

Minutes

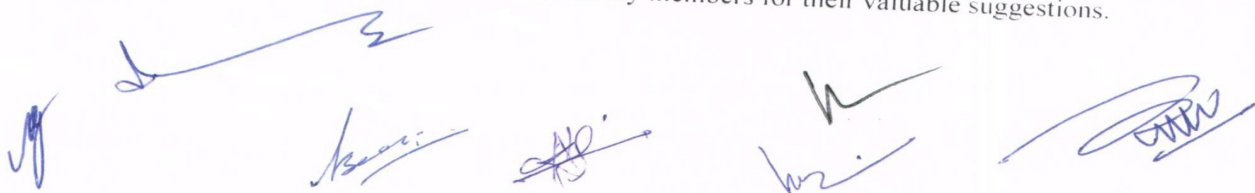
A meeting of **Board of Studies (BOS)** held on 19/04/2013 at 11:30 am in the Department of Computer Science & IT, MJP Rohilkhand University, Bareilly. The following members were present in the meeting.

1. Dr. Ravendra Singh	Member & Head
2. Dr. Neelima Gupta	Member
3. Dr. Ashutosh Gupta	Internal Member
4. Dr. S. S. Bedi	Convener
5. Dr. Vinay Rishiwal	Internal Member
6. Mr. Akhtar Husain	Internal Member
7. Dr. A. K. Daniel	External Member
MMM EC, Gorakhpur	

Following points were discussed and resolved.

1. The recommended list of examiners for **B.Tech.** theory and lab exams for academic session 2013-14 is enclosed (Annexure 1).
2. The recommended list of examiners for **MCA** theory and lab exams for academic session 2013-14 is enclosed (Annexure 2).
3. The recommended list of examiners for **BCA** theory and lab exams for academic session 2013-14 is enclosed (Annexure 3).
4. The new course structure and syllabus for the MCA and B.Tech. have been recommended for its approval from the Faculty Board and Higher authorities for its implementation from academic year 2013-2014.
5. As per recommendations (D.O. No.: 14-7/2009(CPP-II) dated 16/01/2013) of the Task force on National Security regarding the introduction of a new course "Cyber security/Information security" for the UG and PG courses of the University, the mentioned course "Cyber security/Information security" has been included in the M.C.A. course structure and recommended for its approval. It is also recommended that, the mentioned course "Cyber security/Information security" may be included as an elective for B.Tech (CS & IT) for academic year 2013-14, as a core subject with the coordination of other branches of B Tech after due recommendation.
6. Regarding the introduction of a new course "Cyber security/Information security" for BCA course, it is noted that BCA syllabus w.e.f. 2011-2012 was design as a common syllabus for all the State Universities of UP. So it is recommended that course "Cyber security/Information security" may be included according to the recommendation of the committee appointed by State Government in this regard. However, the course may be included in Sixth semester of existing structure of BCA course.
7. According to the availability of the Faculty and necessity with respect to emerging trends, it is recommended that any elective may be included (in the addition of existing elective list) by the recommendation of Departmental Board.
8. As per AICTE approval of MCA course, it is mandatory to consider it as a part of department of CS& IT. Department of CS & IT, IET/FET deals with the admission procedure for MCA and the fees obtained from this course are also being deposited in the account of FET. All faculty members and staff members of this dept. are devoted for conducting the classes and laboratories of MCA course. University also writes the name of the Institute on their award list as well as degree certificates of the students. Hence, it is recommended that the MCA course shall be considered as an integrated part of department of CS & IT, Institute of Engineering and technology along with B.Tech course and same should be sent to the Chancellor to change the act and statutes of the University.

The faculty members of Department of CS&IT were also present in the meeting. The convener is very thankful to all the BOS members and all the faculty members for their valuable suggestions.



I SEMESTER

S.No.	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
THEORY COURSES				L	T	P	
1.	MCA-101	Computer Fundamentals	4	3	1	0	4
2.	MCA-103	Discrete Mathematics	4	3	1	0	4
3.	MCA-105	Computer Accounting in Strategic Management	4	3	1	0	4
4.	MCA-107	Programming in C	4	3	1	0	4
5.	MCA-109	Computer Oriented Numerical Methods	4	3	1	0	4
LABORATORY COURSES							
6.	MCA-107P	C Programming Lab	2	-	-	3	3
7.	MCA-109P	Computer Oriented Numerical Methods Lab	2	-	-	3	3
Total Credits=24							

II SEMESTER

S.No.	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
THEORY COURSES				L	T	P	
1.	MCA-102	Computer Organization	4	3	1	0	4
2.	MCA-104	Object Oriented Programming using C++	4	3	1	0	4
3.	MCA-106	Web Based System Development	4	3	1	0	4
4.	MCA-108	Data Structures	4	3	1	0	4
5.	MCA-110	Database Management System	4	3	1	0	4
LABORATORY COURSES							
6.	MCA-108P	Data Structure using C++ Lab	2	-	-	3	3
7.	MCA-110P	Database Lab (Based on MCA-106 and MCA-110)	2	-	-	3	3
Total Credits=24							

III SEMESTER

S.No.	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
THEORY COURSES				L	T	P	
1.	MCA-201	Management Information System	4	3	1	0	4
2.	MCA-203	Computer Networks	4	3	1	0	4
3.	MCA-205	Java Programming	4	3	1	0	4
4.	MCA-207	Operating System	4	3	1	0	4
5.	MCA-209	Analysis and Design of Algorithm	4	3	1	0	4
LABORATORY COURSES							
6.	MCA-207P	Operating Systems Lab	2	-	-	3	3
7.	MCA-209P	Algorithms Lab	2	-	-	3	3
8.	MCA-211P	Programming Language training course	2	•	-	3	3
Total Credits = 26							

IV SEMESTER

S.No.	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
THEORY COURSES				L	T	P	
1.	MCA-202	Advance Computer Architecture	4	3	1	0	4
2.	MCA-204	Software Engineering	4	3	1	0	4
3.	MCA-206	Computer Graphics	4	3	1	0	4
4.	MCA-208	Advanced Java Programming	4	3	1	0	4
5.	MCA-***	Elective I	4	3	1	0	4
LABORATORY COURSES							
6.	MCA-206P	Graphics Lab	2	-	-	3	3
7.	MCA-208P	Advanced Java Programming Lab	2	-	-	3	3
8.	MCA-210P	Problem Analysis and Design of Project	2	•	-	3	3
Total Credits=26							

2

V SEMESTER

S.No.	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
THEORY COURSES				L	T	P	
1.	MCA-301	Advance Computer Networks	3	3	1	0	4
2.	MCA-303	Seminar	2	4	0	0	4
3.	MCA-305	Cyber Security	3	2	1	0	3
4.	MCA-***	Elective-II	4	3	1	0	4
5.	MCA-***	Elective-III	4	3	1	0	4
LABORATORY COURSES							
5.	MCA-305P	Computer Network Lab	2	-	-	3	3
6.	MCA-306P	Project Lab	6	-	-	9	9
Total Credits=24							

VI SEMESTER

S.No.	Course No.	Subject	Credits
1.	MCA-302	Industrial Training	24
Total Credits=24			

LIST OF ELECTIVES FOR MCA COURSE

MC-531	Artificial Neural Network
MC-532	Data Mining and Warehousing
MC-533	Parallel Computing and Algorithm
MC-534	Distributed System
MC-536	Fault Tolerance Computing
MC-537	Advance Database Management System
MC-538	Network security and Cryptography
MC-539	Network Management System
MC-540	Object Modeling Technique and UML
MC-541	Mobile Computing
MC-542	Internet Programming with .NET framework
MC-543	Compiler Design
MC-545	Linux System Administration
MC-546	Digital Image Processing
MC-548	Distributed Database System
MC-549	Neural Network for Machine Learning
MC-550	Theory of Computation
MC-551	Graph Theory
MC-552	Operation Research
MC-553	Business Environment
MC-554	Environmental Engineering
MC-555	Advanced Data Structures
MC-556	Soft Computing
MC-557	Pattern Recognition and Classification
MC-558	Parallel Computing
MC-559	Data Compression

Note:- The above list is subject to modified depending on the availability of the members and the contents of the syllabi shall be decided by the faculty.

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I SEMESTER

MCA-101 Computer Fundamentals

Credits 4(3-1-0)

- UNIT 1: Introduction to Computers:** Basic definition, Generation, Classification of computers, Introduction to Computer architecture.
Number Systems: Introduction, Classification- Decimal, Binary, Octal, Hexa Decimal, and their convertibility, Data representation, ASCII, BCD, Gray Code.
Logic Gates: Logic gates, Introduction of NAND and NOR, Brief review of Boolean algebra; Minimization of switching functions.
- UNIT 2: Combinational logic;** Design of combinational logic circuit using different chips (different gates); Code converter, encoders, decoders, multiplexers, demultiplexers, 7-segment decoder/driver, ROM, PLA, etc,
Sequential logic circuits: Circuit integration, counters, and the memory unit. Analog to digital converter, digital to analog converter
- UNIT 3: Input/Output:** Input System, Input device- Keyboard, Mouse, Joystick, Lighten, MCR, MICR, Touch Screen, Graphic Tablet, Voice Input System, Output System, Output Devices-VDU, Printers, Plotters
- UNIT 4: Memory:** Introduction, Characteristic, Memory Hierarchy, Main Memory, secondary memory, Back Up Memory, Cache Memory, Primary Memory, Semiconductor Memory, Memory Management Unit.
- UNIT 5: Basic Operating System Concept:** MS-DOS, WINDOWS, Introduction to basic commands Of DOS, Evolution of Operating Systems, Batch Processing, spooling, Multiprogramming, Multiprocessing, Time Sharing, On Line Processing, Real-Time Processing.
- UNIT 6: Computer Software:** Introduction to Software, Relationship between Hardware and Software, Types of Software, Firmware.
Introduction to Internet: Basic Terms related with Internet, WWW, HTTP, FTP, Search Engines

- Text Books:**
1. V. Rajaraman "Computer Fundamentals"
 2. B. Ram "Computer Fundamentals"
 3. Digital Logic and Computer Design by M. Morris Mano, PHL.
 4. Digital Principles and Applications by Malvino & Leach, McGraw- Hill.
 5. Digital Computer Fundamental by Bartee T., Mc Graw Hill.

- UNIT 1:** Logic: Propositions, Conditional and Biconditional Disjunctive normal Form and Simplification, Predicates, Algebra of proposition, Valid Arguments and proofs.
- UNIT 2:** Set Theory:
Sets, Set Relations, Set operations, Infinite Collection of sets, Power sets, Venn Diagram, Algebra of sets, Cartesian Products, Inductively defined sets, Formal Languages, Proofs by Induction.
- UNIT 3:** Functions:
Functions, Injective and Surjective, Composition of functions, Inverse Function, Recursively defined functions, Functions and Set operations.
- UNIT 4:** Counting And Countability :
Counting Principles, Functions and Counting, Permutations and Combinations, Combinatorial arguments, Infinite Sets and Countability.
- UNIT 5:** Relations:
Relations, Types of relation, Representation of relation, Compositions of Relations, Equivalence Relations, Equivalence Classes, Order Relations, Recurrence Relations, Lattice.
- UNIT 6:** Graph Theory :
Basic Concepts, Paths and Connectivity, Planar Graphs, Trees, Rooted Trees, Shortest path algorithm.
- UNIT 7:** Introduction To Algebra :
Binary operations, Semigroups, Groups, Rings, Subgroups, Cosets and Lagrange's Theorem.

- Text Books
1. Olympia Nicodemi, "Discrete Mathematics", CBS Publications, Delhi.
 2. J.P. Trembley & R. Manohar, "Discrete mathematical Structure", Mc Graw Hill Book Co., NY.

Computer Accounting in Strategic Management

MC-105

- Unit I: **Business System and its environment:** Major Business Functions- Planning, Organizing, Staffing, Directing and Controlling, Introduction of Production, Marketing, Personnel and Finance Management.
- Unit II: **Principles of Accounting:** Concept and Role of Financial Accounting and Management Accounting, Financial Structure of organization centers: Responsibility, Reporting, Assets and Liabilities, Accounting Records: Assets and working Capital.
- Unit III: **Costing:** Costing as a decision making tool for the management, Marginal Costing: Introduction of Marginal Cost, Cost-Volume and Profit (C-V-P) Analysis, Break,-Even Analysis its uses and limitations, Profit-volume (PV) Ratio, Budgeting, types and Budgeting control, Influence of Computer Techniques on Accounting Functions.
- Unit IV: **Financial Management:** Concept of funds and relevant inflow & Outflow, Meaning of Project Management, Capital Budgeting, Appraisal of project, Nature of Investment Decision, Payback Period, Average Rate of Return (ARR) Methods, Present-Value (PV), Net Present Value (NPV) Methods, Internal Rate of Return (IRR) method.

References:

1. Financial Management by S.N. Maheshwari, Sahitya Publishers, New Delhi.
2. Financial Management and Accounting by I.M. Pandey, Vikas Publishing House, New Delhi.
3. Management by Griffen.



- UNIT 1: Planning The Computer Program:** Purpose of program planning, Algorithms, Flowcharts, Decision Tablets, Pseudo code.
Programming in C:
History, Introduction to C Programming, Language, Structure of C Programs, Compilation and Execution of C Programs, Debugging Techniques, Primary Data Type and sizes, Declaration of Variables, Modifiers, Identifiers and Keywords, Symbolic constants, Storage Classes(Global, Automatic, External, Register, and Static), Enumerations, Command line Parameters, Macros, The C Preprocessors.
- UNIT 2: Operators:**
Unary Operators, Arithmetic and Logical Operators, Bit wise Operators, Assignment Operators, Expressions, Conditional Expressions, Precedence and order of evaluation.
Control Statements: if-else, switch, break, and continue, the comma operator, goto statement.
Loops: for, while, do-while.
- UNIT 3: Pointers:** Introduction, Accessing the address of a variable, Declaring & Initializing pointers, Accessing a variable through in pointer, Pointers and Arrays, Pointers and character strings, Pointers and functions.
Arrays: Linear Arrays, Multidimensional Arrays, Passing array to functions, Arrays of strings, string manipulations.
- UNIT 4: Functions:** Built-in and user-defined, Function declaration, Definition and Function call, parameter passing, call by value, Call by reference, Recursive Functions, Multi-file programs.
- UNIT 5: User Defined data types:** Structure and Union, Definition and differences, Self-referential Structure.
Derived data types: enum and typedef.
- UNIT 6: File handling mechanism:** file open and close methods, read and write methods, fopen, fclose, fscanf, printf, error handling methods.
- Text Books**
1. Computers Fundamental by Rajaraman.
 2. Computers Fundamental by B. Ram.
 3. Computers Fundamental by P.K. Sinha.
 4. 'Programming in C' by E. Balagurusamy, TMIL.
 5. 'Let Us C' by Yashwant Kanetkar, Narosa.
 6. Exploring 'C' by Yashwant Kanetkar.

MCA 109 Computer Oriented Numerical Methods Credits 4(3-1- 0)

- UNIT 1: Introduction:** Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation.
- UNIT 2: Numerical Solution of Algebraic & Transcendental Equation:** Bisection method, iteration method, Newton Raphson method, Regula Falsi Method.,
- UNIT 3: Numerical Solution of System of Equations:** Linear Equations, Direct method Matrix inversion, Gauss Elimination, Gauss Jordan, In- iterative method-Jacobi, Gauss siedal, and their error analysis.
- UNIT 4: Non-Linear Equations:** Method of iteration, Newton Raphson Method, Eigen values & Eigen vectors, and their error analysis.
- UNIT 5: Interpolation & Extrapolation:** Finite differences, above Methods Newton interpolation formula, Languages, Hermite interpolation and their error analysis.
- UNIT 6: Numerical Differentiation & Integration:** Trapezoidal, Simpson's $1/3$ & $3/8$ rule, Gauss quadridature, Conte formula.
- UNIT 7: Numerical Solution to Ordinary Differential Equations:** Taylor series Method, Picond Method, Euler Method, Runge Kutta methods & their error analysis.
- UNIT 8: Statistical Computation:** Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines, Regression Analysis, Linear and Non linear Regression.

- Text Books**
1. Introductory Methods to Numerical Analysis by S.S. Sastry, PHI.
 2. Numerical Mathematical Analysis by Scarborough, Jonhs Hopkins press.
 3. Computer Oriented Numerical Methods by V. Rajaraman, PHI.
 4. Elementary Numerical Analysis by Conte S.D. & Carle de Bour, Mc Graw Hill.
 5. Introduction to Numerical Analysis by Gupta & Bose, Academic Pub lishers, Calcutta.

MCA-107P C Programming Lab Credits: 2
The laboratory work shall be based on Linux and subject code MCA-107.

MCA-109P Computer Oriented Numerical Methods Lab Credits: 2
The laboratory work shall be based on subject codes MCA-109.

II SEMESTER

MCA-102 Computer Organization

Credits 4(3-1-0)

- UNIT 1:** **Introduction:** Review of digital logic; Logic gates, design of Adder and Subtractor using gates & K-MAP, functioning of multiplexer, de-multiplexer, flip-flops.
- UNIT 2:** **Arithmetic for Computers:** Introduction to number system, negative numbers, addition & subtraction, logical operation, constructing and A.L.U. Multiplication & division (with algorithms), floating point arithmetic.
- UNIT 3:** **Processor Design:** Processor organization, Processor Level, information representation, Instruction format, Addressing Modes (Implied mode, immediate mode, register indirect mode, auto-increment or Auto-decrement mode, direct addressing mode, indirect addressing mode, relative addressing mode, Index Addressing mode), instruction types.
- UNIT 4:** **Control Design:** Control memory Address sequencing, microinstruction interpretation, CPU control unit. Basic concepts of micro programmed control, micro program sequencer for a control memory. Micro programmed control, microprogram sequencer for a control memory. Microinstruction formats.
- UNIT 5:** **Memory Organization:** Classification of memories, Memory Hierarchy, Optimization of memory hierarchy, Virtual Dynamic Address Translation Scheme addressing scheme for main memory, segmented memory system, paged segment memory, memory management policies. High speed memories, Characteristics of Cache memory, Cache memory organization, Block replacement policies, interleaved memories, Associative memory.
- UNIT 6:** **System Organization:** Bus arbitration, Programmed I/O (IO addressing, IO instruction), DMA (Type & procedure), interrupts (procedure, interrupt selection, vectored interrupts), Concurrency Control, System Management.

Text Books

1. Computer Architecture and Organization, By John P. Hayes, Mc Graw Hill.
2. Computer organization and design, by John L. Hennessy & David A. Patterson, Morgan Kaufman.
3. Computer System Architecture, By. M. Morris Mano, PHI.

UNIT 1: UNIT 1: Basics Of Object Oriented Programming

What is Object oriented programming, Procedure oriented programming, problems with structured approach, OO terminology, Characteristics of Object oriented languages (Objects, Classes, Data Abstraction, Data Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message passing) Structure of C++ Program, Benefits of OOPs.

UNIT 2: Tokens, Expressions And Control Structure In C++

Tokens. Basic data types, User defined data types, reference variables. Different Operators in C++ (::, new, delete, ., *, ->, ::*) Loops (For, while and do), Decisions(if, if-else and switch), Control statements(break, continue and goto), default argument .

UNIT 3: Building Objects With Classes

Specifying classes, defining member function- inside and outside, arrays with in a class, Inline function, call by reference, function overloading, friend function, static data member and static member function, Arrays of objects, passing the object and returning the object, local class, Const argument and Const member function, Constructor and Destructors, Characteristics of Constructor, types of constructor, Dynamic initialization of constructor, constructor overloading.

UNIT 4: Defining Operations On Objects

Defining operator overloading, overloading unary and binary operator by using member function, overloading unary and binary operator using friend function, manipulation of strings using operators, rules of operator overloading.

UNIT 5: Using Inheritance In C++

Derived class, single inheritance, multilevel Inheritance, multiple inheritance, Hierarchical inheritance, hybrid inheritance, virtual base class, abstract class, Constructor in Derived class, containership

UNIT 6: Pointer's, Virtual Functions And Polymorphism

Basics of pointers, Manipulation And operations on pointers, pointer to objects,, pointer to function this pointer and pointer to derived class, Dynamic binding, static binding, virtual function, pure virtual function, dynamic binding through virtual function.

UNIT 7: Working With Files

Classes for file stream operation, opening and closing a file, detecting EOF, file modes, file pointers and their manipulations, error handling during file operation. Command line argument, sequential input- output operation, updating a file.

UNIT 8: Object Oriented System Development

Procedure oriented paradigm, Procedure oriented development tools, object oriented paradigm, steps in object oriented analysis and design, implementation.

UNIT 9: Templates And Exception Handling

Templates, class templates, function templates, member function templates, Overloading of Template functions, Non-Type Template Arguments, Introduction of exception handling, its terminology, mechanism of exception handling and catching, Rethrowing an exception, Specifying Exception.

Text Books

1. Programming in C++ by Bjarne Stroustrup,
2. Object Oriented Programming with C++ by Balagurusamy, TMH.
3. Turbo C++ by Robert Lafore,
4. Complete Reference C++ by Herbert Schildt,
5. Thinking in C++ by P.B.Mahapatra, Khanna Publication

MCA-106 Web Based System Development

Credits 4(3-1-0)

- UNIT 1:** History of the Internet and World Wide Web, Growth of the Web, Protocols -HTTP, FTP, SMTP, POP3, MIME, IMAP. Introduction to cyber law in India.
- UNIT 2:** Web: Web project, Web Team, Communication Issues, the Client, and Multi-departmental & Large scale Websites, Quality Assurance and Testing, Technological advances and Impact on Web Teams, Overview of Static or Dynamic Web page, Portal, Search Engine.
- UNIT 3:** **HTML:** Concept of Hypertext, Versions of HTML, Elements of HTML, Formatting Tags, Links, Hyperlinks, Image & Image map, List, Tables, Frames, Forms, Style Sheets, Background and Color Controls. **DHTML:** Introduction to DHTML, Advanced Netscape DHTML, Advanced Microsoft DHTML & Cross browser DHTML. **JavaScript:** Introduction, Statements, Functions, objects in JavaScript, Events and Event Handling, Arrays, FORMS, Buttons, Checkboxes, Text fields and Text areas.
- UNIT 4:** **XML:** Introduction, Problems with HTML & SGML, Types of XML Markup, Displaying an XML Document, Document Type Definitions (DTD), Linking, Using Style Sheets with XML. Data Interchange with an XML document, Document type definitions, Client-side usage, and Server Side usage.
- UNIT 5:** **Middleware Technologies:** Introduction to Common Gateway Interface (CGI), PERL, RMI, COM/DCOM, VBScript, ASP

Text Books

1. Burdman, "collaborative web development" Addison Wesley
2. ASP.NET 21 days, TMH
3. "magic with HTML, DHTML, Javascript", laxmi publication.
4. "web technology", laxmi publication

- UNIT 1:** **Basic Concepts & Notation:** Introduction to data structure, Linear and Non-Linear data structures, Complexity notations: Big-Oh, Theta and Omega.
Arrays: array as an ADT, Using one dimensional array, implementing one Dimensional array, two dimensional array, multidimensional array
- UNIT 2:** **Stacks:** Definition and examples, primitive operations, Array representation of stacks, Example: Infix, Postfix, and Prefix: Basic definitions and Examples, Evaluating a postfix expression, Converting an expression from infix to postfix, Recursion - tower of Hanoi
- UNIT 3:** **Queues and Link Lists:** The Queue and its sequential Representation, Priority Queue; Linked Lists: Inserting and removing nodes from the list, Linked list as a data Structure, Other List structures: Circular Lists, Doubly Linked Lists
- UNIT 4:** **Trees:** Binary Trees, Operation on Binary Trees, Traversal: In order, Preorder, Post order; Application Binary Tree. Binary search tree, Expression Tree; Binary Tree Representation: Array representation, Link List representation; Example: Huffman Algorithm
- UNIT 5:** **Sorting:** Introduction, Selection sort, bubble sort, insertion sort, quick sort, and Merge sort, Heap sort.
- UNIT 6:** **Search Methods:** Basic search Techniques : Sequential Searching, Indexed Sequential Search, Binary Search, Interpolation Search ; Tree searching : inserting into Binary Search Tree (BST), Deleting from a BST, Balanced (AVL) Tree, Search Tree and B-Tree, B+ Tree.
- UNIT 7:** **Hashing:** Introduction, Hash function: Division Method, Mid-square Method, Folding Method, hash table, Collision resolution techniques: Chining and linear probing.
- UNIT 8:** **Graphs and Their Applications:** Introduction, Wars hall's algorithm, Dijkstra's algorithm, Graph traversal: Depth first search, Breadth First search, spanning trees, Prims's and Kruskals algorithm.

- Text Books**
1. Data Structures using C/C++: Tennenbaum, PHI
 2. Introduction to Data Structures : Schaum Series. by Lipetu, Mac Graw Hill
 3. Data Structures by Augenstein & Tenenbaum.

MCA-110 Data Base Management Systems

Credits 4(3-1-0)

- UNIT 1: Introduction:**
Database and its concepts, Database system advantages, Database system architecture(Centralized architecture, client-server architecture, server-system architecture), Data models (E-R, Relational , Network, Hierarchical),Data base-schemas and Instances, Data Independence Data Base Languages, Database users and administrators.
- UNIT 2: Data Modeling Using the Entity-Relationship Model:**
ER model concepts, Notations for E-R diagram, Extended E-R diagram Extended E-R model, E-R model Design issues, constraints, Keys, Weak -Entity Sets, Strong-Entity Sets.
- UNIT 3: Relational Data Model and Languages:**
Relational model concepts, constraints, Fundamental Relational Algebra operations ,additional Relational Algebra operations, Extended Relational Algebra operations, Relational Calculus, Tuple and Domain calculus, SQL: Data definitions queries, Basic Structure, set operators, Aggregate function, Derived Relations. Modification of the Database, Joined relations and up-dates in SQL, Advanced SQL(SQL data types, Embedded SQL, Dynamic SQL)
- UNIT 4: Protecting the Database Against Misuse:**
Integrity constraints,principles of security,Views, security, Encryption, Decryption, symmetric & asymmetric key cryptography, substitution cryptographic technioques, transposition cryptographic Techniques,. RSA algorithm, Diffie Hellman Algorithm, Digital Signature.
- UNIT 5: Database Design:**
Functional dependencies, Normal forms, First second, and third normal forms. BCNF. Multivalued dependencies Fourth Normal form. Join Dependencies and Fifth Normal form.
- UNIT 6: Transaction processing concepts:**
Transaction and system concepts, transaction states,ACID properties of transaction, Concurrn Execution schedules and Recoverability, serializability of schedules.
- UNIT 7: Concurrency Control Techniques:**
Lock-based Protocols:Two phase and three phase Locking Techniques for Concurrency control, Time-based Ptocols:Time stamping and Concurrency control, Deadlock handling: Necessary conditions, Deadlock prevention, deadlock avoidance.
- UNIT 8: Storage and query management**
Overview of Physical storage, Magnetic Disks, RAID, File Organization, data-dictionary, Indexing, B Tree Index, B+ TreeIndex Files, static hashing, dynamic hashing, Query Processing(Measures of Query cost, Evaluation of expressions), Query Optimization(Transformation of relational expressions, Choice of Evaluation Plan).
- Text Books**
1. Abraham Silberschatz, Henry F. Korth S.Sudarshan; database system concepts, McGraw hill Book co. 1997.
 2. Dater, C.J; An introduction to database system volume I & II, Addison-Wesley, 1981, 1983.
 3. Ullman, Jeffrey D: Principles of database systems 2nd Edn Galgotial Publication Pvt. Ltd. 1982.
 4. Whittigton, R.P. Database system engineering, Claventor Press.

MCA-108P	Data Structure using C++ Lab The laboratory work shall be based on MCA-108	Credits: 2
MCA-110P	Database Lab The laboratory work shall be based on MCA-106 and MCA-110.	Credits: 2

III SEMESTER

Credits 4(3-1-0)

MCA-201 Management Information System

- UNIT 1:** **Introduction to information system:** What is information system. types of information system:
Operational Information system (OIS) : office Automation system (OAS), Process Control System (PCS), Transaction processing system (TPS),
Management information system (MIS) : Information Reporting systems (IRS), Decision Support system (DSS), Executive Information system. (EIS), Knowledge based system (KBS).
- UNIT 2:** **Introduction and types of MIS:** Meaning of Management information system, Major types of Management information system, Information

- Reporting systems (IRS), Decision Support system (DSS), and Executive Information system. (EIS), Relationship of Management Information system and operation information system in any organization.
- UNIT 3: Features & Structures of MIS:** Features of MIS, Elements of MIS, Requirements for a successful MIS, Limitations of MIS, Structures of MIS
- UNIT 4: Levels of MIS and Management System for Decision making:** Levels of MIS, Planning, Forecasting, Control, modeling, computing, database administration. MIS in context of decision Making: Programmed and Non-Programmed Decision.
- UNIT 5: Planning and Organizing for MIS:** Information planning, Information needs of an organization. Parts of Planning function. Steps in Process of Strategic Planning, Organization Systems.
- UNIT 6: Implementation, Evaluation and Maintenance of the MIS:** Implementation of MIS, implementation steps of MIS, Method of implementation of MIS, Documentation. Evaluation of MIS, Structure for evaluation of MIS, Problems Related to the maintenance of MIS.

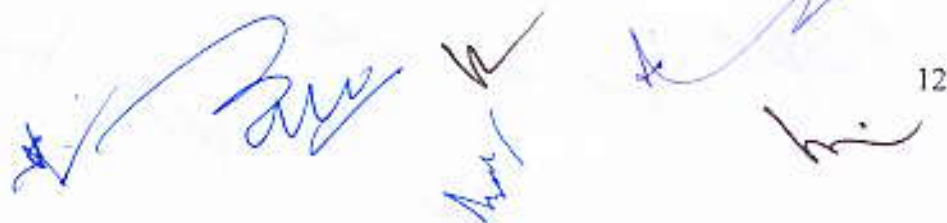
Text Books

1. Management Information System by G.B. Davis & M.H.Olson, Tata McGraw Hill.
2. Management Information System by Laudon & Laudon, PHI.
3. Management Information System by James A.O' Brien, Galgotia ND.

MCA-203 Computer Networks

Credits 4(3-1-0)

- UNIT 1: Introduction:**
Basic Concepts, Transmission Mode, Categories of Network, The OSI Model, Functions of the layers, interface Services, Connections and Connectionless Oriented Services, Service Primitives.
Physical Layer : Transmission Media, Switching, Circuit Switching & Packer Switching, Message Switching.
- UNIT 2: Data Link Layer :**
Error Detection and correction, Data Link control : framing, Flow Control: sliding window protocol, HDLC, POINT TO POINT protocol

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- UNIT 3: Medium Sub Access Sub Layers :**
The Channel allocation problem, ALOHA, CSMA, Multiple Access Protocol, IEEE Standard 802 for LAN & MANS - (IEEE 802.3 (Ethernet), IEEE 802.4 (Token ring), IEEE 802.5 (Token Bus), IEEE 802.6 (DQDB).
- UNIT 4: : Network Layer:**
Network layer design issue, Routing Algorithms (types and Characteristics): Shortest path routing, Flooding, Distance vector routing, Link State routing. Congestion control algorithms: General principles of congestion control, congestion prevention policies, traffic shaping.
- UNIT 5: : Transport Layer:**
Services provided by Transport layer: end to end delivery, addressing, reliable delivery, flow control, Introduction to UDP, TCP, Addressing and subnetting.
- UNIT 6: Application Layer:**
Introduction to electronic mail system, SMTP, DNS, ATM, PPP, HTTP, FTP, TELNET, POP3, SLIP.

Text Books

1. Data Communication And Networking by Behrouz A Forouzan
2. Computer Networks by A.S. Tanenbaum. PHI.
3. Data Network by Bertsekas D, Gallager R. (PHI)
4. Data Communication and Network by Stalling. PHI.

MCA-205 Java Programming

Credits 4(3-1-0)

- UNIT 1:** An overview of JAVA: Object oriented programming (Two paradigms Abstraction, The three OOP principle), Entering the program, compiling the program, Lexical issues (white space identifiers, literals, comments, separators, keywords).
- UNIT 2:** Data types & Operators : variables and arrays, The simple type, Integers (byte, short, int, long) Floating Point Types (float, double, character, Booleans), A closer look at literals (integer literals, floating point literals, character literals, string literals), variables (declaring a variable, Dynamic Initialization, The scope and lifetime of variables) Type conversion and casting Arrays (one Dimensional arrays, Multidimensional arrays). Arithmetic operators (The basic operators the modulus Operator, Arithmetic Assignment operator, increment and decrement operators).
- UNIT 3:** Control statements: Java's selection statements (if, switch), iteration statements (while do-while, for, some for loop variations nested loops), jump statements (using break using continue, return).

- UNIT 4:** **Classes & Methods:** Class fundamentals (The general form of a class, a simple class, Declaring objects a close look at new), Assigning object reference variable, Introducing method (Adding a method to the box class, returning a value adding a method that takes parameters), Constructors the this keyword. Overloading Methods (Over loading constructors), Using object as parameters, A closer look at argument passing, Returning objects, recursion, introducing access, control understanding static, introducing final, introducing nested and inner class, exploring the string class.
- UNIT 5:** **Inheritance:** Inheritance basics (Member access and inheritance), Using super using super to call super class constructors), creating a multilevel hierarchy, when constructors are called, method overriding.
- UNIT 6:** **Packages and interfaces:** Packages (defining a package), understanding CLASSPATH), access protection, importing packages, inter ace (Defining an interface, implementing Interfaces, Appling Interfaces, Variables in Interfaces, Interface can be Extended).
- UNIT 7:** **Exception & String Handling:** Exception- Handling fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements throw, throws, finally, String length, character Extraction (charact (), getChars (), getBytes(), to CharArray(),)String Comparision (equals(), compare to ()). Modifying a string (substring(), concat(), replace()), Data conversion using value () string buffer (length() and capacity, ensure Capacity () Setlength(),charAt() setCharAt(), getChars(), append(), insert(), reverse(), delete() and delete CharAt(), replace()).
- UNIT 8:** **Multithreaded Programming:** The java thread model (Thread priorities synchronization, Messaging the Thread class and the Runnable Interface), The Main, Thread, Creating a Thread (Implementing Runnable, Extending Thread), creating Multiple threads, Thread priorities Synchronization (using Synchronized methods, the Synchronized Statement), Suspending, Resuming, and Stopping Threads.
- UNIT 9:** **Input/output:** Exploring java i/o, The java I/O classes and Interfaces File (Directors, Using File N The listfiles () The listfiles () Alternative, creating Directories), The Stream classes InputStream, Output Stream ,File Input Stream, File Output Stream Byte Array output Stream),The character Streams(Reader, Writer, File Reader,File CharArray Reader, Char Array Writer, Buffered,Reader, Bufferwriter).

- Text Books**
1. The Complete Reference, by Patric Naughton, shildth.
 2. Java by Oreilly
 3. Thinking in Java by Bruce Eckel

MCA-207 Operating System

Credits 4(3-1-0)

- UNIT 1:** **Introduction and History:** What is an operating system generations of OS. Bare system, batch system time sharing and real time system, multiprocessor systems, types of services, user's view operating system's view.
- UNIT 2:** **Processor Management:** Concept of process, process state diagrams. CPU scheduling concepts job scheduling, process scheduling algorithms, multiple Processor scheduling.
- UNIT 3:** **File Management:** File concepts, types, access methods, operation on files, free space management, allocations, implementation, and directory system.
- UNIT 4:** **Concurrent Processes And Programming:** Precedence graphs, critical section problem, semaphores, classical process coordination problems, interprocess communication, motivation modularization, synchronization,

- concurrent languages.
- UNIT 5: Memory Management:** Preliminaries, bare machines, resident monitor, Swapping, fixed and multiple partitions, paging, segmentation, page replacement algorithms allocation of algorithms, trashing, locality concepts.
- UNIT 6: Device Management:** Techniques of device management, device characteristics channels and control units, device scheduling algorithms, virtual devices, SCM, sector queuing.
- UNIT 7: Protection and Deadlocks:** Goals of protection, mechanism and policies, domain of protection, access matrix, existing systems, and language based protection, protection. Problems, security what is deadlock characterization, deadlock prevention, deadlock avoidance, detection and recovery from deadlock combined approach.
- UNIT 8: Design Principles:** Goals, mechanisms and policies layered approach, virtual machines, multiprocessors, implementation, system generation.
- UNIT 9: Case Study:** General concepts of UNIX MSDOS, CTSS, MULTICS OS/360.

- Text Books**
1. Operating System concepts by J.Peterson & A. Silberschetx, Addison-Wesley Publishing Company.
 2. Operating System by Deitel, Addison Wesley.
 3. Operating System by M. Milenkovic, TMH.
 4. Operating System: Design & Implementation by A.S. Tannenbaum, PHI.

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- UNIT 1:** Introduction: Algorithm, Psuedo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis.
- UNIT 2:** Disjoint Sets- disjoint set operations, union and find algorithms, spanning trees, connected components and bi-connected components.
- UNIT 3:** Divide and conquer: General method , applications-Binary search, Finding the maximum and minimum, Quick sort, Merge sort, Strassen's matrix multiplication.
- UNIT 4:** Greedy method: General method, applications- Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Single source shortest path problem.
- UNIT 5:** Dynamic Programming: General method, applications- capital budgeting problem, Multistage graphs, Matrix chain multiplication, 0/1 knapsack problem, optimal binary search trees, All pairs shortest path problem, Travelling sales person problem,
- UNIT 6:** Backtracking: General method, applications-8-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.
- UNIT 7:** Branch and Bound: General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.
- UNIT 8:** Graph Algorithms: Introduction, representation of graphs, Breadth first search, depth first search, topological sort, strongly connected component, flow networks, ford-fulkerson method.
- UNIT 9:** NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

TEXT BOOKS :

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Galgotia publications pvt. Ltd.
2. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education
3. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John wiley and sons.

REFERENCES :

1. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
2. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearson education.

MCA-207P Operating Systems Lab**Credits: 2**

The laboratory work shall be based on Linux and subject code MCA-207.

MCA-209P**Algorithms Lab (Based on MCA-303 and MCA-305)****Credits: 2**

The laboratory work shall be based on subject codes MCA-205 and MCA-209.

MCA-211P**Programming Language training:****Credits: 2**After completing the 1st year, student has to accomplish the given assignments (Based on Linux Administration and Java Programming) by self learning.

IV SEMESTER

MCA-202

Advanced Computer Architecture

Credits 4(3-1-0)

- UNIT 1:** **Introduction to Parallel Processing :** Parallelism in uni-processor systems; Parallel computer structures; Architectural classification schemes.
- UNIT 2:** **Memory Input-Output subsystems :** Memory Hierarchy , Addressing Schemes for Main Memory, Characteristics of cache memory; Cache Memory Organization; Characteristics of input-output subsystems.
- UNIT 3:** **Pipelining,** Classification of Pipeline Processors, General Pipelines and Reservation Table Design of instruction pipelined units; Arithmetic Pipeline Design Examples, Job sequencing and collision prevention ; Characteristic of Vector Processing ,Vector supercomputers; Scientific attached processor; Architecture of Star -100 and TI-ASC.
- UNIT 4:** **Structures and Algorithms for Array Processors :** SIMD array processor; SIMD interconnection networks: Illiac, Cube, Shuffle Exchange, Omega, Modified Omega, Barrel shifter, Parallel algorithms for array processor; SIMD Matrix Multiplication, Parallel sorting on Array Processor.
- UNIT 5:** **Multiprocessor Architecture and Programming:** Functional structures: Loosely Coupled Multiprocessors, Tightly Coupled Multiprocessors ;Interconnection Networks: Time shared, Crossbar switch and Multiport Memories; Multiprocessor Operating Systems: Classification of Multi-processor Operating Systems, Exploiting Concurrency for multiprocessing: Language features, Matrix multiplication on concurrent processor; Multiprocessor Scheduling Strategies: Dimensions of Multiple processor Management .
- UNIT 6:** **Data Flow Computers VLSI computation :** Data driven computing and languages: Control Flow versus Data Flow Computers , Data flow computer architectures; Static data Flow Computers, VLSI computing structures; Systolic Array Structure.
- Text Books**
1. K. Hwang and F.A. Briggs , "Computer Architecture and Parallel Processing " Mc Graw Hill Book Co. NY.
 2. M.J. Flynn," Computer Architecture : Pipelined And Parallel Processor Design ", Naros Publishing Co.
 3. K. Hwang' " Computer Architecture " Mc Graw Hill Co.NY.

- UNIT 1: Introduction:** introduction to software engineering, software crisis, software Characteristic & Application. Software life cycle model, waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model.
- UNIT 2: Project Management:** project management concept, software process and project metrics, project planning, project size estimation metrics, project estimation technique ,empirical estimation techniques, COCOMO-A heuristic estimation technique, halstead's software science-an analytical technique. staffing level estimation, scheduling.
- UNIT 3: Software Requirement Specification:**-requirement analysis, requirement elicitation technique like FAST,QFD & use case approach, DFD,ER-diagram, nature of SRS, characteristic & organization of SRS. Alternative analysis technique: data structure oriented method, the DSSD approach, Jackson system development
- UNIT 4: System Design:** design concept and principal; design fundamental abstraction, refinement, modularity, software architecture, control hierarchy. Design technique and its implementation: structured approach, functional approach, object oriented approach.
- UNIT 5: Testing and Maintenance:** coding guidelines, code review, testing process, design of test case, functional testing , structural testing, software testing technique: unit testing, integration testing (top-down and bottom-up) , alpha and beta testing, system testing and debugging. Maintenance process, maintenance model, reverses engineering and re-engineering, documentation, verification vs validation.
- UNIT 6: Software Reliability And Quality Assurance:** quality concept & characteristic, software quality assurance, software quality activity, software review, cost impact of software, Formal technical review: the review meeting, review reporting and record keeping, review guideline, formal approach to SQA; CMM & ISO9001 Standard.

Text Books

1. Software Engineering: A Practitioner's approach by Roger S. Pressman (Mc-Graw Hill International Edition).
2. An Integrated Approach to Software Engineering : Pankaj Jalote, Narosa Publication.
3. Software Engineering Concepts by Fairley (TMH)

- UNIT 1:** **Introduction:** Origin of computer graphics, display devices, general purpose graphics software display of solid objects.
- UNIT 2:** **Display Techniques and Devices:** Point plotting techniques, coordinate, systems and incremental methods, line-drawing algorithm, circle generators, Display devices, CRT, inherited memory devices, the storage tube display, refresh line-drawing display.
- UNIT 3:** **Graphic Packages And Display Files:** A simple graphics, segments, functions for segmenting the display files, posting and unposting, segment Naming schemes, appending to segment refresh concurrent with reconstruction free storage allocation, display file structure, geometric, models, defining symbols procedures, display procedure, structured display files.
- UNIT 4:** **Two Dimensional Transformation:** Principle concatenation matrix representation, a line clipping algorithm, midpoint division, clipping other graphic entities, polygon clipping, viewing transformation, the windowing Transformer.
- UNIT 5:** **Input Devices:** Pointing and positioning devices, three dimensional input devices. Graph input techniques.
- UNIT 6:** **Event Handling & Input Functions:** Introduction, polling, interrupts, the event queue, functions for handling events, polling task design, light pen interrupts, dragging and fix, hit detection, on-line character recognizers.
- UNIT 7:** **Raster Graphics:** Introduction, generating a raster image, conversion, natural images, solid area son conversion, interactive faster graphics raster display hardware.
- UNIT 8:** **3-D Graphics:** Write frame perspective display, perspective depth, projective transformation, curves & surfaces, hidden line and surface elimination, transparent solids, shading.

- Text Books**
1. Principles of interactive computer graphics by W. M. Newman & R. F. Sproull, Mc Graw Hill.
 2. Computer Graphics by Roy A. Plastick & Gorden Kalley, Schaum's Outline Series
 3. Computer Graphics by Donald Hearn & Baker, PHI.

- UNIT 1:** **HTML:** Tables, Images, Forms, Frames, CSS.
Essential XML and Scripting List: Well Formed & Valid XML Document, Document type definition, XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX.
- UNIT 2:** **Java Script:** Introduction to Java Script, Data type, functions, Events in Java Script, Object in Java Script.
- UNIT 3:** Versions of Swing, Labels and HTML, Actions, Tooltips, Timers, The Event Dispatch Thread, Client Properties, Keyboard Shortcuts, Serialization, Borders, Icons, Cursors, Double-Buffering, The Box Container, Simple Dialogs, JFileChooser, JColorChooser, Menus, JTree and TreeModel, JTable and Table Model, JTextComponent and HTML Text Display, Accessibility, Custom Components.
- UNIT 4:** **Web Servers:** Introduction to Tomcat Server Container.
- UNIT 5:** **The Servlet Technology:** Servlet Application Architecture, The Benefits of Servlets. Inside Servlets: The javax.servlet Package, The Lifecycle of Servlets, Obtaining Configuration Information, Preserving the ServletConfig, The Servlet Context, Sharing Information Among Servlets, Requests and Responses, The GenericServlet Wrapper Class, Creating Thread-Safe Servlets. **HttpServlet:** The HttpServlet Class, The HttpServletRequest, HttpServletResponse, Populating HTML Elements, Request Dispatching
- UNIT 6:** **Session Management:** What Is Session Management, URL Rewriting, Hidden Fields, Cookies, Session Objects, Knowing Which Technique to Use? **Methodology:** Error Handling and Debugging, Sharing data between JSP pages- Sharing Session and Application Data. Learning
- UNIT 7:** **JSP Basic:** What's Wrong with Servlets? Introduction to JSP, How JSP Works, the JSP API, Implicit Objects. **JSP Syntax:** Directive elements, scripting elements Action elements.
- UNIT 8:** **Java Beans:** Introduction to Java Beans, Advantage, Properties, BDK, **Database Connectivity:** Database Programming using JDBC, Studying javax.sql.*package, accessing a database from a JSP page, Application-specific Database Action, Developing Java Beans in a JSP PAGE.

Text Books

1. Java for the Web with Servlets, JSP, and EJB: A Developer's Guide to J2EE Solutions, Budi Kurniawan, New Riders Publishing
2. Inside XML, Steven Holzner, , New Riders Publishing



MCA-206P

Graphics Lab

The laboratory work shall be based on MCA206

Credits: 2

MCA-208P

Advanced Java Programming Lab

The laboratory work shall be based on MCA208

Credits: 2

MCA-210P

Problem Analysis and Design of Project

Credits: 2

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V SEMESTER

MCA-301 Advance Computer Networks

Credits 4(3-1-0)

- UNIT 1:** Introduction and Overview :TCP/IP, Internet, Internet services, Internet protocol and standardization, Approaches to network communication, WAN & LAN Ethernet Technology, FDDI, ATN.
- UNIT 2:** Internetworking concept and Architectural Model, Internet Addresses: Application label interconnection, Network label Interconnection, Properties of Internet, Internet Architecture, Interconnection Through IP Routers, Universal Identifiers, Classes of IP Addresses, Network and Broadcast services, weaknesses in internet addressing, dotted decimal notation, loop back address, summary of special address conventions.
- UNIT 3:** Mapping Internet Address to physical Addresses (ARP) : The address resolution problem, Two type of physical addresses, Resolution through Direct mapping and dynamic binding, ARP refinement, relationship of ARP to other protocols, ARP Implementation, ARP protocol format, Determining an internet Address At startup (RARP)
- UNIT 4:** Internet Protocol : Connectionless Datagram delivery : Virtual network, internet architecture & Philosophy, Concept of Unreliable delivery, connectionless delivery system, Internet datagram and its options, Routing IP Datagrams: Routing in Internet, Direct and Indirect delivery, Table-Driven IP & Next-Hop Routing, Default and Host-specific routers, IP routing algorithm, routing with IP addresses, Handling incoming datagrams, establishing routing tables.
- UNIT 5:** Reliable Stream Transport service (TCP) : Need for stream delivery, properties of reliable delivery service, providing reliability, TCP, ports, connections and endpoints, passive and active opens, segments and sequence numbers, TCP segment format , TCP checksum computation , acknowledgement, timeout and retransmission, Karn's algorithms and timer back off, response congestion, establishing and closing a TCP connection, TCP state machine, TCP performance, silly window syndrome and avoiding silly window syndrome.
- UNIT 6:** TCP/IP over ATM Networks: ATM hardware, logical view of ATM network, two ATM connection paradigms, ATM cell transport, Packet type and multiplexing, IP address binding in ATM network, Connection management, address binding with in an logical IP subnet, ATM ARP packet format, use of ATP ARP packet to determine an address.
- UNIT 7:** Bootstrap and auto configuration (BOOTP, DHCP), DNS and Application: BOOTP message format and retransmission policy, two step Bootstrap procedure, Dynamic Host configuration and IP address assignment, obtaining multiple addresses, address acquisition and lease renewal state, DHCP message format, option and message type, DSCP and Domain name, TCP/IP internal Domain names, mapping domain name to addresses, Domain name resolution , Domain server message format, compressed name format, abbreviation of domain names, inverse mapping, obtaining authority for subdomain, Applications : File access and transfer sharing by file transfer, TCP/IP file transfer protocol (FTP), FTP features, FTP process model, TCP port number assignment, TFTP, NFS, Remote procedural call (RPC), Electronic mail (822, SMTP, MIME).

Text Books

1. Internetworking with TCP/IP Vol I by Stevens, addition Wesley
2. TCP/IP vol I, by Comer, PHI



UNIT 1: INTRODUCTION: History; What is Information Security; Characteristics of Information; Information Security Model; Components of an Information Security; Aspects of Information security: Security Attacks, Security Mechanism, and Security Services (X.800);

UNIT 2: SECURITY INVESTIGATION: Need for Security, Business needs, Legal, Ethical and Professional Issues; Threats and types of attacks (active and passive attacks),

UNIT 3: Information Security Techniques: Introduction to Steganography; Cryptography; Digital Watermarking; Substitution ciphers and Transposition ciphers, Simple XOR, One-Time Pads, Algorithms, Cryptographic Protocols. *Arbitrated and Adjudicated Protocols;* One-Way Hash Functions

UNIT 4: Information Security Policy, Standards and Practice.

Text Books

1. Applied Cryptography by Bruce Schneier, John Wiley & Sons.
2. Network Security and Cryptography by William Stallings.
3. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi.
4. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", vol. 1-3, CRC PressLLC.

MCA-305P

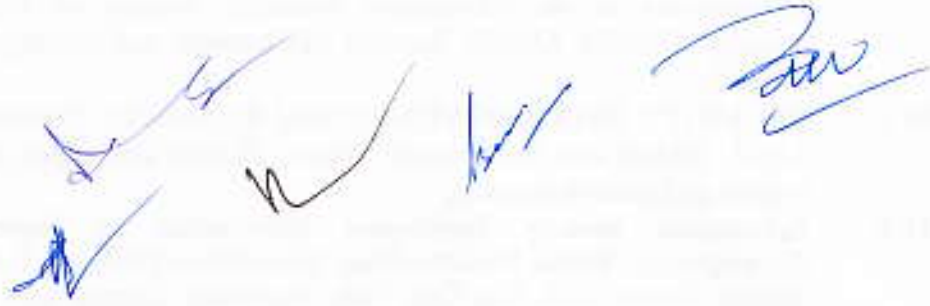
Internet programming Lab
The laboratory work shall be based on MCA503

Credits: 2

MCA-306P

Project Lab

Credits: 2

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- UNIT 1:** Introduction to neural nets, Perceptrons and the LMS Algorithm.
Back propagation Learning, Visually-Guided Robot Control.
- UNIT 2:** Optimization Techniques, Overfitting, Cross-Validation, and Early Stopping, Simple Recurrent Networks, Pattern Classification, Language Processing Models.
- UNIT 3:** Optimization Techniques, Overfitting, Cross-Validation, and Early Stopping, Simple Recurrent Networks, Pattern Classification, Language Processing Models.
- UNIT 4:** Shared Weight Networks, Competitive Learning and Kohonen Nets, Hebbian Learning and Principal Components Analysis, Hopfield Nets and Boltzmann Machines.
- UNIT 5:** Mean Field Approximation, Helmholtz Machines; Minimum Description Length, Bayesian Networks, Computational Learning Theory, Connectionist Symbol Processing, Reinforcement Learning, Neurophysiology for Computer Scientists.
- Text Books**
- 1) Bishop, C. M. (1995) Neural Networks for Pattern Recognition,. Oxford University Press.
 - 2) Optional enrichment: Anderson, J. A., and Rosenfeld, E.
 - 3) Handout: Derivation of the backprop learning rule
 - 4) Haykin, S. Neural Networks: A Comprehensive Foundation, 2nd edition.
 - 5) Kearns, M. J., and Vazirani, U. V. An introduction to Computational Learning Theory,. Cambridge, MA: MIT Press.
 - 6) Churchland, P.S. (1986) Neurophilosophy: Toward a Unified Science of the Mind-Brain.. Cambridge, MA: MIT Press.



- UNIT 1: What is learning :**
Introduction, What is learning, Self learning computer systems Machine learning & Methodology of science, Ex:- A kangaroo in mist. Data Mining: Definitions, Challenges, The knowledge discovery process in detail (Data selection, Cleaning, Enrichment, Coding process) KDD (Knowledge Discovery in Database) v/s Data Mining, DBMS v/s Data Mining, Golden rules to setup KDD environment
- UNIT 2: Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Costoptimality, An example of illustrate Cost-optimal algorithms- such as summation, Min/Max on variousmodels.**
- UNIT 3: DATA Warehousing:**
DATA Warehousing. Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Technical considerations & Implementation considerations of data warehouses, 3-level architecture of data warehousing.
- UNIT 4: Data Mining Techniques :**
Preliminary Analysis of data set using traditional Query rules, Visualization techniques, Likelihood & distance, OLAP Tools, K-nearestneighbor, Decision Trees. Association rules, Neural Networks, Genetic algorithm.
- UNIT 5: Association Rules :**
What is an Association rule, Methods to discover Association Rules, A Priori algorithm, Partition algorithms, Pincer search algorithms, Discussion on different algorithms, Incremental algorithms, Border algorithm, Generalized association rule. Decision Trees :What is a decision tree, Tree construction principle, Web-split, Splitting Indices, Splitting Criteria, Decision tree construction algorithm (brief description only)
- UNIT 6: Web Mining :**
Web mining, Web content mining, Web structure mining, Web users Mining, Text mining, Unstructured text, Episode Rule Discovery for Text, Hierarchy of Categories, Text-Clustering.

Text Books

- 1) Data Mining techniques by Arun Pujari, Universities Press.
- 2) Data Mining by Pieter Adriaans, Dolf Zantinge, Addison- Wesley.
- 3) Data warehousing, Data mining, OLAP, by Alex Berson & Stephen J. Smith, TMH Edition
- 4) Berson, "Data Warehousing, Data-Mining & OLAP", TMH
- 5) Mallach, "Decision Support and Data Warehousing System", TMH
- 6) Bhavani Thura-is-ingham, "Data-Mining Technologies, Techniques Tools & Trends", CRC Press
- 7) Navathe, "Fundamental of Database System", Pearson Education
- 8) Margaret H. Dunham, "Data-Mining, Introductory & Advanced Topics", Pearson Education

- UNIT 1:** Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.
- UNIT 2:** Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Costoptimality, An example of illustrate Cost-optimal algorithms- such as summation, Min/Max on various models.
- UNIT 3:** Parallel Sorting Networks, Parallel Merging Algorithms on CREW/ EREW/MCC, parallel Sorting Networks on CREW/EREW/MCC, linear array
- UNIT 4:** Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.
- UNIT 5:** Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms-Permutation, Combinations, Derrangements.
- Text Books**
- 1) M.J. Quinn, "Designing Efficient Algorithms for Parallel Computer" by Mc Graw Hill.
 - 2) S.G. Akl, "Design and Analysis of Parallel Algorithms"
 - 3) S.G. Akl, "Parallel Sorting Algorithm" by Academic Press.

- UNIT 1: Introduction to distributed system :**
What is distributed system, Advantages of distributed systems over centralized systems and PCs, Disadvantages of distributed system. Hardware concepts: Bus based multiprocessors, switched Multiprocessors, Bus based multi computer, Switched multi computers. Software Concepts: Network OS, true distributed systems, Multiprocessor time sharing system.
- UNIT 2: Architecture of Distributed System:**
Motivation of distributed operating system, System Architecture types, Various issues in distributed operating system: Global Knowledge, Naming, Scalability, Compatibility, Process Synchronization, Resource Management, Security, Client-Server computing model. Communication Network (WAN and LAN), Communication Primitives, The Message Passing Model, Remote procedural calls.
- UNIT 3: Theoretical Foundations of Distributed Operating system:**
Inherent limitation of distributed system, absence of global clock, Absence of shared memory, Lamport's Logical clock, Global State Chandy-Lamport's global state recording algorithm, termination detection.
- UNIT 4: Distributed deadlock, Distributed Mutual Exclusion and Agreement Protocol :**
Mutual Exclusion: Centralized Algorithm, Distributed algorithm, Token ring algorithm. Deadlock in distributed system. Distributed deadlock detection, Distributed deadlock prevention., Introduction to Agreement protocols, System models: Asynchronous Vs Synchronous Computation, Model of processor failure, Authenticated Vs Non-Authenticated Messages, Performance Aspects.
- UNIT 5: Distributed data storage and distributed Query Processing :**
Data Replication, Data Fragmentation (horizontal, vertical and mixed), Data replication and fragmentation, Query Transformation, Simple join Processing, Semijoin strategy. Join strategy that exploits parallelism, Distributed transaction model.
- UNIT 6: Commit protocol, Concurrency control and deadlock handling :**
Commit protocols-two phase commit and three phase commit, Concurrency control-locking protocol and time stamping, Deadlock handling - centralized and distributed approaches.
- Text Books**
1) Advanced Concepts in operating system by Mukesh Singhal and Niranjana G. Shivaratri.
2) Distributed operating system by Andrew S. Tanenbaum.



- UNIT 1: INTRODUCTION:**
Fundamental terminology, Objective of Fault Tolerance, Applications of Fault-Tolerant computing, Reliability, Safety, Availability and Maintainability Modeling using Markov chain, Dependability Evaluation technologies, Failure rate, reliability function, Mean time to Failure (MTTF), Mean Time between failures (MTBF) Mean time to Repair (MTTR)
- UNIT 2: Architecture of Fault Tolerant Computer:**
Taxonomy, Fault Avoidance Techniques, Fault Detection at IBM, Dynamic redundancy in multiple computer system & Recovery on Time and Space, Fault, Detection Techniques, Detection of errors in Data Management, Component Fault Detection, Detection Tests at System level.
- UNIT 3: Reliable Design and Fault Diagnosis:**
Hazard, Fault Detection in Combinational circuits, fault location Experiments, Boolean Differences, Fault Detection by Path Sensitizing.
- UNIT 4: Coding Theory For Fault-Tolerant System:**
Error models, Basic structural properties of parity check codes, Matrix description of parity check codes, vector-space properties of parity check codes Error checking the syndrome, Group properties of Parity check codes, Distance properties of parity check codes Polynomial algebra and cyclic codes, Hamming single error correcting codes, Unidirectional error correcting and Detecting codes, Asymmetric Error-correcting codes, single-Asymmetric error correcting code.
- UNIT 5: Software Design Faults:**
Approaches for uniprocess software: Exception Handling Framework, Recovery Block Approach, N-version Programming. Backward Recovery in Concurrent systems: Domino Effect, Conversations, and FT-Actions, Conversation using monitors, Using Distributed-Action. Forward recovery in concurrent Systems: Exception Resolution, Exception Handling with FT-Action.

Text Books

- 1) D.K. Pradhan, Fault Tolerant Computer System Design, Prentice Hall PTR New Jersey.
- 2) Uvi S.T. Agrawale: Fault Tolerant System Design, Mc GrawHill, International Ed.
- 3) Zvi Kohavi, Switching and finite Automata Theory, TMH.

A collection of approximately seven handwritten signatures in blue ink, scattered across the lower half of the page. The signatures vary in style, with some being cursive and others more stylized or blocky.

MCA-537 Advanced Data Base Management System Credits 4(3-1-0)

- UNIT 1:** Introduction to distributed data base systems, transaction processing Concurrency control techniques, security, Distributed Data Base architecture.
- UNIT 2:** Introduction to object oriented database system, Definition of Objects, Review of Key Object-oriented programming concepts, Object Orientation for Database Systems, Relational Extensions to Object-oriented Database Systems, Object Orientation in Relational Databases, Uses for Object-oriented Database.
- UNIT 3:** Introduction to data mining, Self-learning, What is data warehouse and why do we need, Designing decision support systems, Integration with data mining.
- UNIT 4:** Introduction to knowledge discovery process, Data selection, cleaning, Enrichment coding data mining, Preliminary analysis of the data set using traditional query tools, Decompose trees, Association rules, Neural networks, Genetic algorithms Introduction to setting up a KDD environment.
- UNIT 5:** Advanced Transaction processing: Remote Backup systems, Transaction-Processing Monitors, TP-Monitor Architectures, High-Performance Transaction systems, Long Duration Transactions, Transactional Workflows, Query Optimization security and production, Encryption, Statistical Database.
- UNIT 6:** Data base triggers, functions, procedures, packages and forms with respect to existing database.

Text Books

1. Stegano Ceri and giuseppe Pelagati : Distributed Data base system, Mc-Graw Hill Book Company. 1984, OR (Advance version)
2. Prabhat K. Andleigh, Michael R. Gretzinger : Distributed Object - Oriented Data-Systems Design, PTR Prentic- Hall Inc., 1992.
3. Pieter Adriaans Dolf Zantinge : Data Mining, Addison, Wesley, Longman Ltd., 1997.

UNIT 1: Introduction:

Terminology, Substitution ciphers and Transposition ciphers, Simple XOR, One-Time Pads, Computer Algorithms. Cryptographic Protocols

UNIT 2: : Protocol Building Blocks:

Introduction, Communication using Symmetric Cryptography, One-Way Hash Functions, One-Way Hash Functions, Communication using Public-Key Cryptography, Digital Signatures, Digital Signatures with Encryption.

UNIT 3: : Protocols: Authentication and Key exchange, Key Exchange, Authentication, Multiple key public key cryptography, Secret splitting, Secret Sharing, Cryptographic protection. Zero-Knowledge Proofs, Zero-Knowledge Proofs of Identity, Blind Signatures, Oblivious Transfer, oblivious signature, Simultaneous contract signing Cryptographic Techniques**UNIT 4: : Key Management :**

Generating Keys, Nonlinear Keyspaces, Transferring Keys, Verifying Keys, Using Keys,

UNIT 5: Using Algorithms:

Choosing an Algorithm, Public-Key cryptography versus Symmetric cryptography, Encrypting Communication Channels, Encrypting data for Storage.

UNIT 6: Cryptographic Algorithms:

RSA, DES

Text Books

- 1) Applied Cryptography by Bruce Schneier, John Wiley & Sons.
- 2) Network Security and Cryptography by William Stallings
- 3) Concept of Network Security and Cryptography by Frozen

- UNIT 1:** Data communications and Network Management Overview : Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers,
Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.
- UNIT 2:** SNMPV1 Network Management : Organization and Information and Information Models. Managed network : Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model. SNMPv1 Network Management : Communication and Functional Models. The SNMP Communication Model, Functional model. SNMP Management: SNMPv2 : Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility With SNMPv1.
- UNIT 3:** SNMP Management : RMON : What is Remote Monitoring? , RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON
- UNIT 4:** Telecommunications Management Network: Why TMN? , Operations Systems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, An Integrated View of TMN, Implementation Issues.
- UNIT 5:** Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.
- UNIT 6:** Web-Based Management: NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network, Future Directions.
- Text Books**
- 1) Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.
 - 2) Network management, Morris, Pearson Education.
 - 3) Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
 - 4) Distributed Network Management, Paul, John Wiley.

MCA-540 Object modeling techniques and UML Credits 4(3-1-0)

- UNIT 1:** **Introduction:** object oriented themes, object oriented development, object oriented paradigms encapsulation, abstraction, binding, polymorphism, inheritance, message passing), the object modeling techniques, impact of an object oriented approach.
- UNIT 2:** **Modeling:** The object modeling techniques, object and classes, link and association, advance link and association, concepts, elements of object model, aggregation, abstract classes, multiple inheritance, candidate key.
- UNIT 3:** **Dynamic and functional modeling:** Events and states, operations, concurrency, object oriented developments, functional model, data flow diagram, specifying operations, constraints.
- UNIT 4:** **Analysis and system design:** Overview of analysis, principles of system design, object design, breaking of a system into subsystem.
- UNIT 5:** **UML (Unified Modeling language):** Introduction to UML, importance and principles of modeling, A brief introduction to conceptual model of UML, architecture of UML, case study: Elevator problem

Text Books

1. James Rumbaugh et al, "Object Oriented Modeling and Design", PHI
2. Booch Grady, "Object Oriented Analysis & Design with application 3/e", Pearson Education, New Delhi.
3. James G. Booch, J. Rumbaugh "The Unified Modeling Language",

Several handwritten signatures in blue ink are scattered across the page. There are approximately six distinct signatures, some appearing to be initials and others more full names, written in a cursive or semi-cursive style.

- UNIT 1:** 1. Overview of wireless communication: History, Different Generations, General characteristics of mobile devices, Electromagnetic spectrum, Radio propagation mechanisms, characteristics of wireless medium, wireless topology, cellular system (cell concepts, cell hierarchy, cell fundamentals). *Issues in mobile computing*: Introduction, functions, 3-Tier architecture, applications and services. *GSM*: Mobile services, System architecture, Radio interface, Localization and calling Handover, Security.
- UNIT 2:** 2 **WLAN**: Technical issue (uses, design goal, types, components and services offered by a typical IEEE 802.11 network), IEEE 802.11 standard (physical layer, MAC layer mechanism & functionalities, CSMA/CA mechanism). *HIPERLAN*: HIPERLAN standard, HyperLAN/1 (physical layer, DLC & RLC layer, MAC sub-layer), HyperLAN/2 (Physical layer, MAC sub-layer, power conservation issues) *BLUETOOTH*: Specifications, transport protocol group, middleware protocol group, profile.
- UNIT 3:** **Medium access control (wireless)**: Motivation for a specialized MAC (hidden and exposed terminals, near and far terminals), SDMA, FDMA, TDMA and CDMA.
- UNIT 4:** **Mobile Network layer**: Mobile IP: Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations, and dynamic host configuration protocols (DHCP).
- UNIT 5:** **Mobile Transport layer**: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmission/ fast recovery, transmission/ time-out freezing, selective retransmission, transaction oriented TCP. Wireless Application Protocol WAP: Introduction, protocol architecture and treatment of protocols of all layers.
- UNIT 6:** **Introduction & issues in Ad Hoc wireless networks**: introduction (cellular vs ad hoc wireless networks and applications), Medium Access Scheme, Routing, Multicasting, transport layer protocols, Pricing Scheme, QoS provisioning, Selforganization, security, addressing and service discovery, energy management, Scalability, deployment considerations, Issues in designing a routing protocol for ad hoc wireless Networks (Mobility, Bandwidth constraint, Error prone shared broadcast radio channel, Hidden & exposed Terminal Problems, Resource Constraints, characteristics of idle routing protocol), Classification of routing protocols: Table-driven routing protocols (DSDV, WRP), On-demand routing protocols (DSR, AODV, LAR).

**Text
Books**

1. J.Schiller, Mobile Communications, Pearson Education publication.
2. Murthy and Manoj, Ad Hoc Wireless Networks, Pearson Education publication.
1. Talukder and Yavagal, Mobile Computing, TMH publication.
2. Pahlavan and Krishnamurthy, Principles of Wireless Networks, PHI publication.
3. Stomenovic and Cacute. " Handbook of Wireless Networks and Mobile Computing", Wiley, 2002.

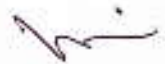
- UNIT 1:** **The .NET Framework:** Introduction, Common Language Runtime, Common Type System, Common Language Specification, The base class library, Microsoft Intermediate Language, Just In Time Compiler, Garbage Collection, Assemblies
- UNIT 2:** **C# Basics:** Introduction, Data Type, Identifiers, Variables & Constants, C# Statements, Object Oriented Concepts, Object & Classes, Arrays and Strings, System Collections, Delegates, Events, Error Handling
- UNIT 3:** **Developing ASP.NET Applications:** Web Application, Web Form Fundamentals
Validation, Templates, DataBound Controls, Master Pages, URL Routing
- UNIT 4:** **Working With Data:** ADO.NET Fundamentals, Reflection, Site Navigation, State Management, LINQ, Microsoft Application Block, Entity Framework
- UNIT 5:** **Advanced ASP.NET:** Security Fundamentals, Web Services, Web User Controls, Ajax.Net, WCF, Custom Controls, Basic Project Modeling Technique
- Text Books**
1. 'Beginning ASP.NET 2.0 in C# 2005' by Apress
 2. 'C# with .NET Framework ' by Shibi Pannikar & Kumar Sanjeev
 3. 'Understanding .NET Framework ' by Tonybaer

- UNIT 1:** **Introduction to Compiling:** Overview of Compilation, the phases of a compiler, cousins of the compiler, grouping of Phases of translation, bootstrapping, Compiler construction tools.
- UNIT 2:** **Lexical Analysis:** Role of lexical analyzer, specification & recognition of tokens, regular expressions and their applications to lexical analysis, BNF notation, ambiguity.
- UNIT 3:** **Syntax Analysis:** Role of Parser, Top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, shift reduce parsing, operator precedence parsing, predictive parser, Canonical collection of LR(0) items LR parsers (SLR, LALR, LR), Parser generation.
Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes, Recursive Evaluation, Analysis of Syntax directed definition.
- UNIT 4:** **Semantic Analysis:** Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes, Quadruples, Triples. Attributed grammars, Syntax directed translation, Syntax directed definition, Parse trees & syntax trees.
- UNIT 5:** **Symbol Tables:** Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language.
Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.
- UNIT 6:** **Code optimization:** Principles sources of optimization, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations.
- UNIT 7:** **Code Generation:** Intermediate code generation, Boolean expressions, Case statements, Procedure calls, issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks.
- Text Books**
1. Aho, Sethi & Ullman, "Compilers Principles & Techniques & Tools", Addison Wesley.
2. Aho & Ulman, "Compiler Design," Narosa Publishers, New Delhi

- UNIT 1:** History of Linux (GNU/LINUX), GNU General Public License, Basic Requirement for Linux Installation, Linux Commands, pwd/cd/ls/who/whoami/which/cp/mv/rm/mkdir/touch/hostname/cat/cal/eject/mount/umount/login/logout/echo/wget, VI Editor, halt/shutdown/poweroff/reboot/ll/dd/joe/emacs/lm/fdisk/mke2fs/mtools/pico/sed/wc/whereis/convert/ifconfig/netftp/scp/hdparm/dmesg/bc/sh/at/atq/trm/date/uptime/su/uptime
- UNIT 2:** Process, Daemon, File System Hierarchy Standard, Details FSTAB, Archiving/ Encoding/ Compressing/ Encrypting File, Compress/Uncompress/ tar/bzip2/bunzip2/gzip/gunzip/zip, Process and Job Control, ps/nice/renice/ top/ nohup/kill/killall/bg/fg/jobs, Symbolic Link / Hard Link, Comparison between Both Links, Advance Linux Commands, useradd/userdel
- UNIT 3:** Shell Scripting, Boot Process, User and Group Administration - Useradd Details, File & Directory Permission & Security, Chmod/chgrp/SetUid/ SetGid/StickyBit/umask, User and Group Quota Management, Cron and Anacron, Autofs/Syslog Administration, Some Advanced Commands: Df/Du/Fdformat/Elabel/Dumpe2fs/Tune2fs/Chroot/Sync/Mkswap/Swapon/E2fsck/ldisk
- UNIT 4:** IP Addressing – Basic, IP Address Configuration for Linux, Sub netting, bonding, Configure ,NIC with Multiple IP, Using Different Utility, ping/ tcpdump/ netstat/nmap, DHCP Server, Configuration, SAMBA, XINETD, TCPWRAPPER, OpenSSH
- UNIT 5:** Apache, Basic Configuration/ Virtual Hosting/ Authentication Content Description and Modification , Indexing /Redirection/ Logging/ Proxying Security - Using OpenSSL.Integration and Testing of PHP Module
- UNIT 6:** NIS, Why NIS?, NIS Server Configuration, NIS Client Configuration, Testing from the Clients, Host.conf and nsswitch.conf, Advantage of NIS/Automation/Security. IPTables, Build internet firewall based on stateless and stateful firewall All Kind of Network address and port translation, NAT to implement transparent Proxy, Iptables integration with Linux router, implementing Default, Static and Dynamic Routers and VPN Support
- UNIT 7:** Squid, Introduction to SQUID/ CLI Options, Network Parameters/ Admin Parameters Caching/ Access Control List, Authentication/ Logging, Transparent Proxy, Reverse Proxy, DNS Mapping, Squid Guard
- UNIT 8:** DNS/DNS Restriction and ACL implementation/Dynamic DNS, Mail – Sendmail, SquirrelMail
- UNIT 9:** MySQL, Introduction to RDBMS, Installation of MySQL, MySQL Architecture, Creation of Database, Simple SQL Statements, Backup and Restore
- Text Books**
1. "Red Hat Linux Bible, Fedora and Enterprise Edition", Christopher Negus, Wiley
 2. "Unix/Linux concepts and Applications", Sumitabha Das, Tata, McGraw Hill

Handwritten signatures and initials in blue ink, including a large signature on the right and several smaller ones below it.

- UNIT 1:** **Introduction:** what is digital image processing ? origin of digital image processing. Use of digital image processing. Fundamental steps in digital image processing, components of an digital image processing.
- UNIT 2:** **Digital image fundamentals:** elements of visual perception, brightness adaption and discrimination, image sensing and acquisition, image sampling and quantization, some basics on pixel, relationships between pixel
- UNIT 3:** **Image enhancement:** in spatial domain: basic gray level transformations, Histogram processing enhancement using arithmetic/logic operations, basics of spatial filtering, sharpening spatial filters, combining spatial enhancement methods.
- UNIT 4:** **Image enhancement in the frequency domain:** Introduction to the fourier transform and frequency domain., smoothing frequency domain filters, sharpening frequency domain filters, homomorphic filtering, implementation.
- UNIT 5:** **Image restoration:** a model of the image degradation/restoration process. Noise model, restoration in the presence of noise only, spatial filtering, mean filters, order statistics, filters, adaptive filters, periodic noise reduction by frequency domain filtering: band reject filters, band pass filters, notch filters, optimum notch filters, linear, position invariant degradations, estimating degradation function inverse filtering, wiener filtering, geometric mean filters, geometric transformation.
- UNIT 6:** **Image compression:** Fundamentals of image compression models, error free compression: variable length coding, LZW coding, bit plane coding, lossless predictive coding, lossy predictive coding, transform coding, wavelet coding, image compression standard.
- UNIT 7:** **Image segmentation :** detection of discontinuities, edge linking and boundary detection, threshold, region based segmentation.
- Text Books**
1. R. C. Gonzalez, R.E. Woods, "digital image processing", Pearson education.
 2. R. C. Gonzalez "digital image processing using MATLAB", Pearson education.
 3. W. K. prett, "digital image processing", Addison Wesley.



- UNIT 1:** **Introduction:** to Distributed Data system, Distributed Database Architecture, Distributed Data base Design, Transaction processing Concurrency Control techniques, Security.
- UNIT 2:** **Data Fragmentations:** Types of Data Fragmentations, Fragmentation and allocation of fragments, Distribution transparency, access primitives, integrity constraints.
- UNIT 3:** **Grouping and aggregate function:** Query processing , Equivalence transformation of queries.
- UNIT 4:** **Evaluation:** parametric queries, Query optimization, Join and general queries.
- UNIT 5:** **Management of Distributed transaction and concurrency control:** Distributed Date base Administration, Catalogue Management Authorisation, Security and protection.
- Text Books**
1. Ceri & Palgathi, "Distributed Database System", McGraw Hill.
 2. Raghu Rama Krishnan and Johannes Gehrli, "Database Management Systems", Mc Graw Hill.
 3. Date C. J, "An Introduction to Database System, Vol I & II", Addition Wesley.
 4. Korth, Silbertz, Sudarshan , "Database Concepts", McGraw Hill.
 5. Elmasari , Navathe, "Fundamentals of Data Base Systems", Addition Wesley.
 6. Data C. J , "An Introduction to Database System", Addition Wesley

- UNIT 1:** Introduction, well posed learning problems, Machine learning approach, perspective and issues in machine learning, elements of Machine learning, types of machine learning: supervised learning, unsupervised learning, reinforcement learning, recommender system, linear regression with one variable (cost function, example), regression with multi variable and applications, gradient descent, overview of soft computing and applications.
- UNIT 2:** Introduction to Artificial Neural Systems, Neural Computation: Some Examples and Applications, biological Neurons, dendrite, synapses and their weights, pre- and post-synaptic signals, activation potential and activation function. Excitatory and inhibitory synapses. The biasing input. Types of activating functions, Models of Artificial Neural Networks, Neural Processing.
- UNIT 3:** Unit 3: Learning and adaptation, Learning as Approximation or Equilibria Encoding, Supervised and Unsupervised Learning, Neural Network Learning Rules: Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule, Least-Mean-Square (Widrow-Hoff) Learning Rule, Correlation Learning Rule, Winner-Take-All Learning Rule, Outstar Learning Rule
- UNIT 4:** Perceptron, Single-Layer Perceptron Classifiers, Classification Model, Features, and Decision Regions, Discriminate Function, perceptron for classification.
- UNIT 5:** Multilayer Feed Forward Neural Network, Supervised Learning, Linearly Nonseparable Pattern Classification, Error Back-Propagation algorithm, Fast training algorithms.
- Unit 6:** Self-Organising Maps, Kohonen networks Recurrent Networks, Hopfield networks.

**Text
Books**

1. Tom M. Mitchell. "Machine Learning" McGraw-Hill, 1997.
2. P. Langley. "Elements of Machine Learning" Morgan Kaufmann Publishers, Inc. 1996.
3. Artificial neural Networks, Zurada, Jacek M.
4. Neural Networks for Pattern Recognition, Bishop, C. M. (1995), Oxford University Press.
5. Neural Networks: A Comprehensive Foundation, Simon Haykin.
6. Artificial neural Networks, B. Yegnanarayana, PHI
7. Neural networks, Fuzzy logic and Genetic Algorithms, S. Raj sekaran , Vijayalakshmi Pari, PHI.

- UNIT 1: Introduction:** A general introduction to Strings, languages, graphs, trees and relations. Models of Computation: RAM and RASP Models of Computation. Complexities of Algorithm run on these models with linear and logarithmic costs and their inter relationships. Turing machines and their relationship to RAM & RASP models., Finite State Machines, Regular expressions: Deterministic- Finite systems, Non deterministic Automata with and without ϵ -moves Proof of equivalence of DFA and NDFA without ϵ -moves ,Construction of DFA from NDFA with ϵ -moves Regular expressions: Definition, equivalence of finite automata and regular expression with the proof and examples.
- UNIT 2: Properties of regular sets:** Definition of Pumping Lemma along with examples, effective Closure properties of regular sets: Union, Intersection, Complementation, Concatenation, Kleen-Closure, Minimisation of a given DFA(only numerical example and no proofs).
- UNIT 3: Context Free Grammars:** Definition of CFG, left most and right most derivations, definition of Ambiguous grammars, simplification of context free grammar: Removal of useless symbols , ϵ -production, Unit production. Conversion of a given grammar into Chomsky normal form, Griebach normal form (examples only).
- UNIT 4: Push Down Automata & Properties of context free languages:** Definition of instantaneous descriptions, definition of Deterministic PDA, construction of PDA for a given language, construction of CFL's given the transition function of PDA . Pumping Lemma (definition and examples) ,effective Closure, Properties of CFLs : Union, Concatenation and Kleen closure.
- UNIT 5: Turing machine:** Definition, Construction of Turing machines for simple languages, Definition of Computable languages and functions, Definition of total recursive, partial recursive functions, construction of Turing machine for simple arithmetic function.
- Text Books**
1. Introduction to Automata Theory, Languages and Computation by J.E. Hopcroft and J. D. Ullaman, Narosa Publishers.
 2. Theory of Computation by D. Wood, John Welley and Sons.

The block contains several handwritten signatures and initials in blue ink. There is a long, sweeping signature on the left, a small 'h' below it, a signature in the center, a signature below it, a large signature on the right, and another signature at the bottom right.

- UNIT 1:** Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, euler graphs, various operation on graphs, Hamiltonian paths and circuits, the traveling sales man problem.
- UNIT 2:** Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and dijkstra Algorithms.
- UNIT 3:** Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets, connectivity and separability, network flows, planer graphs, combinatorial and geometric dual, Kuratowski to graphs detection of planarity, geometric dual, some more criterion of planarity, thickness and crossings.
- UNIT 4:** Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set verses subspaces, orthogonal vectors and subspaces, incidence matrix of graph, sub matrices of $A(G)$, circuit matrix, cut set matrix, path matrix and relationships among A, B, and C fundamental circuit matrix and rank of B, adjacency matrices, rank- nullity theorem.
- UNIT 5:** Coloring and covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem, Directed graphs, some type of directed graphs, Directed paths, and connectedness, Euler digraphs, trees with directed edges, fundamental circuits in digraph, matrices A, B and C of digraphs adjacency matrix of a digraph, enumeration, types of enumeration, counting of labeled and unlabeled trees, polya's theorem, graph enumeration with polya's theorem. Graph theoretic algorithm must be provided wherever required to solve the problems.

**Text
Books**

1. Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science, PHI publications.
2. B. K. Balakrishnan, "Schaum's outline of theory and problems of graph theory," McGraw Hills publications.

- UNIT 1:** **Introduction to operations research:** Operations research techniques, simulation models
Linear programming formulation and graphic solution: Models of mathematical operations research, art of modeling, construction of the LP model, graphical LP solution
- UNIT 2:** **The Simplex method:** Standard LP form, basic solution, The Simplex method, the M-method, the two-phase method, degeneracy, alternative optimal solution, unbounded solution, infeasible solution
- UNIT 3:** **Sensitivity analysis and dual problem:** Definition of the dual problem, the relationship between the optimal primal and dual solution, economic interpretation of duality, the dual Simplex method, primal-dual computations, sensitivity analysis
- UNIT 4:** **Transportation, assignment, and transshipment models:** Definition of the transportation model, determination of a starting solution, the transportation algorithm, definition of the assignment problem, the Hungarian method, the transshipment model
- UNIT 5:** **Network models:** Network definition, minimal spanning tree algorithm, shortest route problem, shortest route algorithm, maximal flow model, enumeration of cuts, maximal flow algorithm, CPM, PERT
- UNIT 6:** **Queuing systems:** Elements of a queuing model, role of exponential distribution, birth and death models, steady state measures of performance, single server models, multiple-server models, machine servicing model, queuing decision models

**Text
Books**

1. Hamdy A. Taha, "Operation Research : An Introduction," Pearson Education. Engineering and Computer Science, PHI publications.
2. B. K. Balakrishnan, "Schaum's outline of theory and problems of graph theory," McGraw Hills publications.

- UNIT 1:** **Introduction-** Basic concepts, Computational Models, Fixed Universe successor problem and other data structure problems
- UNIT 2:** **Binary Search trees-** Introduction, Height of Binary search tree, Basic Operations in Binary Search Tree: Search, Successor, predecessor, insert, deletion, minimum, maximum, Balancing trees, random binary search tree-treaps, optimal binary search tree, Cartesian tree and its applications.
- UNIT 3:** **Balanced Search Trees-** Introduction, rotations, AVL Trees- insertion, deletion, Red Black Trees- height of Rb tree, insertion, deletion, Splay Trees- properties, splaying modes, splay tree operations, insertion, deletion, searching.
- UNIT 4:** **Multiway Search Trees-** m-way search tree, B-tree-insertion, deletion, B⁺ tree- Searching, insertion, deletion, analysis, Finger Search Tree and level Linking, finger searching, finger search tree, search in finger tree, Randomized Finger Search Trees- Finger searching in Treaps, Finger searching in Skip Lists, Applications, (2,3) trees- height, insertion, deletion, application in range query, x-fast tree, y-fast tree.
- UNIT 5:** **String Data Structures-** Introduction, Digital Search trees- searching, insertion, deletion, Binary tries, patricia trie, Suffix Trees, Suffix Array, Correspondence between suffix array and suffix tree.
- UNIT 6:** **Data Structure for Disjoint Sets-** Introduction, Disjoint set operations, Determining connected components of an undirected graph, Disjoint set representation- Linked representation, Disjoint set forests, Shallow threaded trees, Applications- Maze generation, Kruskal's Minimum spanning tree.
- Unit 7:** **Hashing Techniques-** Introduction, Static Hashing, Hash functions, Cuckoo hashing, Bloom filters- design and applications.

**Text
Books**

1. Advance Data Structures: Peter Bross
2. Lecture notes available on Internet.

(Neural Networks, Fuzzy Logic and Genetic Algorithm)**UNIT 1: Neural Networks-I(Introduction & Architecture)**

Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.

UNIT 2: Neural Networks-II (Back propogation networks)

Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

UNIT 3: Fuzzy Logic-I (Introduction)

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

UNIT 4: Fuzzy Logic -II (Fuzzy Membership, Rules)

Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

UNIT 5: Genetic Algorithm(GA)

Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications

**Text
Books**

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.
2. N.P. Padhy, "Artificial Intelligence and Intelligent Systems" Oxford University Press.
- Reference Books:
3. Siman Haykin, "Neural Netowrks" Prentice Hall of India
4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
5. Kumar Satish, "Neural Networks" Tata Mc Graw Hill

MCA-557 Pattern Recognition and Classification		Credits 4(3-1-0)
UNIT 1:	Overview of Pattern classification and regression Introduction to Statistical Pattern Recognition, Overview of Pattern Classifiers, The Bayes Classifier for minimizing, Risk Estimating Bayes Error; Minimax and Neymann-Pearson classifiers	
UNIT 2:	Parametric Estimation of Densities Implementing Bayes Classifier; Estimation of Class Conditional Densities, Maximum Likelihood estimation of different densities, Bayesian estimation of parameters of density functions, MAP estimates, Bayesian Estimation examples; the exponential family of densities and ML estimates, Sufficient Statistics; Recursive formulation of ML and Bayesian estimates.	
UNIT 3:	Mixture Densities and EM Algorithm Mixture Densities, ML estimation and EM algorithm, Convergence of EM algorithm; overview of Nonparametric density estimation	
UNIT 4:	Artificial Neural Networks for Classification and regression Overview of Artificial Neural Networks, Multilayer Feedforward Neural networks with Sigmoidal activation functions, Backpropagation Algorithm; Representational abilities of feedforward networks, Feedforward networks for Classification and Regression; Backpropagation in Practice Radial Basis Function Networks; Gaussian RBF networks, Learning Weights in RBF networks; K-means clustering algorithm.	
UNIT 5:	Support Vector Machines and Kernel based methods Support Vector Machines -- Introduction, obtaining the optimal hyperplane, SVM formulation with slack variables; nonlinear SVM classifiers, Kernel Functions for nonlinear SVMs; Mercer and positive definite Kernels, Support Vector Regression and ϵ -insensitive Loss function, examples of SVM learning, Overview of SMO and other algorithms for SVM; v-SVM and v-SVR; SVM as a risk minimize, Positive Definite Kernels; RKHS; Representer Theorem	
Text Books	<ol style="list-style-type: none"> 1. R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2002. 2. C.M.Bishop, Neural Networks and Pattern Recognition, Oxford University Press (Indian Edition), 2003. 3. C.M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006. 	

- UNIT 1:** **Introduction:** Sequential model, need of alternative model, Parallel processing terminology, contrasting pipelining and data parallelism, control parallelism, scalability, sieve of Eratosthenes.
- UNIT 2:** **PRAM algorithms:** model of serial computation, PRAM model of parallel computation, PRAM algorithms: Parallel reduction, prefix sums, List ranking, preorder tree traversal, merging two sorted lists.
- UNIT 3:** **Processor Arrays and Multiprocessors:** Processor organizations: Mesh networks, Binary tree network, Hypertree network, Pyramid network, Butterfly network, hypercube network, Cube Connected Cycle, Shuffle Exchange network, de Bruijn network, Mapping data to processors on processor arrays and multicomputers. Multiprocessors: UMA and NUMA.
- UNIT 4:** **Matrix Multiplication:** sequential multiplication, Matrix Multiplication on 2D mesh, Hypercube and shuffle exchange SIMD model, Algorithm for Multiprocessors.
- UNIT 5:** **Parallel Sorting Algorithm:** Enumeration sort, lower bound on parallel sorting, odd-even transposition sort, Bitonic merge.
- UNIT 6:** **Data Structure for Disjoint Sets-** Introduction, Disjoint set operations, Determining connected components of an undirected graph, Disjoint set representation- Linked representation, Disjoint set forests, Shallow threaded trees, Applications- Maze generation, Kruskal's Minimum spanning tree.
- Unit 7:** **Graph Algorithms** – searching a graph, Connected components.

References: 1) M.J. Quinn, "Designing Efficient Algorithms for Parallel Computer" by Mc Graw Hill.

UNIT 1: Introduction

Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical *Preliminaries* for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.

UNIT 2: Huffman coding

The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Huffman coding: Loss less image compression, Text compression.

UNIT 3: Arithmetic Coding

Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Move-to-front coding, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markov Compression.

UNIT 4: Mathematical Preliminaries for Lossy Coding

Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.

UNIT 5: Vector Quantization

Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo- Gray Algorithm, Tree structured Vector Quantizers. Structured *Vector* Quantizers.

Books: I. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers

A collection of handwritten signatures and initials in blue ink, including a large signature on the left, a signature in the center, and a signature on the right, with various initials scattered below them.