Distributed Databases : Distributed Data Storage, Distributed Transactions, Commit protocol, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing

**UNIT III**

Parallel Databases : I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Design of Parallel Systems

Deductive Databases : Introduction to Recursive Queries, Theoretical Foundations, Recursive Queries with Negation, From Datalog to SQL, Evaluating Recursive Queries

**UNIT IV**

Information Retrieval and XML Data : Introduction to Information Retrieval, Indexing for Text Search, Web Search Engines, Managing Text in a DBMS, A Data Model for XML, Xquery, Efficient Evaluation of XML Queries.

**UNIT V**

PL/SQL basics, blocks, architecture, variables and constants, attributes, character set, PL/SQL sentence structure, data types, precompiler, conditional and sequential control statements, control structures, conditional control, sequential control, cursors, exceptions, triggers, procedures and packages.

## **MCA-305 SYSTEM ANALYSIS AND DESIGN**

**(L: 3: T: 1)**

**Max.Marks:100**  
**Min.Marks:40**

### **UNIT I**

System Concepts and Information Systems Environment: The System Concept: Definition, Characteristics of Systems, Elements of a System, Open and Closed System, Formal and Informal Information Systems, Computer based Information Systems, Management Information System, Decision Support System, General Business Knowledge, and Interpersonal Communicational System.

### **UNIT II**

System Development Life Cycle: Recognition of needs, Impetus for System Change, Feasibility Study, Analysis, Design, Implementation, Post implementation and Maintenance. Role of the Systems Analyst, The Analyst/User Interface, Behavioral issues.

### **UNIT III**

Systems Planning and Initial Investigation: Strategies for Determining Information Requirement, Problem Definition & Project initiation, Background Analysis, Fact Analysis, Review of Written Documents, Onsite Observations, Interviews and Questionnaires, Fact Analysis, Performance Analysis, Efficiency Analysis, Service Analysis.

### **UNIT IV**

Information Gathering: need, Information about the firms, Information gathering tools, Interviewing, Arranging the Interview, Guides to a Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives.

Tools of Structured Analysis: The Dataflow Diagram (DFD), Data Dictionary, Decision Trees and Structured English.

### **UNIT V**

Feasibility Study: System performance, Economic Feasibility, Technical Feasibility, Behavioral Feasibility, Steps in Feasibility Analysis.

Input/Output and Forms Design: Input Design, CRT Screen Design, Output Design, and Requirements of form Design.

H/W / S/W Selection, Make V/s Buy decision and Maintenance, Documentation: Importance, Types of documentation, Security and disaster planning and management.

## MCA-401 SOFTWARE ENGINEERING

(L: 3: T: 1)

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Software Engineering Paradigms : Software Characteristics, Software myths, Software Applications, Software Engineering Definitions, Various Software Process Models, Process iteration, Process activities, The Rational Unified Process, Computer-aided software engineering Project Management, Management activities, Project planning, Project scheduling, Risk management

### **UNIT II**

Software Requirements, Functional and non-functional requirements, User requirements, System requirements, Interface specification, software requirement document Requirements Engineering Processes, Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management System Models, Critical Systems Specification, Risk-driven specification, Safety specification, Security specification, Software reliability specification

### **UNIT III**

Software Metrics and Measures — Process Metrics, Project metrics, Software Project Planning, Empirical, Putnam, COCOMO. Risk Identification and Projection: RMMM, Project Scheduling and Tracking. Application Architectures — Data processing systems, Transaction processing systems, Event processing systems, Language processing systems, User Interface Design — Design issues, The user interface design process, User analysis, User interface prototyping, Interface evaluation

### **UNIT IV**

Rapid Software Development — Agile methods, Extreme programming, Rapid application development, Software prototyping. Software Reuse — Design patterns, Generator-based reuse, Application frameworks, Application system reuse, Software Evolution Verification and validation, Verification and Validation — Planning verification and validation, Software inspections, Automated static analysis, Verification and formal methods.

### **UNIT V**

Software Testing — System testing, Component testing, Test case design, Test automation. Software Cost Estimation — Software productivity, Estimation techniques, Algorithmic cost modeling, Project duration and staffing.

Quality Management — Process and product quality, Quality assurance and standards, Quality planning, Quality control, Software measurement and metrics

Process Improvement — Process and product quality improvement, Process classification,

Process measurement — Process analysis and modeling, Process change, The CMMI process improvement framework.

## **MCA-402 .NET FRAMEWORK AND PROGRAMMING IN ASP.NET**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Introduction to .NET Framework : Genesis of .Net – Features of .Net - .Net binaries – Microsoft Intermediate Language – Meta Data - .Net types and .net name spaces – Common Language Runtime – Common Type System – Common Language Specification - .Net Applications using command line compiler and visual studio .net IDE.

### **UNIT II**

Basics of ASP. NET : Introducing ASP .NET – Creating and deploying ASP .NET applications – Web forms – Web controls – working with events – Rich web controls – Custom web controls – Validation controls – Debugging ASP .NET pages.

### **UNIT III**

Advanced ASP .NET : ASP .NET configuration – Business objects – HTTP Handlers – Caching in ASP .NET – ASP .NET security – Localizing ASP .NET applications – Deployment projects.

### **UNIT IV**

Building Web Services : Introduction to web services – Web services Infrastructure – SOAP – Building a web service – Deploying and publishing web services – Finding web services – Consuming web services.

### **UNIT V**

Ado .NET: Basics of ADO .NET – Changes from ADO – Data Table – Data Views – Data Set – Data Relation Type – ADO .NET Managed Providers – OLEDB and SQL Managed Providers – OleDb Data Adapter Type.

## **MCA-403 OPEN SOURCE OPERATING SYSTEM**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Introduction to the Concept of Open Source Software, Linux, Linux Architecture, Linux file system (inode, Super block, Mounting and Unmounting ), Essential Linux Commands, Kernel, Process Management in Linux, Signal Handling, System call, System call for Files, Processes and Signals.

### **UNIT II**

Shell Programming – Introduction to Shell, Various Shell of Linux, Shell Commands, I/O Redirection and Piping, Vi and Emacs editor, Shell control statements, Variables, if-then-else, case-switch, While, Until, Find, Shell Metacharacters,

### **UNIT III**

Shell Scripts, Shell keywords, Tips and Traps, Built in Commands, Shell Procedures and Reporting, Handling documents, C language programming, Prototyping, Coding, Compiling, Testing and Debugging.

### **UNIT IV**

Linux System Administrations – File listings, Ownership and Access Permissions, File and Directory types, Managing Files, User and its Home Directory, Booting and Shutting down (Boot Loaders, LILO, GRUB, Bootstrapping, init Process, System services).

### **UNIT V**

Internet and Web service tools, E-mail, Remote Login and FTP, Networks and server setup, LAN, Connection with Internet, Setting up routers, Proxy Servers, Print Servers, File Server, Mail server, FTP server, Web server and News server, DHCP and NIS, Database server.

## **MCA-404 ARTIFICIAL INTELLIGENCE**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Concept of intelligence, Artificial intelligence, definition turning test, areas of application. Search techniques, state space, Production rules, problem characteristics, production system characteristic, depth first, breadth first search methods and their analysis,

### **UNIT II**

Heuristic search method, generate and test, hill climbing, best first method, graph search, AND OR search methods, constraint satisfaction, backtracking.

Introduction to list and string processing and dynamic databases concept of knowledge,

### **UNIT III**

characteristics and representation schemes, Logic, propositional and predicate calculus, resolution, semiotics nets, frames, conceptual dependency, scripts Monotonic reasoning, logical reasoning induction, natural deduction.

### **UNIT IV**

Nonmonotonic reasoning – default reasoning minimalist reasoning, statistical reasoning – Baye’s theorem, certainty factors, dempster shafer theory, Fuzzy logic.

Concept of learning, inductive and deductive. Knowledge acquisition, rote learning, discovery analogy.

### **UNIT V**

Concept of expert system, need for an expert system, Component and categories of an expert system, need for an expert system, Stages in the development of an expert system.

## **MCA-405 E-COMMERCE**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Introduction, Definition, Objectives, Advantages and disadvantages, Forces driving ECommerce, Traditional commerce Vs. E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce.

### **UNIT II**

E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, other models – Brokerage Model, Aggregator Model, Info-mediary Model, Community Model and value chain Model.

### **UNIT III**

Electronic Payment Systems: Special features required in payment systems, Types of Epayment systems, E-Cash, E-cheque, credit card, Smart Card, Electronic Purses.

### **UNIT IV**

E-Marketing, E-Customer Relationship Management, E-Supply Chain Management.

### **UNIT V**

Security Issues in E-Commerce: Security risk of E-Commerce, Types of threats, Security tools and risk management approach. Cyber laws, Business Ethics, EDI Application in business.

## MCA-406 COMPILER DESIGN

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Introduction to translators, compilers, interpreters, compilation process. Programming language grammars, derivations, reductions, regular expression, context free language and grammar. Lexical analyzer, input buffering, specification and recognition of tokens, introduction to finite automata, regular expressions to NFA, minimization of DFA, keywords and reserve word policies, LEX – the lexical analyzer generator.

### **UNIT II**

Syntax analyzer, context free grammars, top down parsing, brute force parser, recursive descent parser, LL(1) parser, Bottom up parsing, operator precedence parsing, simple precedence parsing, LR parser, LALR parser, YACC – the parser generator.

Syntax directed translation schemes, implementation of syntax directed translators, synthesized attributes, inherited attributes, dependency graph, evaluation order, construction of syntax trees,

### **UNIT III**

directed acyclic graph of expression, bottom up evaluation of S- attributed definitions, L attributed definitions, top down translation of L - attributed definitions.

Errors, lexical phase errors, syntactic phase errors.

Intermediate languages, postfix notation, syntax trees, parse trees, three address code, triples and indirect triples.

Translation of assignment statements, Boolean expressions, statements that alter flow of control array references, procedure calls, declarations, case statement, record structures.

### **UNIT IV**

Symbol tables, operation on symbol tables, symbol table organization for non-block structured languages, symbol table organization for block – structured languages.

Run time storage management, storage allocation and referencing data in block structured language, storage allocation.

### **UNIT V**

Code optimization, sources of optimization, loop optimization, DAG and optimization of basic blocks.

Code generation, a machine model, next use information register allocation and assignment, a simple code generator, code generation from DAG's, Peephole optimization.

## **MCA-407 DATA MINING AND DATA WAREHOUSING**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Data Warehousing: Introduction, Definition, Multidimensional data transformation, OLAP operations, Ware house schema, Ware house Server, Other features.

### **UNIT II**

Data Mining: Introduction, Definition, KDD vs. DM, DBMS vs. DM, DM Techniques, Issues and Challenges in DM, DM Applications.

Association Rules: A Prior Algorithm, Partition, Pincer search, Incremental, Border, FP-tree growth algorithms, Generalized association rule.

### **UNIT III**

Classification: Parametric and non-parametric technology: Bayesian classification, two class and generalized class classification, classification error, Decision boundary, Discriminate functions, Non-parametric methods for classification.

### **UNIT IV**

Clustering: Hierarchical and non-hierarchical techniques, K-MEDOID Algorithm, Partitioning, Clara, Clarans. Advanced Hierarchical algorithms

Decision Trees: Decision tree induction, Tree pruning, Extracting classification rules from decision trees, Decision tree construction algorithms, Decision tree construction with presorting.

### **UNIT V**

Other Techniques for Data mining: Introduction, Learning, Neural Networks, Data mining using neural networks, Genetic algorithms. Web Mining: Web mining, Text mining, Content mining, Web structure mining. Searching Techniques: Optimal, non-optimal, Minmax, H-I pruning.

## **MCA-501 OBJECT ORIENTED SOFTWARE ENGINEERING**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

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

### **UNIT II**

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

### **UNIT III**

Object- oriented concepts and principles. Identifying the elements of an object model. Object oriented projects metrics and estimation.

### **UNIT IV**

Design for object – oriented systems. The system design process. Object – oriented testing – testing OOA and OOD models. The object – oriented testing strategies. Inter class testing.

### **UNIT V**

Technical metrics for O-O systems. Class oriented metrics and metrics for O-O projects.

Advanced topics in software engineering. Component based software engineering and development. Classifying and retrieving components.

## MCA-502 ANALYSIS AND DESIGN OF ALGORITHMS

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### UNIT I

Introduction:- algorithm definition and specification – Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences, Performance analysis– Elementary Data structures:- stacks and queues – trees – dictionaries – priority queues –sets and disjoint set union – graphs – basic traversal and search techniques.

### UNIT II

Divide – and – conquer:- General method – binary search – merge sort – Quick sort – The Greedy method:- General method – knapsack problem – minimum cost spanning tree – single source shortest path.

### UNIT III

Dynamic Programming – general method – multistage graphs – all pair shortest path – optimal binary search trees – 0/1 Knapsack – traveling salesman problem – flow shop scheduling.

### UNIT IV

Backtracking:- general method – 8-Queens problem – sum of subsets – graph coloring – Hamiltonian cycles – knapsack problem – Branch and bound:- The Method – 0/1 Knapsack problem – traveling salesperson.

### UNIT V

Parallel models:-Basic concepts, performance Measures, Parallel Algorithms: Parallel complexity, Analysis of Parallel Addition, Parallel Multiplication and division, parallel Evaluation of General Arithmetic Expressions, First-Order Linear recurrence.

## MCA-503 WIRELESS TECHNOLOGIES

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### UNIT I

Introduction, wireless transmission - frequencies for radio transmission - signals - antennas - signal propagation - multiplexing - modulation - spread spectrum - cellular systems – medium access control - specialized MAC - SDMA - FDMA - TDMA - aloha - CSMA – collision avoidance - polling - CDMA - comparison of S/T/F/CDMA

### UNIT II

Telecommunication systems - mobile services - system architecture - radio interface – protocols - localization and calling - handover - security - new data services - satellite systems- broadcast systems - digital audio broadcasting - digital video broadcasting, WDM Optical networks.

### UNIT III

Wireless LAN - infrared Vs radio transmissions - infrastructure and adhoc networks – IEEE 802.11 b/a/g - bluetooth - IEEE 802.16, Mobile network layer - mobile IP - packet delivery - registration - tunneling and encapsulation - optimizations - reverse tunneling - dynamic host configuration protocol

### UNIT IV

Adhoc networks - routing - algorithms - metrics - mobile transport layer - TCP - indirect TCP -snooping TCP - mobile TCP - retransmission - recovery - transaction oriented TACP – support for mobility - file systems - WWW - WAP - architecture - datagram protocol –

### UNIT V

Transport security - transaction protocol - session protocol - application - environment - WML – WML script - wireless telephony application.

## MCA-504 BIO-INFORMATICS

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Introduction – Importance of Bioinformatics – Biological Sequence Structure – Deficit – Genome Projects – Status – Sequence analysis – Homology and analogy.

EMBNET – NCBI – virtual Tourism. Primary Sequence Databases Biological data base – Primary Sequence Database – Composite Protein Sequence Database – Secondary Database - Composite Protein – Pattern database structure and classification of database.

### **UNIT II**

Genome Information Resources - DNA Sequence data base – Specialised genomic Resources.

DNA Sequence analysis : Why analyse DNA? – Gene structure – Features of DNA sequence analysis – Issues in the interpretation and EST search – Approach of Gene hunting – Cell CDNA libraries and ESTs – Approaches to EST analysis – Effect of EST data on DNA data base examples of EST analysis.

### **UNIT III**

Data Base Searchers and Pair Wise Alignment Data base searching – Alphabets and Complexity – Comparing Two Sequences – Sub-Sequence – Identity and Similarity – Dot plots – Simple alignment – Gaps – Scoring Matrices – Dynamic programming – BLAST and its relative – FSTA and related algorithms – Alignment scores and statistical significance of data base sequences.

### **UNIT IV**

Global and local Alignments : Algorithms – Similarities – Semi global alignment Multiple Sequence Alignment : Goal – Definition – Consensus – Complex – methods – Database of multiple Alignment – searching database with multiple alignment.

Methods of Photo Genetics.: Distance Based Methods – Based Methods – Comparison.

### **UNIT V**

RNA Structure: Amino Acids – Polypeptide Composition Algorithm – Modeling protein folding prediction – RNA Sequence Structure.

Proteomics: Classification – Techniques – Inheritors – Drying Design – Structures – X-Ray Crystal – NMR – Empirical methods and prediction techniques.

**MCA-505 GEO-INFORMATICS**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

**UNIT I**

Basic concepts about Spatial information, Definition, Historical evolution and need for spatially based resource information system, objectives of GIS - Manual v/s automated GIS.

**UNIT II**

Data structure types of data structure, Raster and Vector formats, advantages and disadvantages of various data structures and data formats.

**UNIT III**

Data input: data pre-processing, methods of data capture, digitization and scanning methods, commonly used map projections and ellipsoids.

**UNIT IV**

The format of GIS - Handling digital Geographical Information Data - Analysis of single data planes in Raster format - Analysis of Multiple data planes in Raster format - Uses of topographic data in Raster format - Data structures for thematic maps.

**UNIT V**

Digital Elevation Model (DEM): need, methods, data sources and products of DEM – Digital Terrain Modeling (DTM) - Input verification, storage and methods of data analysis for Spatial modeling - Methods of GIS and Spatial interpolation

## **MCA-506 INFORMATION PROTECTION AND SECURITY**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

Introduction to Cryptography: Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model, and Steganography, Classical Encryption Techniques.

### **UNIT II**

Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.

### **UNIT III**

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

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

### **UNIT IV**

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

### **UNIT V**

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

## MCA-507 EMBEDDED SYSTEMS

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

An Overview of Embedded system, Requirements, Challenges issues, and trends in software development. Application market segments, control system and industrial automation, Data communication, Networked Information Appliances, Telecommunications.

### **UNIT II**

Hardware Architecture: Processor, Memory, Latches and buffers, ADC & DAC, Application specific control, Display units, keypads, DSP.

### **UNIT III**

Microcontrollers and their applications, Communication interfaces: Serial interface, IEEE 1394, USB, Infra red, Ethernet and PCI bus.

### **UNIT IV**

Embedded system development process : requirement , system architecture, operating system and processes. Development platform and tools, HLL support Cross compilers, Linux and Windows CE based development Tools. Mobile/ handheld systems.

### **UNIT V**

Basic idea of embedded system application like mobile networks, GPS, Real time system, Database applications, Networked and JAVA-enabled information appliances, Mobile JAVA applications.

## **MCA-508 ERP SYSTEMS**

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### **UNIT I**

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

### **UNIT II**

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

### **UNIT III**

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

### **UNIT IV**

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

### **UNIT V**

Technologies in ERP Systems and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues discussed in above units through Soft System approaches or qualitative Analysis tools, Learning and Emerging Issues, ERP and ECommerce.

Concept of E-Governance : Concept, E-Governance frame work, area of application like public sector, service industry.

## MCA-509 SOFT COMPUTING

**(L: 3: T: 1)**

**Max.Marks:100**

**Min.Marks:40**

### UNIT I

Overview of Crisp sets and fuzzy sets : Basic concepts of crisp sets and fuzzy sets, Basic types of fuzzy sets, Fuzzy sets verses crisp sets, Representation and extension principle for fuzzy sets, Operations on Fuzzy sets Fuzzy Relations and Fuzzy Logic: Crisp versus Fuzzy relations, Binary relations on fuzzy sets, Equivalence, compatibility and ordering relations, Morphisms and compositions of relations, Fuzzy relations equations, Fuzzy measures and possibility theory, Classical logic and multivalued logics, Fuzzy propositions and approximate reasoning

### UNIT II

Fuzzy systems and neuro fuzzy systems : Relevance of integration between fuzzy sets and neural networks – pros and cons, Fuzzy neurons, Fuzzy neural networks, Neuro fuzzy systems, Fuzzy associative memories Introduction to Genetic Algorithms : What are genetic algorithms?, Robustness of traditional optimisation and search methods, The Goals of optimisation, How are genetic algorithms different from traditional methods?, A simple genetic algorithm, Genetic algorithms at work – a Simulation by hand, Grist for the Search Mill – Important Similarities, Similarity Templates (Schemata), Learning the Lingo.

### UNIT III

Genetic Algorithms Revisited : Mathematical Foundations, Who shall live and who shall die? The fundamental Theorem, Schema processing at work: An example by hand revisited. The two-armed and k-armed bandit problem, How many schemata are processed usefully?, The building block hypothesis, Another perspective: The minimal deceptive problem, Schemata revisited: similarity templates as hyper planes.

### UNIT IV

Computer Implementation of A Genetic Algorithm : Data Structures, Reproduction, Crossover, and mutation, A Time to reproduce, a time to cross, Get with the main program, How well does it work?, Mapping objective functions to fitness form, Fitness scaling, Codings, A multiparameter, Mapped, Fixed-Point coding, Discretization, Constraints

### UNIT V

Introduction To Genetic-Based Machine Learning : Genetics-Based machine learning: whence it came, What is a classifier system?, Rule and message system, Apportionment of credit: The bucket brigade, Genetic algorithm, A simple classifier system in Pascal, Results using the simple classifier system

Guidelines :

1. Paper MCA-408, At least one case study of industry standard software must be carried out along with one system design project. This will be a group activity having maximum of 3 students.
2. Paper MCA-510 will be a group activity having maximum of 3 students.
3. Paper MCA-513 will be individual activity in which student has to prepare and present a seminar along with report on some latest topic related with information technology.