

A P S UNIVERSITY, REWA (MP)
MASTER OF COMPUTER APPLICATION (MCA)
SCHEME OF EXAMINATION(w.e.f. Session 2013-14)

FIRST SEMESTER

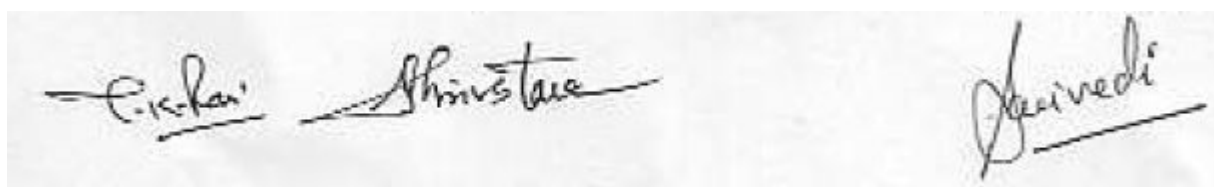
SN	Paper Code	Paper Name	Theory Marks Max(Min)	CCE Marks Max(Min)	Total Marks (Min)
1	MCA101	Information Technology	70(24)	30(15)	100
2	MCA102	Mathematical Foundation of Computer Science	70(24)	30(15)	100
3	MCA103	Programming and Problem solving in C	70(24)	30(15)	100
4	MCA104	Computer Organization & Assembly Lang. Prog.	70(24)	30(15)	100
5	MCA105	Communication Skills	70(24)	30(15)	100
6	MCA106	Lab I – Prog. In C			100(50)
7	MCA107	Lab II – Assembly Lang. Prog			100(50)
		TOTAL			700

SECOND SEMESTER

SN	Paper Code	Paper Name	Theory Marks Max(Min)	CCE Marks Max(Min)	Total Marks (Min)
1	MCA201	Operating System	70(24)	30(15)	100
2	MCA202	Data Structure	70(24)	30(15)	100
3	MCA203	Computer Oriented Numerical & Statistical Methods	70(24)	30(15)	100
4	MCA204	Database Management System(DBMS)	70(24)	30(15)	100
5	MCA205	Organization and Management Concepts	70(24)	30(15)	100
6	MCA206	Lab I – Data Structure			100(50)
7	MCA207	Lab II – DBMS			100(50)
		TOTAL			700

THIRD SEMESTER

SN	Paper Code	Paper Name	Theory Marks Max(Min)	CCE Marks Max(Min)	Total Marks (Min)
1	MCA301	Theory of Computation	70(24)	30(15)	100
2	MCA302	Software Engineering Methodologies	70(24)	30(15)	100
3	MCA303	Object Oriented Methodology & C++	70(24)	30(15)	100
4	MCA304	Computer Networks	70(24)	30(15)	100
5	MCA305	Accounting and Financial Systems	70(24)	30(15)	100
6	MCA306	Lab I - C++			100(50)
7	MCA207	Lab II - Accounting Packages			100(50)
		TOTAL			700



FOURTH SEMESTER

SN	Paper Code	Paper Name	Theory Marks Max(Min)	CCE Marks Max(Min)	Total Marks (Min)
1	MCA401	Information Storage & Management	70(24)	30(15)	100
2	MCA402	Computer Graphics & Multimedia	70(24)	30(15)	100
3	MCA403	Design & Analysis of Algorithms	70(24)	30(15)	100
4	MCA404	Java Programming & Technologies	70(24)	30(15)	100
5	MCA405	Data Mining and Warehousing	70(24)	30(15)	100
6	MCA406	Lab I - Computer Graphics			100(50)
7	MCA407	Lab II - Java Programming			100(50)
		TOTAL			700

FIFTH SEMESTER

SN	Paper Code	Paper Name	Theory Marks Max(Min)	CCE Marks Max(Min)	Total Marks (Min)
1	MCA501	Artificial Intelligence	70(24)	30(15)	100
2	MCA502	Internet & Web Technology	70(24)	30(15)	100
3	MCA503	Cloud Computing	70(24)	30(15)	100
4	MCA504	Elective I - (a) Soft Computing (b) Dot net Technology	70(24)	30(15)	100
5	MCA505	Elective II - (a) Bio Informatics (b) Network Security	70(24)	30(15)	100
6	MCA506	Lab I - Cloud Computing			100(50)
7	MCA507	Lab II - Web Technology			100(50)
		TOTAL			700

SIXTH SEMESTER

SN	Paper Code	Paper Name	External Evaluation	(IA)	Total Marks (Min)
1	MCA601	Major Project	300	200	500(250)
		TOTAL			500

GRAND TOTAL(I to VI Sem. Marks)

4000 Marks

P. K. S. K. S.
Shrivastava
J. S. S. S.

MCA – FIRST SEMESTER
MCA-101 Information Technology

UNIT-I

Basic concepts of IT, concepts of Data & Info, data processing, history of computers (generation, type of languages), organization of computers, I/O devices, storage devices, system software, application software, utility packages, numerical based on storage devices.

UNIT-II

Assembler : Elements of assembly language programming, a simple assembly scheme, pass structure of assembler, design of two pass assemblers, a single pass assemblers. Macros & Macro Processors : Macro definition & Call, Macro expansion Nested macro calls, advanced macro facilities, design of macro processors.

UNIT-III

Compilers & Interpreters : aspects of compilation, memory allocation, compilation of expression compilation of control structures, code optimization, interpreters. Software Tools : Software tools for program development, editors, debug monitors, programming environment, user interfaces.

UNIT-IV

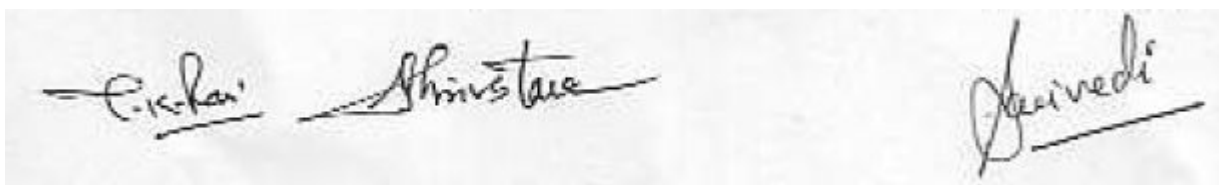
Linker & Loaders : Relocation & linking concepts, design of linkers, self relocating programs, a linker for MS DOS, linking for overlays, loaders : A two pass loader scheme, Relocating loaders, subroutine linkage, Direct linkage loader, Binders overlays.

UNIT-V

Sequential file organisation, random file organisation, index structure, indexed file organisation, alternate key indexed sequential files, multi key organisation, multi key access, multi list file organisation, inverted files & their definitions, insertion, deletion, operations with optimum utilization of memory, comparison of various type of file organisation.

BOOKS

1. D.M. Dhamdhare “ System Programming & O.S.” 2nd Ed., Tata Mc. Graw Hill.
2. J. Donovan “System Programming” THM.
3. Rajaraman V. “Fundamental of Computers” (4nd edition.) Prentice Hall of India, New Delhi 2004.
4. Sanders D.H. “Computer’s today” McGraw Hill 1988.
5. S.Jaiswal, “Fundamental of Computer & IT”, Wiley dreamtech India..



Handwritten signatures of three individuals: 'S. Jaiswal', 'Shrivastava', and 'S. Jaiswal'.

MCA – FIRST SEMESTER
MCA-102 Mathematical Foundation of Computer Science

UNIT-I

Sets, Relations and Functions:

Sets, Subsets, Power sets, Complement, Union and Intersection, Demorgan's law Cartesian products, Relations, relational matrices, properties of relations, equivalence relation, functions, Injection, Surjection and Bijective mapping, Composition of functions, the characteristic functions and Mathematical induction.

UNIT-II

Propositions & Lattices :

Proposition & propositional functions, Logical connections Truth-values and Truth Table, the algebra of propositional functions-the algebra of truth values-Applications (switching circuits, Basic Computer Components). Partial order set, Hasse diagrams, upper bounds, lower bounds, Maximal and minimal element, first and last element, Lattices, sub lattices, Isotonicity, distributive inequality, Lattice homomorphism, lattice isomorphism, complete lattice, complemented lattice distribution lattice.

UNIT-III

Groups

Binary Composition, Algebraic Structure, Algebraic properties or Group axioms, Monoid, Semi group, Groupoid, Groups, Abelian Groups, Finite and Infinite Group, Integral power of an element, order of an element of a group, Transformations, Permutation and permutations group, Cyclic permutation, Even and odd permutations, Subgroups of a group, Cosets, Lagrange theorem, Cyclic groups, Normal subgroups.

UNIT-IV

Graphs:

Finite graphs, incidence and degree, isomorphism, sub graphs and union of graphs, connectedness, walk, paths, and circuits Eulerian graphs, tree properties of trees, pendant vertices in tree, center of tree, spanning trees and cut vertices, binary tree, matrix representation of graph, incidence and adjacency matrix and their properties, applications of graphs in computer science.

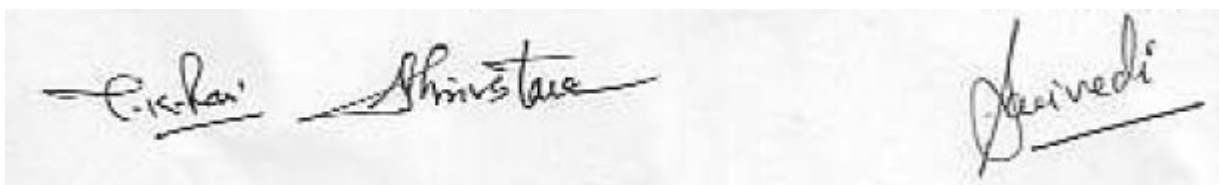
UNIT-V

Discrete Numeric function and Recurrence relation:

Introduction to discrete numeric functions and generating functions introduction to recurrence relations and recursive algorithms, linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions

BOOKS

1. J.P.Trembley & R.P.Manohar "Discrete Mathematical Structure with applications to Computer Science".
2. M. K. Gupta, Discrete Mathematics, Krishna Prakashan Media (P) Ltd.
3. Kenneth H. Rosen-203 "Discrete Math & its Applications"
4. K.A. Ross and C.R.B. Wriht "Discrete Mathematics"
5. Bernard Kolman & Robert C. Busby "Discrete Mathematical Structures for Computer Science".



The image shows three handwritten signatures in black ink on a light-colored background. From left to right, the signatures are: 'S. K. Gupta', 'Shrivastava', and 'S. K. Gupta'. Each signature is written in a cursive style and is underlined.

MCA – FIRST SEMESTER
MCA-103 Programming and Problem Solving in C

UNIT-I

An overview: Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithms & flowcharts; Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/ conventions of coding, documentation, naming variables; Top down design; Bottom-up design.

UNIT-II

Fundamentals of C Programming: History of C; Structure of a C Program; Data types; Constant & Variable, naming variables; Operators & expressions; Control Constructs – if-else, for, while, do-while; Case switch statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

UNIT-III

Modular Programming: Functions; Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, comparison with iteration, types of recursion- direct, indirect, tree and tail recursion, when to avoid recursion, examples.

UNIT-IV

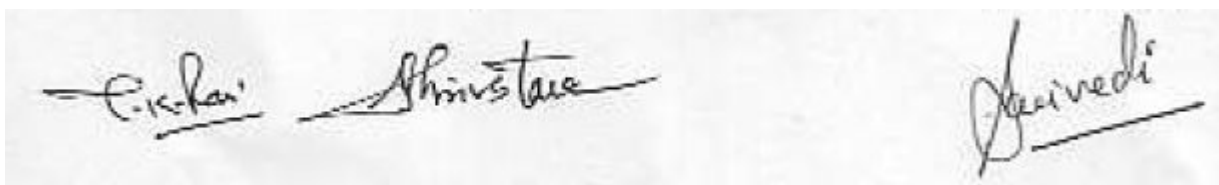
Advanced Programming Techniques: Special constructs – Break, continue, exit(), goto & labels; Pointers - & and * operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(); String; Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers; Pointer to function, Function as parameter; Structure – basic, declaration, membership operator, pointer to structure, referential operator, self referential structures, structure within structure, array in structure, array of structures; Union – basic, declaration; Enumerated data type; Typedef; command line arguments.

UNIT-V

Miscellaneous Features: File handling and related functions; printf & scanf family; C preprocessor – basics, #include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef; Variable argument list functions.

BOOKS:

1. Kernighan & Ritchie “The C programming language”, PHI
2. Schildt “C: The Complete reference” 4th ed TMH.
3. Cooper Mullish “The Spirit of C”, Jaico Publishing House, Delhi
4. Kanetkar Y. “Let us C”, BPB.
5. Kanetkar Y.: “Pointers in C”, BPB
6. Gottfried : “Problem Solving in C”, Schaum Series
7. Jones, Harrow Brooklish “C Programming with Problem Solving”, Wiley Dreamtech India.



The image shows three handwritten signatures in black ink on a light-colored background. From left to right, the signatures are: 'C. K. Kanetkar', 'Shrinivasa', and 'S. S. Srinivasa'. Each signature is written in a cursive, flowing style.

MCA – FIRST SEMESTER

MCA-104 Computer organization and Assembly Language Programming

UNIT I

Computer Organization: Digital and Analog computers, Major components of a digital computer, Memory addressing capability of a CPU, Word length of a computer, Processing speed of a CPU, Hardware, Software and Firmware. Dumb, Smart and Intelligent terminals.

Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes: BCD code, Gray Code, ASCII code, Excess 3 Code, Error detecting Code.

UNIT II

Computer Arithmetic: Binary representation of Negative Integers using 2's complement and Signed magnitude representation, Fixed point Arithmetic operations on Positive and Signed (Negative) Integers like addition, subtraction, multiplication, Booth's algorithm for multiplication, Division of positive and negative binary numbers.

Boolean Algebra and Logic Gates: Basic Definitions, Basic Theorems and properties of boolean algebra, Boolean Functions, Digital Logic gates.

UNIT III

Gate-Level Minimization: The K-Map Method, 3 and 4 variable K-Map, Combinational Circuits, Decoders, Encoders, Multiplexers and Demultiplexers, Sequential circuits, Latches, Flip Flops: SR, D, JK, T. Master Slave JK Flip flop, Integrated Circuits. Shift Registers- Serial in Serial out, Serial in Parallel out, Parallel in Serial out and Parallel in Parallel out. Designing of Asynchronous (Ripple) Counters, Design of Synchronous Counters.

UNIT IV

Introduction of 8085 Microprocessor: Architecture of 8085 processor. Register Architecture: Accumulator, Register and Flag Register. Program Counter, Stack pointer and Instruction register. **Addressing Modes:** Direct memory addressing mode and Register direct Addressing Mode. Register Indirect Addressing Mode, Immediate Addressing Mode and Implicit or Implied Addressing Mode.

UNIT V

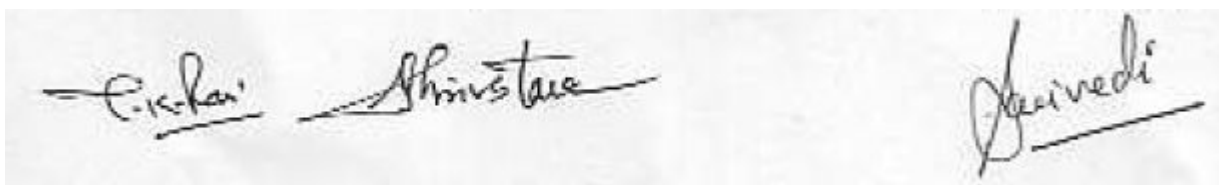
Introduction to Assembly Language Programming: Various Instructions Classifications: instruction Format, Opcode, Operand and Hex code. Instruction Operation Status, Various Instruction Sets: Data Transfer Group Instructions, Arithmetic Group Instructions, Logical Group Instruction, Branch Group Instructions: Conditional , Unconditional and Machine control Instructions.

Text Book(s):

1. Microprocessor Architecture, Programming and Applications with 8085/8080 by Ramesh S. Gaonkar.
2. Digital Design by M. Morris Mano. Publication: PHI Eastern economy edition.

Reference Book(s):

1. Fundamentals of Computers by B Ram Publication : PHI , Fourth edition
2. Microprocessor and Its applications by R Theagrajan,S Dhanapal
3. Computer Architecture By Dr. Rajkamal. Publication: TMH Indian Special edition 2006.



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MCA – FIRST SEMESTER
MCA-105 Communication Skills

UNIT-I

Communication

Meaning and process of communication, importance of effective communication, communication situation, barriers to communication. Objectives of communication, types of communication, principles of communication, essentials of effective communication.

UNIT-II

Media of Communication

Written, oral, face-to-face, visual, audio-Visual, merits and demerits of written and oral communication.

UNIT-III

Communication Skills:

Developing communication skills; Listening; Speaking; Reading-Writing (Oral & Written). Body language; Utility of aids in Communication.

UNIT-IV

Spoken Skills

Preparing for oral presentation, conducting presentations; Debates; Seminar; Speeches; Lectures; Interviews; Telephonic Conversation; Negotiations; Group Discussions.

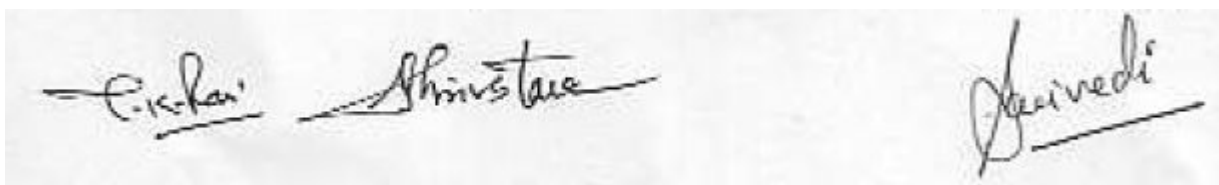
UNIT-V

Written Skills:

Preparing of bio-data, seminar, paper, bibliography, and official correspondence; Mechanics of writing; Formal & Informal writings, letters; paragraphing, precise, report writing, technical reports, length of written reports, organizing reports, writing technical reports; Creative writing; Common Errors in Language.

BOOKS:

1. Rajendra Pal and J.S. Korlahalli "Essentials of Business Communication" , Sultan Chand & Sons Publishers, New Delhi.
2. U.S.Rai & S.M. Rai "Business Communications" , Himalaya Publishing House.
3. Menzal and D.H. Jones "Writing a technical Paper", Mc Graw Hill, 1961.
4. Strategy and Skill "Business Communication", Prentice Hall New Jersey, 1987
5. Scot Ober "Contemporary Business Communication", Wiley India.



The image shows three handwritten signatures in black ink on a light-colored background. The first signature on the left is 'S. K. Singh', the middle one is 'Shivastava', and the one on the right is 'S. K. Singh'.

MCA – SECOND SEMESTER

MCA-201 Operating System

UNIT-I

Introduction: Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogramming and, Real time operating systems, Different views of the operating system, System Programmer's view, User's view, Operating system concepts and structure, Layered Operating Systems, Monolithic Systems. **Processes:** The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management, Scheduling algorithms, First come first serve, Round Robin, Shortest run time next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms stated above

UNIT-II

Memory Management : Memory management without swapping or paging, Concepts of swapping and paging, Page replacement algorithms namely, Least recently used, Optimal page replacement, Most recently used, Clock page replacement, First in First out (This includes discussion of Belady's anomaly and the category of Stack algorithms), Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation

UNIT-III

Inter-process Communication and Synchronization: The need for inter-process synchronization, Concept of mutual exclusion, binary and counting semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, Classical problems in concurrent programming, Dining Philosopher's problem, Bounded Buffer Problem, Sleeping Barber Problem, Readers and Writers problem, Critical section, critical region and conditional critical region, Monitors and messages. **Deadlocks:** Concepts of deadlock detection, deadlock prevention, deadlock avoidance. Banker's Algorithm

UNIT-IV

File System: File systems, directories, file system implementation, security protection mechanisms. **Input/output:** Principles of I/O Hardware: I/O devices, device controllers, direct memory access. **Principles of I/O software:** Goals interrupt handlers, device drivers, and device independent I/O software. User space I/O Software. **Disks:** Disk hardware, Disk scheduling algorithms (namely First come first serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms) Error handling, track-at-a-time caching, RAM Disks. **Clocks:** Clock hardware, memory-mapped terminals, I/O software.

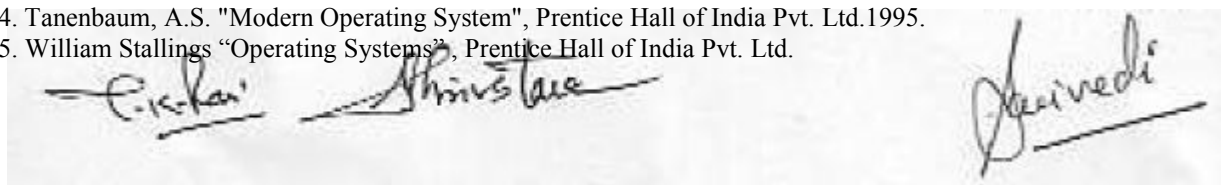
UNIT-V

Processes and Processors in Distributed Systems: Threads, System models, processor allocation, scheduling. Distributed File Systems: Design, Implementation, and trends. .Performance Measurement, monitoring and evaluation Introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.

Case Studies: WINDOWS and LINUX /UNIX Operating System.

BOOKS

1. Deitel, H.M. "An Introduction to Operating Systems". Addison Wesley Publishing Company 1984.
2. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International Edition- Computer Science series 1992.
3. Galvin P., J.L. Abraham Silberschatz. "Operating System Concepts". John Wiley & Sons Company, 1989.
4. Tanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd.1995.
5. William Stallings "Operating Systems", Prentice Hall of India Pvt. Ltd.



MCA – SECOND SEMESTER

MCA-202 Data Structure

Prerequisites: Array, Structure, pointers, pointer to structure, functions, parameter passing, recursion.

UNIT-I

Stack and Queue: contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue-operations

UNIT-II

General List: list and it's contiguous implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.

UNIT-III

Trees: definitions-height, depth, order, degree, parent and child relationship etc; Binary Trees-various theorems, complete binary tree, almost complete binary tree; Tree traversals-preorder, in order and post order traversals, their recursive and non recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition.

UNIT-IV

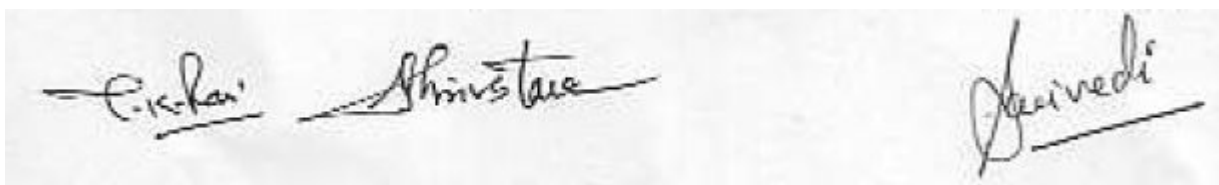
Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaining; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

UNIT-V

Graphs: related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskals & dijkstras algorithm. Miscellaneous features Basic idea of AVL tree- definition, insertion & deletion operations; basic idea of B-tree- definition, order, degree, insertion & deletion operations; B+-Tree- definitions, comparison with B-tree; basic idea of string processing.

BOOKS

1. Kruse R.L. Data Structures and Program Design in C; PHI
2. Aho "Data Structure & Algorithms".
3. Trembly "Introduction to Data Structure with Applications".
4. Tennenbaum A.M. & others: Data Structures using C & C++; PHI
5. Horowitz & Sawhney: Fundamentals of Data Structures, Galgotia Publishers.
6. Yashwant Kanetkar, Understanding Pointers in C, BPB.



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MCA – SECOND SEMESTER
MCA-203 Computer Oriented Numerical & Statistical Methods

UNIT – I

Numerical approximation, Representation of integers and real numbers in computers, fixed and floating point arithmetic, normalized floating point numbers, Round off and truncation errors, relative and absolute errors. Iterative methods: Zeros of single transcendental equations and zeros of polynomials using bisections, false position, Newton Raphson methods. Convergence of solutions.

Unit – II

Interpolation : Forward, Backward, central (Stirling's) and divided difference formulas, Lagrange's interpolation, Inverse interpolation for equal and unequal intervals. Numerical Integration : Newton Cotes's formula, Simpson's 1/3rd and 3/8th rule. Gauss Legendre (two and three points) integration formula.

Unit – III

Simultaneous linear equations: Solutions of simultaneous linear equations – Gauss elimination method and pivoting, ill conditioned equations and refinement of solutions, Gauss-seidal iterative methods. Solution of differential equation: Runge-Kutta fourth order method. Euler's method, Picard's, Taylor's series.

Unit - IV

Distributions : Binomial distribution, Poisson distribution and normal distribution, χ^2 distribution, Rectangular distribution, hypergeometric distribution.

Unit -V

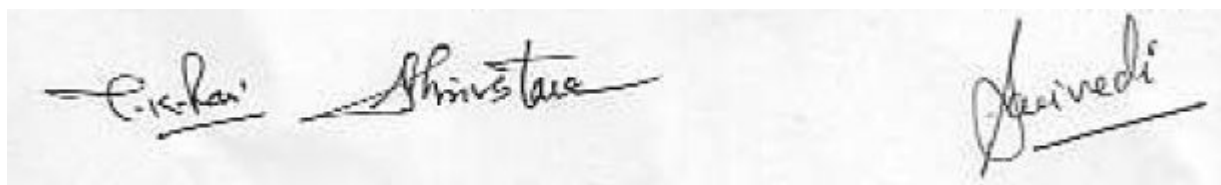
Hypothesis testing for sampling: Small samples, t, z and f tests. Chi-square test. Large samples : Comparison of large samples, testing the significance of the difference between the means of two large samples.

BOOKS

1. E. Balaguruswamy "Numerical Methods", TMH, ISBN – 07-463311-2, 1999.
2. B.S. Grewal "Numerical Methods in Engineering & Science".
3. Miller "Mathematical Statistics with applications" 7 ed, Pearson.
4. Gupta & Kapoor, Introduction to Statistics, Chand & Co.
5. V. Rajaraman "Computer Oriented Numerical Methods".
6. M.Ray and Har Swarup Sharma " Mathematical Statistics".

REFERENCE BOOKS

1. Iyengr M.K. Jain & R.K. Jain "Numerical Methods for scientific and engineering computation", Wiley Eastern (New Age), 1995
2. E.V. Krishnamurthy & S.K. Sen "Computer Based Numerical Algorithms".
3. Miller & Freund's "Probability and Statistics for Engineers".



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MCA – SECOND SEMESTER
MCA-204 : Data Base Management System

UNIT-I

Introduction: Advantage of DBMS approach, various view of data, data independence, schema and subschema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture. **ER model:** basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

UNIT-II

Domains, Relations and Keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys. **Relational Algebra & SQL:** The structure, relational algebra with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL.

UNIT-III

Functional Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form.

UNIT-IV

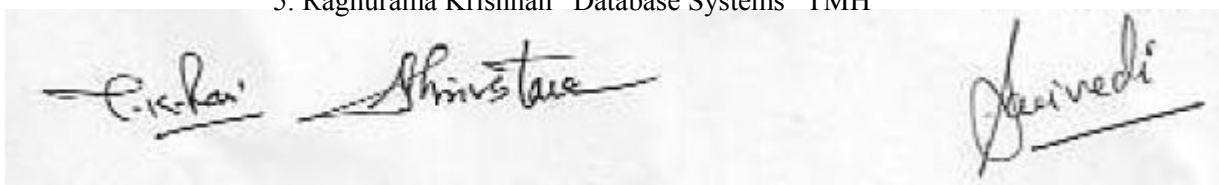
Database Integrity: general idea. Integrity rules, domain rules, attribute rules, relation rules, Database rules, assertions, triggers, integrity and SQL. **Transaction, concurrency and Recovery:** basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints. **Distributed Database:** basic idea, distributed data storage, data replication, data fragmentation horizontal, vertical and mixed fragmentation

UNIT-V

Emerging Fields in DBMS: object oriented Databases-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing- terminology, definitions, characteristics, data mining and it's overview, Database on www, multimedia Databases-difference with conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats, video servers. **Storage structure and file organizations:** overview of physical storage media, magnetic disks performance and optimization, basic idea of RAID, file organization, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization **Network and hierarchical models:** basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models.

BOOKS

1. A Silberschatz, H.F Korth, Sudersan "Database System Concepts" –, MGH Publication.
2. C.J Date "An introduction to Database Systems" –6th ed.
3. Elmasri & Navathe "Fundamentals of Database systems" – III ed.
4. B.C. Desai. "An introduction to Database systems" BPB
5. Raghurama Krishnan "Database Systems" TMH



MCA – SECOND SEMESTER
MCA-205 : Organization and Management Concepts

UNIT I

Introduction

Definition of Management, Management functions, Role of Managers, Principles of Management, Management Thought- Classical School, Scientific school.

UNIT II

Planning

Nature and purpose of planning, Types of planning, Steps in planning, Decision Making, Programmed and Non Programmed Decision Making.

UNIT III

Organizing and Staffing

Formal and Informal Organization, Organizational division – Departments, Bases of Departmentation, Span of Management, Line and Staff conflicts, Definition of Staffing, System Approach to Staffing, Selection Process, Performance Appraisal, Career Strategy.

UNIT IV

Motivation and Leadership

Motivation, Theories of Motivation – Maslow's Need Hierarchy Theory, McGregor's Theory X and theory Y, Herzberg's two factor Theory, Leadership, Managerial Grid.

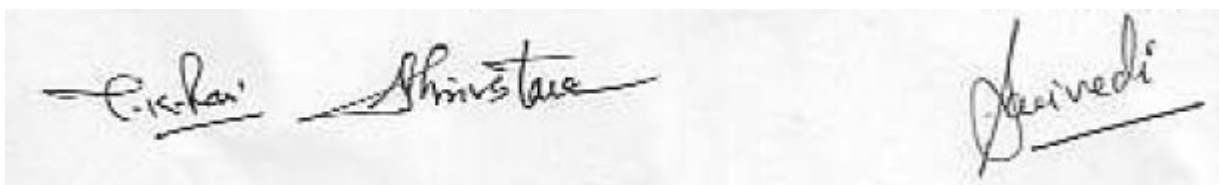
UNIT V

Controlling

The Basic Control process, Control as feedback System, Real Time Control.

Text Book(s):

1. R. D. Agarwal- Organization and Management -Tata McGraw Hill Publishing Company Ltd.
2. Harold Koontz Heinz Weihrich – Essentials of Management - Tata McGraw Hill Publishing Company Ltd.



Handwritten signatures of three individuals: 'G. K. K. K.', 'Shrivastava', and 'Srivastava'.

MCA – THIRD SEMESTER

MCA-301 : Theory of Computation

UNIT-I

Review of Mathematical Preliminaries : Set, Relations and functions, Graphs and trees, string, alphabets and languages. Principle of induction, predicates and propositional calculus. **Theory of Automata :** Definition, description, DFA, NFA, Transition systems, 2DFA, equivalence of DFA & NDFA, Regular expressions, regular grammar, FSM with output (mealy and moore models), Minimisation of finite automata.

UNIT-II

Formal Languages : Definition & description, Parse structured grammars & their classification, Chomsky classification of languages, closure properties of families of language, regular grammar, regular set & their closure properties, finite automata, equivalence of FA and regular expression, equivalence of two way finite automata, equivalence of regular expressions.

UNIT -III

Context-Free grammar & PDA : Properties unrestricted grammar & their equivalence, derivation tree simplifying CFG, unambiguifying CFG, ϵ -productions, normal form for CFG, Pushdown automata, 2 way PDA, relation of PDA with CFG, Determinism & Non determinism in PDA & related theorems, parsing and pushdown automata.

UNIT-IV

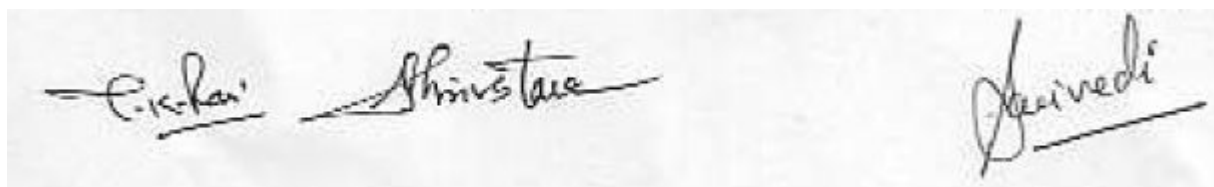
Turing Machine : Model, design, representation of TM, language accepted by TM, universal turing machine, determine & non-determinism in TM, TM as acceptor/generator/algorithms, multidimensional, multitracks, multitape, Two way infinite tape, multihead, Halting problems of TM.

UNIT-V

Computability : Concepts, Introduction to complexity theory, Introduction to undecidability, recursively enumerable sets, primitive recursive functions, recursive set, partial recursive sets, concepts of linear bounded Automata, context sensitive grammars & their equivalence.

BOOKS

1. Hopcroft & Ullman "Introduction to Automata theory, languages & Computation" , Narosha Publishing house.
2. Lewish Papadimutrau "Theory of Computation" , Prentice Hall of India, New Delhi.
3. Peter linz, "An Introduction to formal language and automata", Third edition, Narosa publication.
4. Marvin L. Minsky "Computation : Finite & Infinite Machines", PHI.
5. Mishra & Chander Shekhar "Theory of Computer Science (Automate, Language & Computations), PHI.



Chandra Shrivastava Saurvedi

MCA – THIRD SEMESTER
MCA-302 : Software Engineering Methodologies

UNIT -I

System concepts and Information system environment: The system concept, characteristics of system, elements of system, The System Development Life Cycle, The Role of System Analyst. Introduction system planning & initial investigation, various information gathering tools feasibility study conretions & structures tools of system analysis, various methods of process design, form design methodologies, introduction to information system testing, quality assurance security & diastruct computer various (deleting recovery)

UNIT -II

Software Process, Product and Project: The Product : Software, Software Myths, The process : Software Engineering : A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Software Process Models, Component – Based Development, Fourth Generation Techniques, Software process and Project Metrics : Software measurement

UNIT-III

Software Project Planning and Design: Software Project Planning : Project planning objectives, Decomposition Techniques, Empirical estimation models, The Make/Buy Decision., Risk analysis. Software Design: Design Principles, Cohesion & Coupling, Design notation and specification, structure design methodology.

UNIT-IV

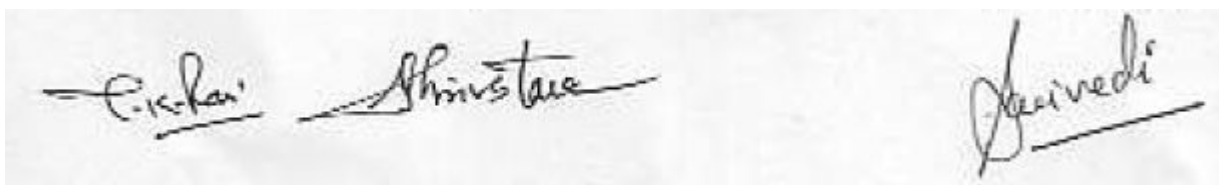
Software Quality Assurance and Testing : Software Quality Assurance : Quality Concepts, The Quality Movement, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, Mistake Proofing for Software, Introduction to ISO standard. Testing Strategies: A strategic approach of software testing strategic issues, unit testing, integration testing, validation testing, system testing, the art of debugging. OOA, OOD.

UNIT-V

Advanced Topics: MIS & DSS:Introduction to MIS, long range planning, development and implementation of an MIS, applications of MIS in manufacturing sector and in service sector. Decision Support System concepts, types of DSS. Object Oriented Software Engineering: Object Oriented Concepts, Identifying the Elements of an Object Model, Management of Object Oriented Software Projects. CASE tools, Re-engineering

BOOKS

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 6th ed., McGraw Hill Inc
2. Pankaj Jalote "Software Engg" Narosa Publications.
3. Ian Sommerville : Software Engineering 6/e (Addison-Wesley)
4. Richard Fairley : Software Engineering Concepts (TMH)
5. Elis Awad, "System Analysis & Design", Galgotia publications
6. W.S. Jawadekar: Management Information Systems, TMH Publication, India
7. Hoffer " Modern System Analysis & Design" 3e, Pearson Edition



Handwritten signatures of three individuals: P. K. Jain, Shrivastava, and D. S. Jaiswal.

MCA – THIRD SEMESTER
MCA-303 : Object Oriented Methodology & C++

UNIT-I

C++ basics, loops and decisions, structures and functions, object and classes, object arrays, constructor and destructor functions.

UNIT-II

Operator and function overloading, pointers, pointers to base and derived classes inheritance, public and private inheritance, multiple inheritance.

UNIT-III

Polymorphism, virtual functions, abstract base classes and pure virtual function, friend function, early and late binding.

UNIT-IV

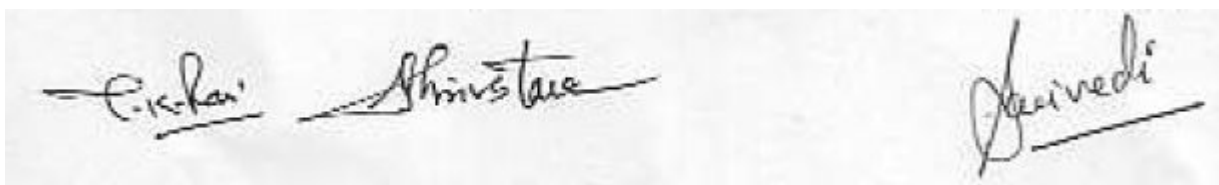
C++ I/O system, formatted I/O, creating insertors and extractors, file I/O basis, creating disk files and file manipulations using seekg(), seekp(), tellg() and tellp() functions, exception handling: try, catch and throw.

UNIT-V

UML concepts, object-oriented paradigm and visual modeling, UML diagrams, UML specifications, object model, object oriented design, identifying classes and object, object diagrams.

BOOKS

1. Lafore R. "Object Oriented Programming in C++", Galgotia Pub.
2. Lee "UML & C++ a practical guide to Object Oriented Development 2 ed, Pearson.
3. Schildt "C++ the complete reference 4ed, 2003.
4. Hans Erit Eriksson "UML 2 toolkit" Wiley.
5. Balagurusawmy "Object Oriented Programming with C++".
6. B.G., Boach "Object Oriented Analysis & Design with Applications", Addison Wesley.
7. S. Parate "C++ Programming", BPB.
8. Boggs "Mastering UML" BPB Publications.



The image shows three handwritten signatures in black ink on a light-colored background. From left to right, the signatures are: 'E. K. Khar', 'Shrivastava', and 'D. S. Vaidi'. Each signature is written in a cursive style and is underlined.

MCA – THIRD SEMESTER

MCA-304 : Computer Networks

UNIT-I

Introduction: Computer Network, Layered Network Architecture-Review of ISO-OSI Model., Transmission Fundamentals-, Communication Media-Conductive Metal (Wired Cable), Optical Fiber links, Wireless Communication-Radio links, Satellite Links, Communication Services & Devices, Telephone System., Integrated Service Digital Network (ISDN)., Cellular Phone., ATM, Modulation & Demodulation-, Digital to Analog Conversion-Frequency Modulation (FM), Amplitude Modulation (AM), Phase Modulation (PM)., Analog to Digital Conversion-Pulse Amplitude Modulation(PAM), Pulse Code Modulation (PCM), Differential Pulse Code Modulation, (DPCM)., Modem & Modem Types., Multiplexing-, Frequency Division Multiplexing (FDM)., Time Division Multiplexing (TDM), Statistical Time Division Multiplexing (STDM)., Contention Protocol-, Stop-Go-Access Protocol, Aloha Protocol- Pure aloha & Slotted aloha, Carrier sense multiple access with collision detection (CSMA/CD)

UNIT-II

Data Security and Integrity: Parity Checking Code, Cyclic redundancy checks (CRC), Hemming Code, Protocol Concepts –, Basic flow control, Sliding window protocol-Go-Back-N protocol and selective repeat protocol, Protocol correctness- Finite state machine

UNIT-III

Local Area Network: Ethernet : 802.3 IEEE standard, Token Ring : 802.5 IEEE standard, Token Bus : 802.4 IEEE standard, FDDI Protocol, DQDB Protocol, Inter Networking, Layer 1 connections- Repeater, Hubs, Layer 2 connections- Bridges, Switches, Layer 3 connections- Routers, Gateways.

UNIT-IV

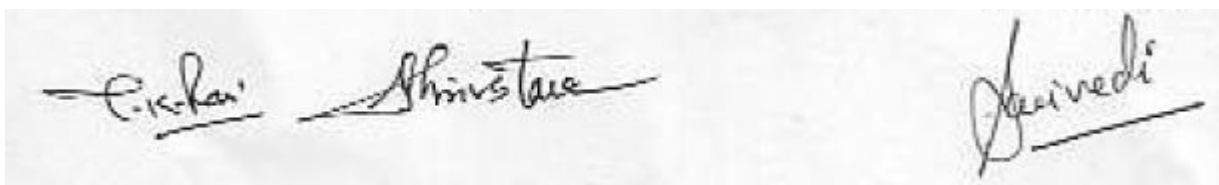
Wide Area Network: Introduction, Network routing, Routing Tables, Types of routing, Dijkstra's Algorithm, Bellman-Ford Algorithm, Link state routing, Open shortest path first, Flooding, Broadcasting, Multicasting, Congestion & Dead Lock, Internet Protocols, Overview of TCP/IP, Transport protocols, Elements of Transport Protocol, Transmission control protocol (TCP), User data-gram protocol (UDP).

UNIT-V

Network Security, Virtual Terminal Protocol, Overview of DNS, SNMP, email, WWW, Multimedia.

BOOKS

1. A.S.Tanenbaum, "Computer Network", 4th addition, PHI
2. Forouzan "Data Communication and Networking 3ed", TMH
3. J.F.Hayes, "Moduling and Analysis of Computer Communication Networks", Plenum Press
4. D.E.Comer, "Internetworking with TCP/IP", Volume Ist & IInd, PHI
5. Willium Stalling, "Data & Computer communications",Maxwell Macmillan International Ed.
6. D.Bertsekas and R.Gallager,"Data Networks", 2nd Ed. ,PHI.
7. G.E. Keiser ,"Local Area Networks ", McGraw Hill, International Ed.



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MCA – THIRD SEMESTER
MCA-305 : Accounting and Financial Systems

UNIT I

Introduction to Book Keeping: Meaning, Nature, development, Objectives, merits and difference between Book Keeping and Accountancy. Fundamentals of Accounting: Accounting concepts and conventions. Brief Introduction to GAAP and its importance.

UNIT II

Accounting Structure: The Process of Accounting – Journal, Ledger, Subsidiary books, Trial Balance based on Double Entry Book Keeping System.

UNIT III

Financial Systems and related concepts: Form and preparation of Income statements (P & L A/C), Statement of Financial Position. Methods of Depreciation – SLM Method and WDV method.

UNIT IV

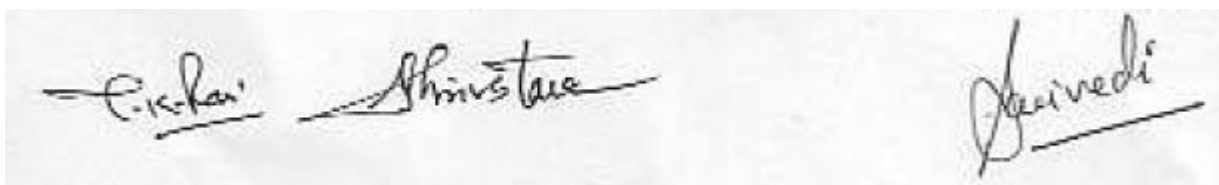
Financing Decisions: Tools of Financial Analysis: Financial Statement Analysis, Statement of Financial position. Break Even Analysis. Leverages: Operating, Financial and Combined.

UNIT V

Inventory Management and Responsibility Accounting: Methods of Inventory Management and Material Issues. Responsibility Accounting -Meaning, Objectives and Importance. Accounting Package – Tally (Operations).

Books:

1. Tulsian's Accountancy for Class XI, Financial Management by Khan & Jain.
2. Financial Accounting by T.S. Grewal.
3. Financial Management by Khan and Jain.
4. NCERT Books on Accounting and Financial Management for Class XI and XII.



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MCA – FOURTH SEMESTER
MCA-401 : INFORMATION STORAGE AND MANAGEMENT

Unit-I

Introduction to Storage Technology: Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information Lifecycle Management, Data categorization.

Unit-II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

Unit-III

Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison. Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

Unit -IV

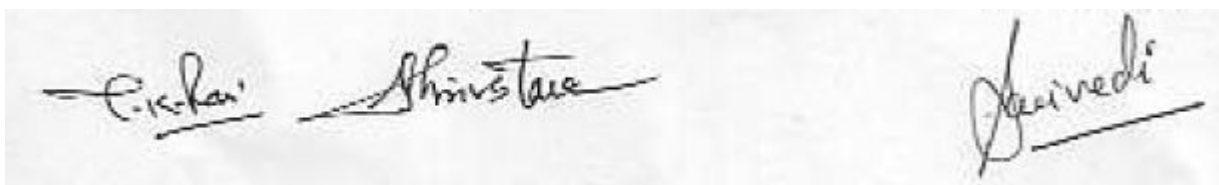
Hybrid Storage solutions; Virtualization: Memory, network, server, storage & appliances. Data center concepts & requirements, Backup & Disaster Recovery: Principles Managing & Monitoring: Industry management standards (SNMP, SMI-S, CIM), standard framework applications, Key management metrics (Thresholds, availability, capacity, security, performance).

Unit-V

Information storage on cloud :Concept of Cloud, Cloud Computing, storage on Cloud, Cloud Vocabulary, Architectural Framework, Cloud benefits, Cloud computing Evolution, Applications & services on cloud, Cloud service providers and Models, Essential characteristics of cloud computing, Cloud Security and integration.

References:

1. G. Somasundaram & Alok Shrivastava (EMC Education Services) editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage Network explained : Basic and application of fiber channels, SAN, NAS, iSESI, INFINIBAND and FCOE, Wiley India.
3. John W. Rittinghouse and James F. Ransome; Cloud Computing : Implementation , Management and Security, CRC Press, Taylor Frances Pub.
4. Nick Antonopoulos, Lee Gillam; Cloud Computing : Principles, System & Application, Springer.
5. Anthony T. Velete, Toby J.Velk, and Robert Eltenpeter, Cloud Computing : A practical Approach, TMH Pub.
6. Saurabh , Cloud Computing : Insight into New Era Infrastructure, Wiley India.
7. Sosinsky, Cloud Computing Bible, Wiley India.



The image shows three handwritten signatures in black ink on a light-colored background. The first signature on the left is 'G. Somasundaram', the middle one is 'Alok Shrivastava', and the one on the right is 'Devede'.

MCA – FOURTH SEMESTER

MCA-402 : Computer Graphics & Multimedia

UNIT-I

Computer Graphics : definition, classification & Applications, Development of Hardware & Software for Computer Graphics. Display devices, Hard copy devices. Interactive Input devices, display processor, Line drawing; various algorithms and their comparison, circle generation-Bresenham's mid point circle drawing algorithm, mid point ellipse drawing algorithm.

UNIT-II

Attributes of output primitives, line style, color and intensity, Area filling algorithms, Scan line algorithm, boundary fill flood fill algorithm, Antialiasing techniques. Two dimensional transformations; translation, scaling, rotation, reflection sheering, composite transformation, transformation commands, character generation.

UNIT-III

Viewing coordinates, Window, view port, clipping, Window to view port transformation, line clipping algorithm; Cohen Sutherland, polygon clipping; Sutherland hodgman algorithm, 3D clipping : Normalized view volumes, view port clipping, clipping in homogeneous coordinates. Illumination model: Light sources, diffuse reflection specular reflection, reflected light, intensity levels, surface shading; phong shading ground shading, color models like RGB, YIQ, CMY, HSV etc.

UNIT-IV

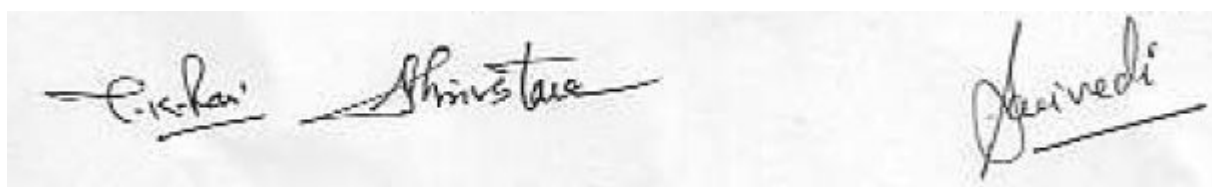
3-D Viewing: Three-dimensional concepts, 3D display techniques, 3D representation polygon & curved surfaces. Design of curves & surfaces- Bezier's Method, B-spline methods, 3D transformation transition, scaling, composite transformation rotation about arbitrary axis, projections: Parallel & Perspective, Hidden surface and line removal; back face removal, depth buffer and scan line methods.

UNIT-V

Introduction to multimedia, multimedia components, multimedia hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia tools, presentations tools, Authoring tools, presentations.

BOOKS

1. D.Hearn and M.P. Baker "Computer Graphics" (2nd ed), PHI.
2. S. Harrington – "Computer Graphics - a Programming approach" (2nd ed) McGrawhill.
3. New Mann & Sprovl- "Principles of interactive computer graphics" (2nd ed) McGrawhill.
4. Roger S. David "Procedural Elements for Computer Graphics", McGraw Hill.
5. Roger S David "Mathematical Elements for Computer Graphics", McGraw Hill.
6. Foley & Vandan "Computer Graphics Principles & Practice in "C" "Addision Wesly.
7. Tay Vaughan " Multimedia Making it Work" 5th Ed. 2001, Tata McGraw Hill.
8. Prabhat K. Andleigh & Kiran Thakur "Multimedia System Design", PHI
9. Drew, "Fundamentals of Multimedia", Pearsons.
10. Nigel Chapman, J. Chapman "Digital Multimedia" Wiley India.



The image shows three handwritten signatures in black ink on a light-colored background. The first signature on the left is 'S. K. Singh', the middle one is 'Shivstara', and the one on the right is 'S. K. Singh'.

MCA – FOURTH SEMESTER
MCA-403 : Design and Analysis of Algorithms

UNIT – I

Pre-requisites: Data structure & Discrete structures, models of computation, algorithm analysis, order architecture, time space complexities average and worst case analysis.

UNIT-II

Divide and conquer: Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.
Graph searching and Traversal: Overview, Traversal methods (depth first and breadth first search)

UNIT-III

Greedy Method: Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths. **Branch and bound:** LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem, searching & sorting algorithms.

UNIT-IV

Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, Matrix multiplication, Traveling salesman Problem, longest Common sequence. **Back tracking:** Overview, 8-queen problem, and Knapsack problem

UNIT-V

Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples. Combinational algorithms, string processing algorithm, Algebraic algorithms , set algorithms

BOOKS

1. Ullman "Analysis and Design of Algorithm" TMH
2. Goodman "Introduction to the Design & Analysis of Algorithms, TMH-2002.
3. Sara Basse, A. V. Gelder, " Computer Algorithms," Addison Wesley
4. T. H. Cormen, Leiserson , Rivest and Stein, "Introduction of Computer algorithm," PHI
5. E. Horowitz, S. Sahni, and S. Rajsekaran, "Fundamentals of Computer Algorithms," Galgotia Publication

The image shows three handwritten signatures in black ink on a light-colored background. From left to right, the signatures are: 'G. K. Saha', 'Shrivastava', and 'S. S. S. S.'. Each signature is written in a cursive style and is underlined.

MCA – FOURTH SEMESTER

MCA-404 : Java Programming & Technologies

UNIT-I

The Java Environment: History of Java: Comparison of Java and C++; Java as an object oriented language: Java buzzwords; A simple program, its compilation and execution; the concept of CLASSPATH; Basic idea of application and applet; **Basics:** Data types; Operators- precedence and associativity; Type conversion; The decision making – if, if ..else, switch; loops – for, while, do...while; special statements–return, break, continue, labeled break, labeled continue; Modular programming methods; arrays; memory allocation and garbage collection in java keywords. **Object Oriented Programming in Java:** Class; Packages; scope and lifetime; Access specifics; Constructors; Copy constructor; this pointer; finalize () method; arrays; Memory allocation and garbage collection in java, keywords **Inheritance** : Inheritance basics, method overriding, dynamics method dispatch, abstract classes.

UNIT-II

Interfaces : defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces. **Multithreading and Exception Handling:** Basic idea of multithreaded programming; The lifecycle of a thread; Creating thread with the thread class and runnable interface; Thread synchronization; Thread scheduling; Producer-consumer relationship; Daemon thread, Selfish threads; Basic idea of exception handling; The try, catch and throw; throws Constructor and finalizers in exception handling; Exception Handling.

UNIT-III

Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet. **The AWT:** The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, Choice menu, Text area, Scroll list, Scroll bar; Frame; Layout managers flow layout, Grid layout, Border layout, Card layout. **The Java Event Handling Model:** Java's event delegation model – Ignoring the event, Self contained events, Delegating events; The event class hierarchy; The relationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, ContainerEvent, Focus Event, Item Event, Eey Event, Mouse Event, Text Event, Window Event.

UNIT-IV

Input/Output : Exploring Java i.o., Directories, stream classes The Byte stream : Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams, Buffered reader, buffered writer, print writer, serialization. **JDBC:** JDBC-ODBC bridge; The connectivity model; The driver manager; Navigating the resultset object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

UNIT-V

Networking & RMI: Java Networking : Networking Basics : Socket, Client server, reserved sockets, proxy servers, Inet address, TCP sockets, UDP sockets. ; RMI for distributed computing; RMI registry services; Steps of creating RMI Application and an example. **Collections:** The collections framework, collection interfaces, collection classes.

BOOKS

1. Naughton & Schildt “The Complete Reference Java 2”, Tata McGraw Hill
2. Deitel “Java- How to Program.” Pearson Education, Asia
3. Horstmann & Cornell “Core Java 2” (Vol I & II) , Sun Microsystems
4. Ivan Bayross “Java 2.0” : BPB publications
5. Ivor Horton’s “Beginning Java 2, JDK 5 Ed., Wiley India

MCA – FOURTH SEMESTER
MCA-405 : Data Warehousing and Mining

UNIT – I

Motivation, importance, Data type for Data Mining : relation Databases, Data Warehouses, Transactional databases, advanced database system and its applications, Data mining Functionalities: Concept/Class description, Association Analysis classification & Prediction, Cluster Analysis, Outlier Analysis, Evolution Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.

UNIT – II

Data Warehouse and OLAP Technology for Data Mining: Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology.

UNIT- III

Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives, Languages, and System Architectures, Concept Description: Characterization and Comparison, Analytical Characterization.

UNIT – IV

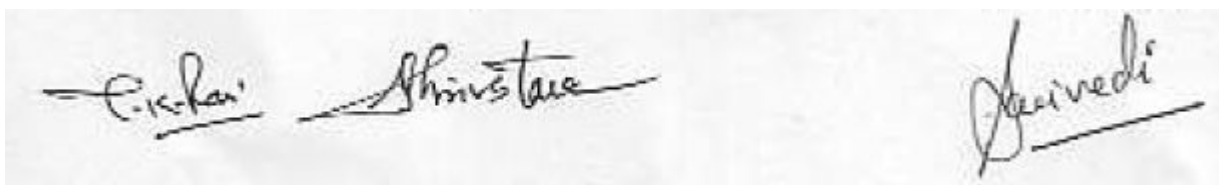
Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single-Dimensional Boolean Association Rules from Transactional Databases: the Apriori algorithm, Generating Association rules from Frequent items, Improving the efficiency of Apriory, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint-Based Association Mining.

UNIT – V

Classification & Prediction and Cluster Analysis: Issues regarding classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Applications & Trends in Data Mining: Data Mining Applications, currently available tools.

BOOKS

1. J. Han and M. Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Pub.
2. Berson “Dataware housing, Data Mining & DLAP, @004, TMH.
3. W.H. Inmon “ Building the Datawarehouse, 3ed, Wiley India.
4. Anahory, “Data Warehousing in Real World”, Pearson Education.
5. Adriaans, “Data Mining”, Pearson Education.
6. S.K. Pujari, “Data Mining Techniques”, University Press, Hyderabad.



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MCA – FIFTH SEMESTER

MCA-501 : Artificial Intelligence

UNIT-I

General Issues and Overview of AI : The AI problems, what is an AI technique, Characteristics of AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteration and recursion, property lists and arrays.

UNIT-II

Problem Solving, Search and Control Strategies : General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches depth first breadth first search. **Heuristic Search Techniques :** Hill climbing, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems.

UNIT-III

Knowledge Representations : First order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

UNIT-IV

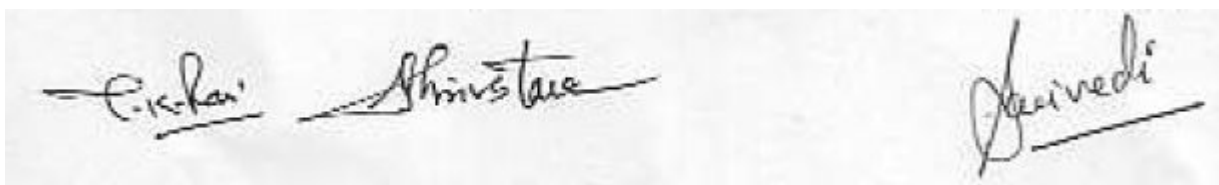
Natural Language processing : Parsing techniques, context free grammar, recursive transition nets (RNT), augmented transition nets (ATN), case and logic grammars, syntactic analysis. **Game playing :** Minimax search procedure, alpha-beta cutoffs, additional refinements. **Planning :** Overview an example domain the block world, component of planning systems, goal stack planning, non linear planning.

UNIT-V

Probabilistic Reasoning and Uncertainty : Probability theory, bayes theorem and bayesian networks, certainty factor. **Expert Systems :** Introduction to expert system and application of expert systems, various expert system shells, vidwan frame work, knowledge acquisition, case studies, MYCIN. **Learning ;** Rote learning, learning by induction, explanation based learning.

BOOKS

1. Elaine Rich and Kevin Knight "Artificial Intelligence" - Tata McGraw Hill.
2. "Artificial Intelligence" 4 ed. Pearson.
3. Dan W. Patterson "Introduction to Artificial Intelligence and Expert Systems", Prentice India.
4. Nils J. Nilson "Principles of Artificial Intelligence", Narosa Publishing House.
5. Clocksin & C.S.Melish "Programming in PROLOG", Narosa Publishing House.
6. M.Sasikumar,S.Ramani etc. "Rule based Expert System", Narosa Publishing House.



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MCA – FIFTH SEMESTER
MCA-502 : Internet and Web Technology

UNIT I

Introduction to HTTP, web Server and application Servers, Installation of Application servers, Config files, Web.xml. Java Servlet, Servlet Development Process, Deployment Descriptors, The Generic Servlet, Lifecycle of Servlet. Servlet Packages, Classes, Interfaces, and Methods, Handling Forms with Servlet.

UNIT II

Various methods of Session Handling. Various elements of deployment descriptors. Java Database Connectivity: various steps in process of connection to the database, various type of JDBC Driver.

UNIT III

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects. Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL. java.sql Package. Querying a database, adding records, deleting records, modifying records. Type of Statement.

UNIT IV

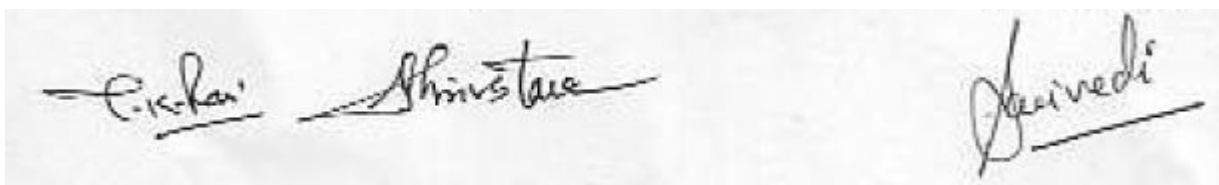
Separating Business Logic and Presentation Logic, Building and using JavaBean. Session handling in JSP, Types of errors and exceptions handling.

UNIT V

Introduction to Web Services, MVC Architecture, Struts and Hibernate.

Books:

1. K. Mukhar, "Beginning Java EE 5: From Novice to Professional", Wrox Press.
2. M. Hall, L. Brown, "Core Servlets and Java Server Pages", 2nd edition, Pearson Education
3. G. Franciscus, "Struts Recipes", Manning Press
4. C. Bauer, G. King, "Hibernate in Action", Manning Press
5. B. Basham, K. Sierra, B. Bates, "Head First Servlet and JSP", 2nd Edition, O'Reilly Media.



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MCA – FIFTH SEMESTER

MCA-503 : Cloud Computing

Unit-I

Introduction: Historical development ,Vision of Cloud Computing, Characteristics of cloud computing as per NIST , Cloud computing reference model ,Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments .Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis ,Satellite Image Processing ,CRM and ERP ,Social networking .

Unit-II

Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance; **Cloud Solutions:** Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management. **Cloud Offerings:** Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

Unit –III

Cloud Management & Virtualization Technology: Resiliency, Provisioning, Asset management,Concepts of Map reduce , Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute ,storage, networking, desktop and application virtualization .Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements , Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits .

Unit-IV

Cloud Security: Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture .

Unit-V

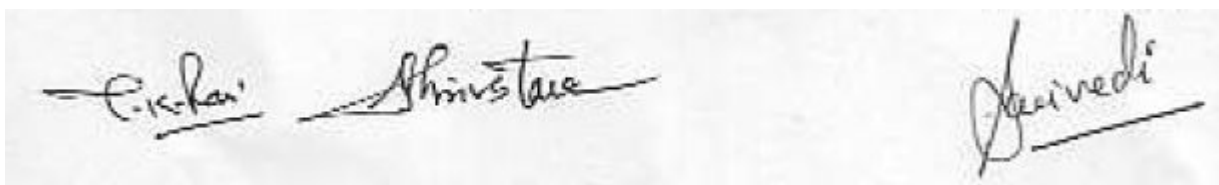
Market Based Management of Clouds , Federated Clouds/Inter Cloud: Characterization & Definition ,Cloud Federation Stack , Third Party Cloud Services .Case study : Google App Engine, Microsoft Azure , Hadoop , Amazon , Aneka

List of Experiments:

1. Installation and configuration of Hadoop/Euceliptus etc.
2. Service deployment & Usage over cloud.
3. Management of cloud resources.
4. Using existing cloud characteristics & Service models .
5. Cloud Security Management.
6. Performance evaluation of services over cloud .

Recommended Text:

1. Buyya, Selvi ,” Mastering Cloud Computing “,TMH Pub
2. Kumar Saurabh, “Cloud Computing” , Wiley Pub
3. Krutz , Vines, “Cloud Security “ , Wiley Pub
4. Velte, “Cloud Computing- A Practical Approach” ,TMH Pub
5. Sosinsky, “ Cloud Computing” , Wiley Pub



Handwritten signatures of three individuals: 'S. K. S.', 'Shrivastava', and 'Saurvedi'.

MCA – FIFTH SEMESTER
MCA-504 : Elective I : EI (a) Soft Computing

UNIT-I

Introduction, Soft Computing concept explanation, brief description of separate theories. Neural Networks and Probabilistic Reasoning; Biological and artificial neuron, neural networks and their classification. Adaline, Perceptron, Madaline and BP (Back Propagation) neural networks. aptive feedforward multilayer networks. Algorithms: Marchand, Upstart, Cascade correlation, Tilling. RBF and RCE neural networks. Topologic organized neural network, competitive learning, Kohonen maps.

UNIT-II

CPN , LVQ, ART, SDM and Neocognitron neural networks. Neural networks as associative memories (Hopfield, BAM). Solving optimization problems using neural networks. Stochastic neural networks, Boltzmann machine.

UNIT-III

Fundamentals of fuzzy sets and fuzzy logic theory, fuzzy inference principle. Examples of use of fuzzy logic in control of real-world systems.

UNIT-IV

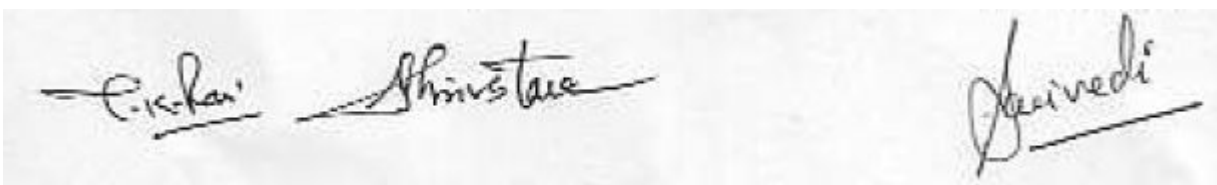
Fundamentals of genetic programming, examples of its using in practice. Genetic Algorithms Applications of GA's – Class.

UNIT-V

Fundamentals of rough sets and chaos theory. Hybrid approaches (neural networks, fuzzy logic, genetic algorithms, rough sets).

BOOKS

1. Cordon, O., Herrera, F., Hoffman, F., Magdalena, L.: Genetic Fuzzy systems, World Scientific Publishing Co. Pte. Ltd., 2001, ISBN 981-02-4016-3
2. Kecman, V.: Learning and Soft Computing, The MIT Press, 2001, ISBN 0-262-11255-8
3. Mehrotra, K., Mohan, C., K., Ranka, S.: Elements of Artificial Neural Networks, The MIT Press, 1997, ISBN 0-262-13328-8
4. Munakata, T.: Fundamentals of the New Artificial Intelligence, Springer-Verlag New York, Inc., 1998. ISBN 0-387-98302-3
5. Goldberg : Introduction to Genetic Algorithms
6. Jang, “ Nero-Fuzzy & Soft Computing”, Pearsons



The image shows three handwritten signatures in black ink on a light-colored background. From left to right, the signatures are: 'C. K. Jang', 'Shrivastava', and 'S. S. Srinivasa'. Each signature is written in a cursive style and is underlined.

MCA – FIFTH SEMESTER
MCA-504 : Elective I : EI(b) : .Net Technology

UNIT-I

Introduction to .NET Technology, Introduction to VB.NET, Software development and Visual Basic .NET, Visual Basic .NET and .NET frame.

UNIT-II

Visual Basic fundamentals: The Visual Basic .NET Development Environment, The element of VB.NET, VB.NET operators, Software design, Conditional structure and control flow, Methods.

UNIT-III

Classes and Objects: Types, Structure and Enumeration, Classes, Interfaces, Exception handling and Classes, Collections, Arrays and other Data Structure.

UNIT-IV

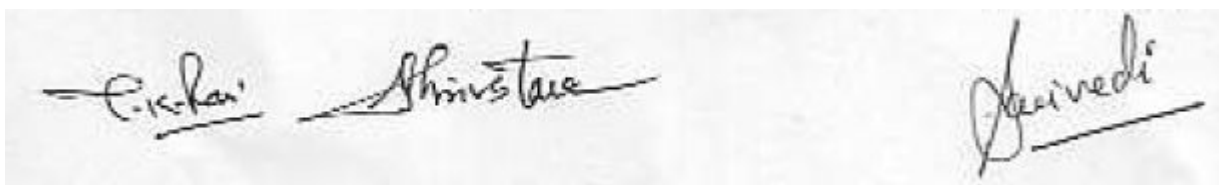
Advance design concepts, Patterns, Roles and Relationships, Advanced Interface Patterns: Adapters and Delegates and Events Data Processing and I/O.

UNIT-V

Writing Software with Visual Basic .NET, Interfacing with the End User, Introduction to ASP.NET and C#.NET and their features.

BOOKS

1. Jeffrey R. Shapiro “The Complete Reference Visual Basic .NET” Tata Mcgraw Hill.
2. Rox “Beginner and Professional Edition VB.NET” Tata Mcgraw Hill.
3. Steven Holzner “Visual Basic .NET Black Book” Wiley Dreamtech Publication.
4. Alex Homer, Dave Sussman “Professional ASP.NET1.1” Wiley Dreamtech
2. Bill Evzen,Bill Hollis “Professional VB.NET 2003” Wiley Dreamtech
3. Tony Gaddis “Starting Out VB.NET PROG.2nd Edition” Wiley Dreamtech
4. Chris Ullman, Kauffman “Beg. ASP.NET1.1 with VB.NET 2003” Wiley Dreamtech
5. Chris Ullman, Kauffman “Beg ASP.NET1.1 with VC#.NET 2003” Wiley Dreamtech



The image shows three handwritten signatures in black ink on a light-colored background. From left to right, the signatures are: 'S. K. S.', 'Shrivastava', and 'S. S. S.'. Each signature is written in a cursive style and is underlined.

MCA – FIFTH SEMESTER
MCA-505 : Elective- II : EII(a) Bioinformatics

UNIT-I

Fundamentals of Bioinformatics and Information Technology : Introduction to bioinformatics, experimental sources of biological data fundamentals of molecular biology available databases operating system, including windows and Unix networks-including the intranets and the Internet. **Analytical science and Bioinformatics**: High throughput sequencing, experimental determination of protein structures, Gene expression monitoring, proteomics, metabiomics.

UNIT-II

Protein Information resources : Introduction, biological databases, primary sequence databases, composite protein sequence database, secondary databases, composite protein pattern databases, structure classification databases, web addresses. **Genome information resources** : Introduction, DNA sequence databases, specialised genomic resources. **DNA Sequence analysis** : Introduction, why analyse DNA, Gene structure and DNA sequences, features of DNA sequence analysis, issues in the interpretation of EST searches, two approaches to gene hunting, the expression profile of a cell, cDNA libraries and ESTs, different approaches to EST analysis, effects of EST data on DNA databases.

UNIT-III

Pairwise alignment techniques : Introduction, database searching, alphabets and complexity, algorithms and programs, comparing two sequences a simple case, sub-sequences, identity and similarity, the dotplot, local and global similarity, global alignment the needleman and Wunsch algorithm, local alignment the Smith Waterman algorithm, dynamic programming, pairwise database searching. **Multiple sequence alignment** : Introduction, the goal of multiple sequence alignment, multiple sequence alignment a definition, the consensus, computational complexity, manual methods, simultaneous methods, progressive methods, database of multiple alignment, searching databases with multiple alignments. **Secondary database searching** : Introduction, why bother with secondary database searches, what is a secondary database.

UNIT-IV

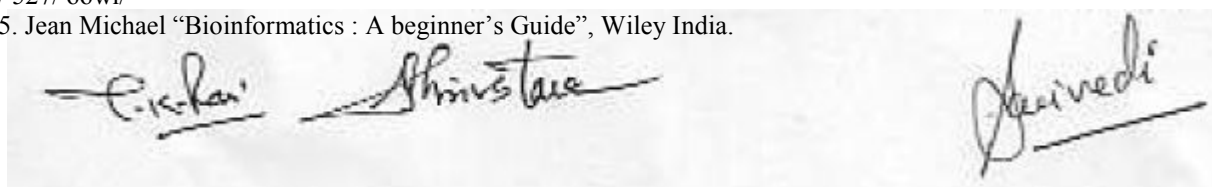
Bioinformatics tools : Visualisation of sequence data, sequence alignment, homology searching, including BLAST, gene expression informatics, introduction to gene finding. **Building a sequence search protocol** : Introduction, a practical approach, when to believe a result, structural and functional interpretation. **Analysis packages** : Introduction, what's in an analysis package, commercial databases, commercial software, comprehensive packages, packages specialising in DNA analysis, intranet packages, internet packages.

UNIT-V

Applications and commercial aspects of Bioinformatics : Drug discovery, genetic basis of disease, personalised medicine and gene-based diagnostics, legal, ethical and commercial ramifications of bioinformatics. **Perl Programming** : Data manipulation, file maintenance, pipelining, packaging and interfacing system facilities. **Macromolecular Modelling and Chemoinformatics** : Acquisition of chemical information, including molecular structure from databases visualisation of molecules simulation of molecular interaction introduction to industry standard modelling software.

BOOKS

1. Attwood TK & Parry-smith DJ "Introduction to Bioinformatics" 2001, Pearson Education Asia.
2. Setup Joao & Meidanis Joa "Introduction to computational Molecular Biology" PWS Publishing Company, 1997 (An international Thouson publishing company).
3. Andreas D. Baxevan's & B.F. Francis Quellette, "Bio Informatics: A Practical guide to the analysis of Genes & Proteins", Second edition 2001, A John Wiley & Sons.
4. Martin Tompa Lechre notes on Biological sequence Analysis, Department of Computer Science & Engineering, university of wasnington, seattle USA <http://www.cs.washington.edu/education/courses/527/oowi/>
5. Jean Michael "Bioinformatics : A beginner's Guide", Wiley India.



The image shows three handwritten signatures in black ink on a light-colored background. From left to right, the signatures are: 'E. K. Khan', 'Shrivastava', and 'J. K. Vaidi'. Each signature is written in a cursive, flowing style.

MCA – FIFTH SEMESTER
MCA-505 : Elective-II : EII (b) Network Security

UNIT-I

Classical Encryption Techniques: Symantec Cipher model, substitution Techniques, transposition techniques, rotor machines, steganography. Block Ciphers and the Data Encryption standards: Simplified DES, block cipher principles, the data encryption standard, the strength of DES, differential and linear cryptanalysis, block cipher design principles, block cipher modes of operation. Advanced Encryption Standard: Evaluation Criteria for AES, the AES cipher. Contemporary symmetric ciphers: Triple DES, blowfish. Confidentiality using symmetric encryption: Placement of Encryption function, traffic confidentiality, key distribution, and random number generation.

UNIT-II

Public key Encryption and Hash functions : Prime numbers, Fermat's and Euler's Theorems, testing for primality, the chinese remainder theorem, discrete logarithms. Public key cryptography and RSA: Principles of Public key cryptosystems, the RSA algorithm. Key Management other public key cryptosystems: Key management, diffie-Hallman key exchange, elliptic curve arithmetic, and elliptic curve cryptography.

UNIT-III

Message authentication and Hash function : Authentication Requirements, Authentication functions, message authentication codes, hash functions, security of hash function and MACs.

Hash Algorithms: MD5 message digest algorithm, secure Hash algorithm, ripemd-160, HMAC. Digital Signature and Authentication protocols: Digital signatures, Authentication protocols, and digital signature standard. Authentication Applications: Kerberos, X.509 Authentication service.

UNIT-IV

Electronic Mail Security: Pretty Good privacy, S/MIME. IP Security: IP Security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management. Web Security: Web security considerations, Secure sockets layer and transport layer security, secure electronic transaction.

UNIT-V

System security: Intruders, intrusion detection, and password Management. Malicious software: Viruses and related threats, virus countermeasures. Firewalls: Firewall Design Principles, Trusted systems.

BOOKS

1. William Stallings "Cryptography and Network Security", 3 ed, Pearson Education.
2. W.Stallings " Network security Essential " Applications & Standards", Pearson ed.
3. Kanfren "Network Security : Private Communications in a public world 2/e
4. Eric Maiwald " Network Security : A Preginner's Guide, second ed.", Tata Mcgraw Hill.
5. Roberta Bragg " Mark Rhodes, Ousley & Keith Strassberg Network Security : The Complete Reference " Tata McGraw Hill.
6. Eric Maiwald "Fundamentals of Network Security" Wiley India.