BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY
Department of Computer Science
(MCA)

W.E.F. 2016-17

FIRST YEAR

1st Semester

Paper Code	Paper Title	Paper Type	Credit
MCA-101	Computer Architecture	Non- Core	06
MCA-102	Discrete Structures	Foundation-Compulsory	06
MCA-103	Object Oriented Programming & C++	Core	06
MCA-104	Computer Based Numerical & Statistical Techniques	Core	03
MCA-105	Programming Lab-I	Core	03
MPDC-105	Remedial Language Course **	Foundation-Elective	01

Total Semester Credit: 24

2nd Semester

Paper Code	Paper Title	Paper Type	Credit
MCA-201	Graph Theory and Combinatorics	Core	06
MCA-202	System Programming	Core	06
MCA-203	Data Structure	Foundation-Compulsory	06
MCA-204	Computer Based Optimization Techniques	Non- Core	03
MCA-205	Programming Lab-II	Core	03
MPDC-205	Moral Studies **	Foundation-Compulsory	01

Total   Semester Credit: 24

SECOND YEAR

3rd Semester

Paper Code	Paper Title	Paper Type	Credit
MCA-301	Operating System	Core	06
MCA-302	Analysis and Design of Algorithm	Core	06
MCA-303	Software Engineering	Non- Core	06
MCA-304	Internet and Java Programming	Foundation-Compulsory	03
MCA-305	Programming Lab III	Core	03
MPDC-305	Community Service **	Foundation-Compulsory	01

Total Semester Credit: 24

4th Semester

Paper Code	Paper Title	Paper Type	Credit
MCA-401	Data Base Management System	Core	06
MCA-402	Compiler Design	Non- Core	06
MCA-403	Data Communication & Computer Network	Core	06
MCA-404	**Elective Paper-I**	Elective	03
MCA-405	Programming Lab IV	Core	03
MPDC-405	Ambedkar Studies **	Foundation-Compulsory	01

Total Semester Credit: 24

THIRD YEAR

5th Semester

Paper Code	Paper Title	Paper Type	Credit
MCA-501	Artificial Intelligence	Core	06
MCA-502	Computer Graphics	Core	06
MCA-503	**Elective Paper II**	Elective	06
MCA-504	**Elective Paper III**	Elective	03
MCA-505	Programming Lab V	Core	03

Total Semester Credit: 24

6th Semester

Paper Code	Paper Title	Paper Type	Total Credit
MCA-601	Industrial Training and Project (I) Internal assessment (II) External Assessment (Dissertation & Viva-voce examination	Core	24

The weightage of internal and external assessment will be in the ration of 30% and 70%

Internal assessment will be done as follows

There will be three components having equal weightage

i) SRS / Synopsis

ii) Design of Project

iii) Project report

Each student will have to submit relevant documents for each of the above components to his/her

supervisor/guide through email/ physical presence and evaluation of the same will be done by the concern

supervisor/guide

Total Credit of all Semesters- 144

Note:
1. Students of the programme can chose any other course equal or higher credits from any other department of the university in leu of non-core and elective course under the CBCS programme. However, all of these courses are available to students of other departments under the CBCS programme
2. Credit not to be counted for paper market as **

A) List of Electives for Semester IV (Elective-I):-

1. Modeling & Simulation
2. Data Mining
3. Real Time System
4. Software Project Management
5. Electronic Commerce
6. Parallel Computing

B) List of Electives for Semester IV (Elective-II & III):-

(i) Electives II (6 Credit)

1. Distributed Computing
2. Embedded Systems
3. Soft Computing
4. Digital Image Processing

(ii) Electives III (3 Credit)

1. Advance Database Management System
2. Neural Network
3. Natural Language Processing
4. Digital Signal Processing
5. Mobile Computing

BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE
REVISED COURSE STRUCTURE FOR THREE YEARS
MCA (Evening)

W.E.F. 2016-17

FIRST YEAR

1st Semester

Paper Code	Paper Title	Paper Type	Credit
MCAE-101	Computer Organization and Architecture	Non- Core	06
MCAE -102	Combinatorics and Graph Theory	Foundation- Compulsory	06
MCAE -103	Object-Oriented Programming Techniques	Core	06
MCAE -104	Principles of Management and MIS	Non- Core	03
MCAE -105	Presentation and Communication Skills	Core	03
MPDC-105	Remedial Language Course	Foundation-Elective	01

Total Semester Credit: 24

2nd Semester

Paper Code	Paper Title	Paper Type	Credit
MCAE -201	System Software	Core	06
MCAE -202	Computational Methods	Core	06
MCAE -203	Data Structure	Foundation- Compulsory	06
MCAE -204	Accounting and Financial Management	Non- Core	03
MCAE -205	Summer Industrial Training-I	Core	03
MPDC-205	Moral Studies	Foundation- Compulsory	01

Total Semester Credit: 24

SECOND YEAR

3rd Semester

Paper Code	Paper Title	Paper Type	Credit
MCAE -301	Operating System	Core	06
MCAE -302	Analysis and Design of Algorithm	Core	06
MCAE -303	Advanced Software Engineering	Non- Core	06
MCAE -304	Web Technologies	Foundation- Compulsory	03
MCAE -305	Seminar and Presentation	Core	03
MPDC-305	Community Service	Foundation- Compulsory	01

Total Semester Credit: 24

4th Semester

Paper Code	Paper Title	Paper Type	Credit
MCAE -401	Advanced Database Management System	Core	06
MCAE -402	Compiler Design	Non- Core	06
MCAE -403	Advanced Computer Networks	Core	06
MCAE -404	Elective Paper-I	Elective	03
MCAE -405	Summer Industrial Training-II	Core	03
MPDC-405	Ambedkar Studies	Foundation-Compulsory	01

Total Semester Credit: 24

THIRD YEAR

5th Semester

Paper Code	Paper Title	Paper Type	Credit
MCAE -501	Artificial Intelligence	Core	06
MCAE -502	Computer Graphics and Animation	Core	06
MCAE -503	Elective Paper-II	Elective	06
MCAE -504	Elective Paper-III	Elective	03
MCAE -505	Mini Project and Presentation	Core	03

Total Semester Credit: 24

6th Semester

Course Code	Course Title	Paper Type	Credit
MCAE-601	Corporate Training and Project (III) Project Report (IV) Viva-Voce Examination	Core	14 10

Total Semester Credit: 24

Grand Total of Credit:144

A) List of Electives for Semester IV (Elective-I):-

1. .Modeling & Simulation
2. Data Mining
3. Real Time System
4. Software Project Management
5. Electronic Commerce
6. Parallel Computing

B) List of Electives for Semester V (Elective-II & III):-

(i) Elective II (6 Credit)

1. Soft Computing
2. Digital Image Processing
3. Digital Signal Processing
4. Distributed Computing

(ii) Elective III (3 Credit)

1. Embedded Systems
2. Neural Network
3. Natural Language Processing
4. Mobile Computing

Total Credit of all Semesters- 144

Note:
1. Students of the programme can chose any other course equal or higher credits from any other department of the university in leu of non-core and elective course under the CBCS programme. However, all of these courses are available to students of other departments under the CBCS programme
2. Credit not to be counted for paper market as **

MCAE 101   COMPUTER ORGANIZATION AND ARCHITECTURE (CREDIT: 06)

UNIT 1

Introduction to Computer Organization, , I/O Storage Devices, CPU, Processor, Data Representation, Number System, Computer Arithmetic and Boolean Algebra, Generation Of Computer, Introduction to Operating Systems, Software Elements.

UNIT II

Flowcharts & Algorithms, Programming Languages and Their Evolution, Level and Classification Of Programming Language-Machine, Assembly & High Level Languages, Logic Families, DTL, TTL, ECL, NMOS, PMOS, CMOS

UNIT III

Logic Gates, K-Map and Application, Adder and Sub tractor, Multiplexer & Demultiplexer, Encoder circuits, Flip Flops, R-S, J-K & T Flip Flops, Counters & Registers,

UNIT-IV

Types of Memories, RAM, ROM PROM, EPROM, Cache Memory, Bubble Memory, Secondary Memory, Memory Devices & Properties, Instructions format & Addressing Techniques, I/O Organization, DMA, CPU organization, ALU Design, Control UNIT & Processor UNIT Organization.

Suggested Readings:

1.William Stalling, **"Computer Organization & Architecture".** Pearson education Asia

2.Mano Morris, **"Computer System Architecture",** PHI

3.Zaky &Hamacher, "**Computer Orgaization**", Mc Graw Hill

4.B.Ram, " **Computer Fundamentals Architecture & Organization",** New Age Publication

5.Tannenbaum, **"Structured Computer Organization",** PHI

6.V.Rajaraman, **"Fundamentals of Computers"**, PHI

7.Peter Norton's, **"Introduction to Computers"**,TMH

MCAE 102   COMBINATORICS AND GRAPH THEORY (CREDIT: 06)

UNIT-I

Counting principal, Permutation, Combination, Recurrence Relation, Solution of Recurrence Relation, Inclusion and Exclusion Principal, Introduction of Graph, Types of Graph, Self Loop, Parallel Edge, Adjacent Vertices, Degree, Isolated Vertex, Pendant Vertex, Sub Graph, Walk, Path, Circuit.

UNIT-II

Representation of Graph, Adjacency Matrix, Incidence Matrix, Path Matrix, Eular Graph, Hamiltonian Graph, Traveling Sales Man Problem, Connected Graph, Loosely Connected and Tightly Connected Graph

UNIT-III

Tree, Traversal in a Tree, Types of Tree, AVL Tree, Diameter,Centre, Eccentricity in the Tree, Binary Search Tree, Expression Tree, Spanning Tree, Minimum Cost Spanning Tree, Kruskal Algorithm, Prim's Algorithm, Shortest Path, Dijkastra Algorithm, Path between All Vertex, Depth First Search, Breadth First Search.

UNIT-IV

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

Coloring of the Graph, Chromatic Number, Chromatic Polynomial, Planar Graph, Kurotowasky's Two Non Planar Graph, Kurotowaskies Theorem, Dual Graph, Geometric Dual & Combinational Dual, Network Flow, Cut Set, Maximum Flow.

Suggested Reading:

1.Deo Narsingh, **"Graph Theory with application to engineering and computer science".**

2.Tremblay and Manohar, " **Discrete mathematical structure with application to computer".**

3.G.L. Goodare, **"Discrete mathematics and graph Theory".**

MCAE 103   OBJECT-ORIENTED PROGRAMMING TECHNIQUES (CREDIT: 06)

UNIT-I

Object & Classes , Links and Associations Generalization and Inheritence, Aggregation, Abstract Classes, A sample Object Model, Multiple Inheritance, Meta Data, Candidate Keys, Constraints.

UNIT-II

Dynamic Modeling: Event and States, Operations and Methods, Nested State, Diagrams, Concurrency, Relation of Object and Dynamic Models, Advanced Dynamic Model Concepts Keys, Constraints.

Functional Modeling: Functional Models, Data Flow Diagrams, Specifying Operations, Constraints, a Sample Functional Model.

UNIT-III

Programming in C++: Classes and Objects in C++, Functions, Constructors, Inheritance, Function Overloading, Operator Overloading, I/O Operations, Real Life Applications, Extended Classes Pointer, Virtual Functions, Polymorphisms, Working with files , Class Templates, Function Templates.

UNIT-IV

Translating Object Oriented Design into an Implementation, OMT Methodologies, Exmples and Case Studies to Demonstrate Methodology, Comparison of Methodology, SA/SD and JSD.

Suggested Readings:

1.Rambaugh James etal, **" Object Oriented Design and Modeling",** PHI-1997

2.Bjarne Stroustrup, **" C++ Programming Language"**, Addison Wesley

3.Balagurusamy E**. "Object Oriented Programming with C++",** TMH, 2001

4. Booch Grady, **" Object Oriented Analysis and Design with Application 3/e",**Pearson

5.Lipman, Stanley B, Jonsce Lajole, **" C++ Primer Reading",** AWL-1999

6.Dillon and Lee, **" Object Oriented Conceptual Modeling",** New Delhi PHI-1993

MCAE 104   PRINCIPLES OF MANAGEMENT & MIS (CREDIT: 03)

UNIT-I

Concept of Management: Present Pattern of Develop in Business and Industry, Need for Principles of Business Management, Management Functions Unification of Diverse Specialized Activities, Planning , Policy Making

UNIT-II

Authority and Responsibility, Organizing Coordination, Motivation Direction and Control, Managerial Objectives and Criteria of Management, Organization Structure and Relationship,: Types, Basis Functions, Regions, Operations, Products, Customers, Deligation, Specification, Duties, Authority, Accountability, Staffing and job Specification, Communications.

UNIT-III

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

Information Technology and Business, Use of Computer Based Information System in Different Functional Areas, Computer Based Sales Information Systems, Inventory Control Systems, Accounting Information Systems, Personnel Information Systems.

UNIT-IV

E-Commerce and Elements, Pc's and Networking, E-mail, Internet and Intranet, Electronic Marketing, EDI, UN, /EDI facts, ERP, Consumer Trade Transaction, Internet Bandwidth & Technology, Security Issues, Business Process Re-engineering, Management of Change, Legal Issues, E-Commerce in India.

Suggested Readings:

1. M. Govindarajan, S. Natarajan, "managerial roles, concept, planning socal responsibility etc.", PHI Learning, 2005.

2. Harold Koontz, Cyril O'Donnell, "Principles of management: an analysis of managerial functios" 1972.

3. Dr. S.Shajahan, "Management perspective computer based information system" 2004

4. V.S.Bagad , application of MIS, Delegation of authority, staffing coordination" 2009.

MCAE 105   PRESENTATION AND COMMUNICATION SKILLS (CREDIT: 03)

It is based on presentation of technical and latest topics which are based from the field of Computer Science. After final presentation, students will submit their report in hard copy.

Evalution is based on performance of presentation and practical' as well as on contents of the topics and report.

SEMESTER-II

MCAE 201 SYSTEM SOFTWARE (CREDIT: 06)

UNIT-I

Components of System Software, Evolution of System Software, General Machine Structure (Memory, Register, Data Instructions), Assemblers, Design of Two Pass Assembler, Introduction to Macros and Macro Processors.

UNIT-II

Translators, Interpreters, Brief Description of Different Phases of Computer, Loaders: A Two Pass Loaders Scheme, Relocating Scheme, Relocating Loader, Subroutine Linkage, Direct Linking Loader, Binders, Overlays, Types and Basic Functions of Operating Systems.

UNIT-III

Software Tool: Text Editors, Program Generators, Debug Monitors, Access to System Services, ROM, BIOS, Booting Process (DOS), Expanded memories introduction to Mouse, Keyboard & Screen Management**.**

UNIT-IV

Introduction to DOS Device Drivers: Types, Structure & Processing, Interrupt Types, Organization, Interrupt Hardware and Program Status Register (PSR), Interrupt Processing

Suggested Readings:

1.J.J. Donovan, "System Programming", TMH

2.D.M. Dham Dhere, "Introduction to System Software", TMH

3.D.L. Peter, " An Introduction to Real Time Microcomputer System Design",TMH

4.Ted. J.Biggerstaf, " System Software Tools", Prentice Hall

5.Ray Dunkan, "Advanced MS DOS Programming",BPB Publication

6.D.A. Norton, " System Programming & Operating System", Adison Wisley

MCAE 202 COMPUTATIONAL METHODS (CREDIT: 06)

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

UNIT-I

Number representation: fixed and floating point, Numerical errors and their types. Roots of Algebraic Equation, Interpolation and Approximations, Interpolating Polynomials and is Construction using Lagrangian Method and Method of Divided Differences. Extrapolation methods.

UNIT-II

Newton and Guassian Quadrature Method. Integration Formulate Using Finite Differences, Romberg Integration, Direct Solution of Linear System, Linear System for Stored Matrices. Gauss Elimination, Triangular Decomposition, Eigen Values and Eigen Vectors.

UNIT-III

Measure of Central Tendency and Dispersion, Elements of Probability, Bionomial, Possion, Rectangular, exponential and Normal Distributions. Linear Regression, Least Square Method, rank Correlation Coefficient of Correlation Ratio, Concepts of Population and Sample Parameter & Statistic, Testing of Hypothesis, Chi Square, F-t-test, Implementation of Methods in C++.

UNIT-IV

Linear Programming – Graphical, Simplex, Two Phase & Big M Methods, Dual Linear Programming- Dual of a Problem. Dual Simplex Method. Transportation Methods- North West Corner, Least Cost , Vam Methods, Optimal Solution by Modi & Stepping Stone Method, Assignment Problem, Game Theory, Implementation in C++.

Suggested Readings:-

1. Rajaraman V, **"Computer Oriented Numerical Methods"**, PHI

2. Gerald & Wheatley, **"Applied Numerical Analyses"**, AV.

3. Jain, Iyengar and Jain, **"Numerical Methods for Scienific and Engineering Computations"**, NewAge Int.

4. Franci Scheld, **" Numerical Analysis"**, TMH.

MCAE 203 DATA STRUCTURE (CREDIT: 06)

UNIT-I
Introduction of Data structure, Algorithm, Way of Writing Algorithm, Types of data structure and its operation, Complexity analysis , Array, Linear List, sorting- Selection, Bubble, Insertion, quick and shell sort, merging ,Sorting network ,searching –linear search and Binary search

UNIT-II
Introduction of Linked list, Single linked list and double linked list, Insertion and deletion of nodes in single linked list and double linked list. Merging two linked list and polynomial addition using linked list. Hash Table, Hash function and collision resolution technique.
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UNIT-III
Queue, Circular Queue, Priority Queue, Stack, Implementation using array and linked list. Infix to prefix representation using stack. Practical applications of stack and queue.

UNIT-IV
Tree: Definition of Tree and their types , Binary Tree and their representation, Implementation of Binary search tree using iteration and recursion and Searching in the tree(in order, Pre-order, Post order), Threaded Tree, AVL Tree, Practical applications , Definition of Graph, Types of Graph, Memory representation of graph using matrix and linked list. Traversal in the graph-DFS and BFS
 All implementation in C++.

Suggested Readings:
1.Hadley, G., **"Linear Programming and Massachusetts",** Addison-Wesley
2.Schaum's Series , **"Introduction of Data structure",** Prentice hall of India
3.Hiller, F.S., G.J. Lieberman, "**Introduction to Operations Research**", Holden-Day

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

4.Harvey M. Wagner, "**Principles of Operations Research with Applications to Managerial Decisions**", Prentice Hall of India Pvt. Ltd.

5. Sanjay Pahuja, Practical approach to Data structure and Algorithm

MCAE 204 ACCOUNTING AND FINANCIAL MANAGEMENT (CREDIT: 03)

UNIT-I

Classification and coding of accounts-source of capital, Liabilities and net worth of a business, methods of Obtaining Finance from public and private and internal and external sources, long and short term loans, secured and unsecured advances, credit instruments, cost of obtaining capital, forms of capital structure.

UNIT-II

Planning and Assessment of Capital Requirement, Fixed Assets, Current Assets, Liquid Resources, Forecast of Business Activity, Requirement of Working Capital, Cash Flow, Investment of Capital, Investment In Own Business and in Business or Subsidiaries, Trustee Securities, Investment in Companies Quoted in Stock Exchange, Investment Trusts.

UNIT-III

Valuation of Fixed and Current assets and Goodwill; Then Effect of Chaining Price Levels, Control of capital employed: provision, Replacement and extension of fixed and current Assets; Necessity For Sound Capital Investment Policies; Determination of Priorities For Capital Projects; Methods of assessment and evaluation of profitability of capital investments; Forest authorization recording And Control of Capital Expenditure; Return On Capital Employed; Control of the Levels of the stocks And Work Progress.

UNIT-IV

Credit Control and Realization of Debtors; Debtors and Creditors; Investigation of Customer's Credit Standing ; Realization of Sundry Debtors; Credit Allowed by Vendors Case and Trade Discount Payable and Receivable. Profit and Profit Planning Distribution Ploughing Back of Profit. Reports Design and Content of Annual Reports ans Accounts, Accounting and Statistical Data.

Suggested Readings:-

1. Philip Kotler, "Marketing Management",(May 2002)

MCAE 205 SUMMER INDUSTRIAL TRAINING-I (CREDIT: 03)

This paper is based upon the summer industrial training and after completion of training students will submit summer training report and present their project work. Evaluation is based upon the practical, quality of summer training report and presentation.

SECOND YEAR

SEMESTER-III

MCAE 301 OPERATING SYSTEM (CREDIT: 06)

UNIT-I

Basic Concepts and Functions of Operating Systems, Types: Single and Multi User, Batch Processing, Real Time, Time Sharing, parallel and Distributed OS.

Memory Management – Objectives, Classification of Memory Management, Static and Dynamic Memories, allocation techniques, Compaction, Paging & Segmentation, Address Translation, Fragmentation in Each Case, Performance and Comparison.

UNIT-II

Virtual Memories- Aims and Methods of Implementation-static & dynamic, Demand Paging, Page Faults and System Performance, Page Replacement Algorithms, Prepaging, Comparisons.

Information Management, Files and File System, File System Characteristics, Access and Allocation Methods, Disk Management, Disk scheduling I/O operations.

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar Shalini Chandra

UNIT-III

Process Management – Process States, State Diagram, Scheduler, Scheduling Algorithms, Deadlock – Necessary Conditions, Prevention, Avoidance, Detection and Recovery, Synchronization of Process

UNIT-IV

Process Synchronization: Concurrency, Critical Section and Its S/W, H/W and Semaphore Solution, Classical Examples on Semaphore,

UNIX case study- Overview –History, flavours and architecture, Unix File system, Basic Commands & Utilities, introduction to shell Programming, & System Calls.

Suggested Readings:

1.Abraham Siberschatz and Peter Baer Galvin, **"Operating System Concepts",** Fifth Edition, Addision-Wesley.

2.Milan Milankovic, **"Operating System, Concepts jand Design",** Mc Graw-Hill

3.Harvey M Deital, "**Operating System",** addision-Wesley.

4.Richard Peterson, **"Linux: The Complete Referece",** Osborne Mc Graw-Hill

5.Parata, **"Advanced Unix Programming Guide",** BPB

6.Yashwant Kanitkar, **"Unix Shell Programming",** BPB

7.Meeta Gandhi, Tilak Shetty, Rajiv Shah, "The 'C"Odyssey Unix-The Open Boundless C", BPB

8.Sumitabh Das, "**Unix Concepts and Applicantions**",TMH.

MCAE 302 ANALYSIS AND DESIGN OF ALGORITHM (CREDIT: 06)

UNIT-I

Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms and complexity of Algorithms, Asymptotic Notations, Growth of Function, Recurrences Sorting in Polynomial Time: Insertion Sort, Merge Sort, Heap Sort and Quick Sort, Sorting in Linear Time: Counting Sort, Radix Sort, Bucket Sort, Medians and order Statistics.

UNIT-II

Elementary Data Structure: Stacks, Queues, Linked List, Binary Search Tree, Hash Table.

Advanced Data Structure: Red Black Trees, Splay Trees, Augmenting Data Structure Binomial Heap, B Trees, Fibonacci Heap and Data Structure for Disjoint Sets Union-find Algorithm, Dictionaries and Priority Queues, Merge able Heaps, Concatcnable queues.

UNIT-III

Advanced Design and Analysis Techniques: Dynamic Programming, Greedy Algorithm, Backtracking, Branch and Bound, Amortized Analysis.

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All Pair Shortest Path, Maximum Flow and Traveling Salesman Problem.

UNIT-IV

Randomized Algorithms, String Matching, NP-Hard and NP-Completeness Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials & The FFT, Number Theoretic Algorithms, Computational Geomety, Implementation in C++

Suggested Readings:

1.Horowitz Sahani, **"Fundamentals of Computer Algorithms",** Golgotia

2.Coremen Leiserson et.al., "**Introduction to Algorithms**", PHI

3.Brassard bratley, "**Fundamental of Algorithms**",PHI

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

4.M.T. Goodrich et.al., "**Algorithms Design**", John Wiley

5.A.V. Aho et.al., "**The Design and Analysis of Algorithms,** "Pearson Education

MCAE 303 ADVANCED SOFTWARE ENGINEERING (CREDIT: 06)

UNIT-I

Software: Characteristics Components Applications; Software Process Models: Waterfall; Spiral, Prototyping, Fourth Generation Techniques; Concepts of Project Management, Role of Metrics And Measurement.

UNIT-II

Software Project Planning: Objective Decomposition Techniques: Software Sizing, Problem Based Estimation, Process Based Estimation, Cost Estimation Models; COCOMO Model, The Software Equations.

UNIT-III

System Analysis: Principles of Structured Analysis, Requirement Analysis, DFD, Entity Relationship Diagram, Data Dictionary. Software Design: Objectives, Principles, Concepts, And Design Mythologies: Data Design, Architecture Design, Procedural Design, Object- Oriented Concept.

UNIT-IV

Testing Fundamentals: Objectives, Principles, Testability. Test Cases: White Box & Black Box Testing; Testing Strategies: Verification And Validation Testing, System Testing.

Suggested Readings:-

1. Advanced Software Engineering by Sergio F. Ochoa and Gruia- Catalin Roman

2. Advanced Software Testing by Rex Black

MCAE 304 WEB TECHNOLOGIES (CREDIT: 03)

UNIT-I
Introduction to SGML – features – XML, XML as a subset of SGML – XML Vs HTML , Views of an XML document , simple XML documents , Starting & Ending of Tags, Attributes of Tags ,Entity References , Comments , CDATA section, Document Type declarations , Creating XML DTDs, Element type declaration , Attribute List Declaration , Attribute types, Attribute defaults, Displaying XML Data in HTML browser as HTML tables , Storing XML data in HTML document , Converting XML to HTML with XSL minimalist XSL style sheets , XML applications

UNIT-II
Java Beans: Features , Designing Java Beans, Creating and using properties, Induced, bound and constrained properties , using and creating events , Introspection , creating & using BeanlInfo clauses , customization , providing custom property editors and GUI interfaces.

UNIT-III
JSPs , Creating simple JSP Pages ,templating, Request time expression , Request & Response objects, Reading parameter values, Using Javabeans in JSPs , Reading & setting Properties of JavaBeans , Connecting forms & bean properties , Serialized beans , declaring variables & methods in pages , scriptlets , conditionals, loops & execution handling in JSPs with scriptlets , Accessing beans via scriptlets.

UNIT-IV
EJB , Basics of EJB , Types of Beans , Development of Session Beans , Steps , Creating & Implementing Interfaces , Writing Deployment descriptors , Packaging and deploying bean , using the bean from a client , Development of state full session bean. Entity beans , Features (Basics of developing and using entity beans)

Suggested Readings:-

1. Sean McGrath, XML by Example: BUILDING ecommerce applications, Pearson Education Asia

2. Joseph L. Weber, Using JAVA 2 Platform Special Edition Java 2, AWT, Swing, XML and Jva Beans-, Prentice Hall of India

3. Steven Holzner Programming, Wiley Dreamtech

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

4. EdRoman, Mastering Enterprise Java Beans and the Java 2 Platforms, Enterprise Edition-(WILEY Computer Publishing)

5. Raj kamal, Internet and Web Technologies, TMH

MCAE 305 SEMINAR AND PRESENTATION (CREDIT: 03)

Presentation and Seminars shall be conducted by the faculty members of the department and evaluation shall be based upon the presentation and practical on the latest topics in the field Computer Science

SEMESTER-IV

MCAE 401 ADVANCED DATABASE MANAGEMENT SYSTEM (CREDIT: 06)

UNIT-I

Introduction: An overview of database management system, Database system Vs File System, Database system concepts and architecture, Data models schema and instances, Data independence and Data base language and interfaces, Data Definitions Language, DML, Overall Database Structure.

Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

UNIT-II

Relational Data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, Views and Indexs, Queries and Sub Queries, Aggregate Functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL, PI/SQL, Triggers and Clusters.

UNIT-III

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

UNIT-IV

Introduction to Decision Support, Data Warehousing, Creating And Maintaining A Warehouse. Introduction To Data Warehouse And Olap, Multidimensional Data Model, Data Warehouse Architecture, Olap And Data Cubes, Operations On Cubes, Data Preprocessing Need For Preprocessing, Multidimensional Data Model, Olap And Data Cubes, Introduction To Data Mining, Data Mining Functionalities, Algorithm, Classification-Decision Tree, Baysian Classifiers, Outlier Analysis, Association Rules- Apriori Algorithm, Clustering- K Means Algorithm.

Suggested Readings:

1.Date C.J., **"An Introduction to Database System"**, Addision Wesley

2.Korth, Silbertz, Sudarshan, **"Database Concepts",** Mc Graw Hill

3.Elmasri, Navathe, **"Fundamentals of Database System",** Addision Wesley

4.Paul Beynon Davies, **"Database System",** Palgrave Macmillan

5.Bipin C. Desai, **"An Introduction to Database System",** Galgotia Publication

6.Majumdar & Bhattacharya, **" Database Management System",** TMH

7.Ramakrishnan, Gehrke, **"Database Management System"**, Mc Graw Hill

8.Bharti P.K., **" An Introduction to Database Systems"**, JPNP

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

MCAE 402 COMPILER DESIGN (CREDIT: 06)

UNIT-I

Introduction of Compilers and Translators, Phases of comiler, Regular expressions, Finite State Machines, Push Down Machines and Their Application, tokens, Lexical analysis, Symbol Tables Organization, Introduction to Lexical Analyzer.

UNIT-II

Syntax Analysis: Grammars, Ambiguity, Classification, Parsers-Top Down and Bottom Up, Operator Precedence, Recursive Descent Parser, LL(I) Grammar, Error Handling, Shift Reduce Processing, LR Grammars and Parsers, Their Application.

UNIT-III

Intermediate Codes: Internal Forms of Source Program, Semantic Analysis, Intermediate Code Forms, Syntax Directed Translations for assignment, mixed statements, arrays references and function.

UNIT-IV

Code Optimization: Types, Local, Loop Optimization, basic blocks construction, Use of Data Flow Analysis in code optimization.

Code Generation: Features and Problems of Code Generation, Code Generation Through GETREG, DAG.

Suggested Readings:

1. Aho & Ulman, Principles of Compiler Design, Narosa Publication

2. Aho & Sethi, Ulman, Copilers: Principles, Techniques & Tools, Addision Wesley

3. Barrat, Eates, et.al. Compiler Construction: Theory & Practice, Galgotia Publication

4. Trembley & Sorenson, Compiler Writing, TMH

5. Gries, Compiler Construction for Digital Computer, Johi, Wiley & Sons.

MCAE 403 ADVANCED COMPUTER NETWORKS (CREDIT: 06)

UNIT- I

Review of Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet - Foundation of Networking Protocols: 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM, Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure. The Link Layer and Local Area Networks: Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Virtualization

UNIT- II

Routing and Internetworking: Network–Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer. Logical Addressing: IPv4 Addresses, IPv6 Addresses - Internet Protocol: Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intradomain Multicast Protocols, Interdomain Multicast Protocols, Node-Level Multicast algorithms, Transport and End-to-End Protocols: Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server

UNIT-III

Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

802.11 Wireless Standard, Cellular Networks, Mobile IP,Wireless Mesh Networks (WMNs)
Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch

UNIT -IV

VPNs, Tunneling and Overlay Networks: Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – VoIP and Multimedia Networking: Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocols.
Mobile A-Hoc Networks: Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks – Wireless Sensor Networks: Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocol

Suggested Reading:-

1. Behrouz A. Forouzan, Data Communications and Networking, Fourth Edition, Tata McGraw Hill, 2007.

2. Andrew S. Tanenbaum, Computer Networks, Fourth Edition, Prentice Hall.

3. A. Farrel, The Internet and Its Protocols, Elsevier.

MCAE 404 ELECTIVE PAPER-I(CREDIT-3)

MCAE 405 SUMMER INDUSTRIAL TRAINING-II (CREDIT: 03)

This paper is based upon the summer industrial training and after completion of training students will submit summer training report and present their project work. Evaluation is based upon the practical, quality of summer training report and presentation.

THIRD YEAR

SEMESTER-V

MCAE 501 ARTIFICIAL INTELLIGENCE (CREDIT: 06)

UNIT-I

Artificial Intelligence: Definition, Historical Overview, Growth, Turing Test and Its Significance Branches of AI and Applications, Problem Solving, production system and Control Strategies.

UNIT-II

State Searching: Informed and Uninformed (blind) Searches-DFS, BFS, Best First Search etc. AND-OR Graph, Algorithms A*, Properties of A*, AO* and Related Algorithms, Game Playing Strategies, Mini Max Procedure and Applications.

UNIT-III

Knowledge Representation: Propositional Logic, First Order Predicate, Semantic Net, Partitioned Semantic Net, Frames and Scripts, Conceptual Dependency (CD), Reasoning Process, Uncertainty Considerations.

Introduction to Expert Systems: System Feasibility Considerations, Architecture, Tools Overview of Rule Based and Other Types of ES Design.

UNIT-IV

Natural Language Processing: Grammar for Natural Languages, Parsing, Transition Nets (TN), ATN and RTN Parser, Lexicon, Sentence Generation.

Introduction to: Pattern Recognition, Planning, Machine Translation, Neural Nets and Machine Learning, Fuzzy Logic.

Suggested Readings:

1. Elaine, Rich & K. Knight, Artificial Intelligence, TMH Publication

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

2. N.J. Nilson, Principles of Artificial Intelligence, Narosa Publication

3. Russell & Norvig, Artificial Intelligence: A modern Approach, Pearson Education, 2013

4. E.Charniak & D. Mc Dermott, Introduction to AI, Addison Wesley

5. Avron Barr & Edward A, Feigenbaum the Handbook of Artificial Intelligence, Addision Wesley-Longman

6. James Allen, Natural Language Understanding, Pearson.

7. Peter Jackson, Introduction to Experts System, Addison Wesley

8. Tau & Genzales, pattern Recognition Principles, Addison Wesley.

MCAE 502 COMPUTER GRAPHICS AND ANIMATION (CREDIT: 06)

UNIT-I

Graphics Display Devices, Intractive devices, Line and circle plotting Using breshenhams,s Algorithem, Picture Transformation, Scaling mirror Images, 2D & 3D Graphics, coordinate System, 3D Transformation, Rotation about an arbitrary Axis.

UNIT-II

Curve drawing, Bezier curves, B-splines, Windowing and clipping, Suterland cohen Approach, Curus bach method, Midpoint subdivision Algorithm

UNIT-III

Orthogonal Projection, Multiple views, isometric projections, Perspective projections, 3D clipping, Hidden surface removal, curved surface Generation, Generation of Solids, Sweeps method, Interpolation, Illumination method, Ray tracing.

UNIT-IV

Shading, Transparency, Shadows, textures Colours, CGS Modelling, Grapic standards GKS, PHIGS, Animation fundamentals- Control and sequencing, creating, Sealing and saving Frames, Synchronising Frames, Audio-Vidio Editing, Implementation in C++.

Suggested Readings:-

1. Hearn, Baker, Computer Graphics, TMH

2. Folly Vandum, Graphics

3. Adems & Rogers, Mathematical elements of Computer Graphics.

4. Adems & Rogrerse , Procedural elements of Computer Graphics

MCAE 503 ELECTIVE PAPER-II (CREDIT: 06)

MCAE 504 ELECTIVE PAPER -III (CREDIT: 03)

MCAE 505 MINI PROJECT & PRESENTATION(CREDIT: 03)

The students will do the mini project under the supervision of the faculty members and evalution is based upon the quality of mini project, presentation, practical and viva-voice.

MCAE 601 CORPORATE TRAINING AND PROJECT (CREDIT: 24)

    (I)   **PROJECT REPORT**
    (II)   **VIVA-VOCE EXAMINATION**

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

MCAE 601 has two components, 30% weightage is internal while 70% weightage is external. The internal component is divided according to the following:

10% Weightage is for SRS/Synopsis of the project

10% Weightage is for Design of the project

10% Weightage is for project report

A) List of Electives for Semester IV (Elective-I):-

1. Modeling & Simulation
2. Data Mining
3. Real Time System
4. Software Project Management
5. Electronic Commerce
6. Parallel Computing

B) List of Electives for Semester V (Elective-II & III):-

(i) Elective II (6 Credit)

1. Soft Computing
2. Digital Image Processing
3. Digital Signal Processing
4. Distributed Computing

(ii) Elective III (3 Credit)

1. Embedded Systems
2. Neural Network
3. Natural Language Processing
4. Mobile Computing

List of Elective Papers (MCAE-404)

ELECTIVE PAPER-I

1. Modeling & Simulation (2-1-0)   **Credit 3   (Contact Hours: 30)**

UNIT-I

System Definition and Components, Stochastic Activities, Continuous and Discrete Systems, System Modeling, Types of Model, Static and Dynamic Physical Models, Static and Dynamic Mathematical Models, Full Corporate Model, Types of System Study.

UNIT-II

System Simulation, Why to Simulate and When to Simulate, Basic Nature of Simulation, Technique of Simulation, Comparison of Simulation and Analytical Methods, Types of System Simulation, Real Time simulation, Hybrid Simulation, Simulation of Pure-Pursuit Problem Single-Server Queuing System and An Inventory Problem, Monte Carlo Simulation, Distributed Lag Models, Cobweb Model.

UNIT-III

Simulation of Continuous Systems, Analog Vs, Digital Simulation, Simulation of Water Reservoir System, Simulation of A Servo System, Simulation of An Autopilot Discrete System Simulation, Fixed Time-Step Vs, Event-To-Event Model, Generation of Random Numbers, Test for Randomness, Generalization of Non-Uniformly Distributed Random Numbers, Monte-Carlo Computation Vs. Stochastic Simulation.

UNIT-IV

System Dynamics, Exponential Growth Models, Exponential Decay Models, Modified Exponential Growth Models, Logistic Curves, Generalization of Growth Models, System Dynamics Diagrams, Feedback in Socio-Economic Systems.

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

World Model: Simulation of Pert Networks, Critical Path Computation, Uncertainties in Activity Duration, Resource Allocation and Consideration- Simulation Software, Simulation Languages, continuous and discrete Simulation Languages, Expression Based Languages, Object-Oriented Simulation, Gerneral Purpose Vs Application-Oriented Simulation Packages.

Suggested Readings:

1.Geoftrey Gordon, "System Simulation", PHI

2.Narsingh Deo, "System Simulation with Digital Computer",PHI

3. Averill M. Law, W. David Kelton, "Simulation Modeling and Analysis", TMH

2. Data Mining   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT-I

The process of knowledge discovery in databases, predictive and descriptive data mining techniques, supervised and unsupervised learning techniques

UNIT-II

Introduction to DATA warehousing, Data-Mart, Client/Server Computing Model & Data Warehousing, On Line Analytical Processing (OLAP)

UNIT-III

Techniques of Data Mining: Link analysis, Predictive Modeling, Database Segmentation, Decision Trees, Bayesian techniques in data mining. Nearest Neighbor & Clustering, Rule Introduction

UNIT-IV

Introduction to Multimedia Data-Mining, Mining the World Wide Web (Web Data-Mining), Search engines, Web query expansion, Mining Meta-Data, Data Visualization & Overall Perspective, Application of Data-Mining.

Issues in Data Mining: Scalability and data management issues in data mining algorithms,privacy, social, ethical issues in KDD and data mining,pitfalls of KDD and data mining

Suggested Readings:

1. Jiawei Han and Micheline Kamber, **Data Mining: Concepts and Techniques** (2nd ed.),

   Morgan Kaufmann, 2006.

2. Berson, **"Data Warehousing, Data-Mining & OLAP",** TMH

3. Mallach, **"Decision Support and Data Warehousing System",** TMH

4. Bhavani Thuraisingham, **"Data-Mining Technologies, Techniques Tools & Trends",** CRC Press

3. Real Time System   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT-I

Introduction To Real-Time Computing: Characterizing Real – Time System & Task; Performance Measures of Real Time System, Estimation of Program Run Time, Real- Time System Design: Hardware Requirement, System Development Cycle.

UNIT-II

Data Transfer Techniques, Synchronous & Asynchronous Data Communication, Standard Interface. Task Assignment And Scheduling: Priority Scheduling, Scheduling with Fixed Priority Dynamic Priority Scheduling.

UNIT-III

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

Real-Time Programming Language & Tool: Desired Language Characteristics, Data Typing, Control Structure, Run Time Error- Handling, Overloading & Generics, Runtime Support, Real-Time Databases.

UNIT-IV

Real-Time Communication Language Algorithm: Fault Tolerance Techniques, Causes of Failure, Fault Type, Fault Detection, Redundancy, Integrated Failure Handling Reliability Evaluation Techniques: Parameter Values, Reliability Model For Hardware Redundancy, Software Error Model, and Clock Synchronization.

Suggested Readings:

1. Real Time System: by C.M. Krishna & K.G. Shen- Mc Graw Hill 1197.

2. Real Time Microcomputer Design: An Introduction by P.D. Lawerence & K. Mauch, Mc. Graw Hill, 1998.

3. Real Time System: Specification, Verification & analysis by Mathai Joseph, Prentice Hall Inc. 1996.

4. Real Time Computer control by Stuart Bennet, Printice Hall., 1998.

5. Real Time Language by S.J. Young, John willey & sons, 1982.

4. Software Project Management   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT-I

Introduction to Project Management, Importance of Software Project Management, Stages And Stakeholders of a Software Project, Elements of Software Project, Project Planning, Project Execution, Project and Product Life Cycles, Role of Project Manager, Project Management Framework, Software Tools for Project Management

UNIT-II

Importance of Integration Management And Scope Management, Project Plan Development, Plan Execution, Scope Management, Methods for Selecting Projects, Project Scheduling, Schedules And Activities, Sequencing And Scheduling Activity, Project Network Diagrams, Network Planning Models, Program Evaluation And Review Technique (Pert), Project Cost Management, Cocomo Model, Types of Cost Estimates

UNIT-III

Project Quality Management, Quality Assurance, Planning And Control on Projects, Quality of Information Technology Projects, Stages of Software Quality Management, Tools and Techniques for Quality Control, Project Human Resources Management, project Human Resources Management , Keys to managing, Organizational Planning, Issues In Project Staff Acquisition And Tea Development

UNIT-IV

Distributing Project Information and the Advantages and Disadvantages, Project Documentation and the Use of Templates, Project Risk Management, Key Concepts In Risk Response Development, Sources of Risk in it Projects, Project Procurement Management, Project Management Process Groups, Project Controlling and Configuration Management, Project Closing

Suggested Readings:

1. Kathy Schwabe, "Information Technology Project Management "Kathy Schwabe, International Student Edition,

2. Bob Hughes and Mike Cotterell "Software Project Management", Third Edition, Tata Mcgraw- Hill

3. Elaine marnel, "Microsoft Office Project 2003 Bible", Wiley Publishing Inc.

4. Basics of software Project Management, Niit, Prentice-Hall India, 2004

5. Jalote Pankaj, Software Project Management In Practice, Pearson Education

5. Electronic Commerce   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT I

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

Building Blocks of Electronic Commerce: Introduction, internet and networking technologies, Internet and network protocols, web server scalability, software technologies for building E-commerce applications, distributed objects, object request brokers, component technology, web services, web application architectures, BizTalk framework Compliant Server

UNIT II

Security of E-commerce transactions: Review of cryptographic tools, authentication, signatures, observers, anonymity, privacy, traceability, key certification, management and escrow

UNIT III

Payment protocols and standards: Smart card, e-cash, e-wallet technologies, electronic money and electronic payment systems, business models for electronic commerce, electronic marketplaces, auctions and other market mechanisms, design of auctions, optimization algorithms for marketplaces, multi-agent systems.

UNIT IV

Global eCommerce and Law: Cyber law in India. Comparative evaluation of Cyber laws of

certain countries.

Suggested Readings:

1. E.M. Awad, **Electronic Commerce From Vision to Fulfillment** (3rd ed.), Prentice-Hall

of India, 2006

2. P.T. Joseph, **E-Commerce An Indian Perspective**, Prentice-Hall of India, 2007

3. Scott Bonneau, Tammy Kohl, Jeni Tennison, Jon Duckett and Kevin Williams, **XML**

Design Handbook, Wrox Press Ltd., 2003.

4. Michael Cheshar, Ricky Kaura, and Peter Linton, **Electronic Business and Commerce**,

Springer, 2003.

5. W.J. Pardi, **XML in Action: Learn to quickly create dynamic, data-driven sites with**

the Web's hottest new technology, Prentice Hall of India, 1999.

6. P. Weill and M.R. Vitale, **Place to Space: Migrating to eBusiness Models**, Harvard

Business School Press, 2001.

6. Parallel Computing   **(2-1-0)**   **Credit 3**   **(Contact Hours: 30)**

UNIT-I

Introduction of Parallel Computing, Advantages of Parallel Computing, Solving Problem In Parallel: Temporal Parallelism, Data Parallelism and Their Comparison. Inter Task Dependency And Task Graphs. Structure of Parallel Computers: Pipelined

UNIT-II

Parallel Computers, Array Processors, Shared Memory Multiprocessor, Massage Passing Multiprocessors, MMC Systems, Integer Arithmetic; Cary Look- Ahead, Addition And Carry-Save Addition On Binary Tree, Integer Multiplication And Convolution On Linear Array. Elementary Sorting Algorithms.

UNIT-III

Matrix Algorithm: Matrix- Vector Multiplication And Solving Lower Triangular System of Equation On A Linear Array, Matrix, Matrix Multiplication, LU Decomposition, Matrix Inversion, Guassian Elimination On A Mesh.

Graph Algorithms: Mesh Algorithm for Transitive Closure, Connected Component, Shortest Path, Breadth First Search And Minimum spanning Tree. Mesh of Trees and its Applications Such as Matrix-Vectors Multiplication, Convolution And Integer Multiplication

UNIT-IV

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

More Fancier Networks: R-Dimensional Mesh of Trees, Shuffle Trees, Shuffle-Exchange Network, Hypercube, De- Bruijn Network And Butterfly. Some Examples on These Networks, Sorting And FFT On Butterfly.

Introduction To Dataflow Computers. Parallelism In Logic Programming. Programming Parallel Computers.

Suggested Readings:

1. Elements of Parallel Processing, V. RajaRaman, Prentice- Hall of India, 1990.

2. Designing effiecent Algorithms on parallel Computers, Mc- Graw Hill International, New York, 1987.

3. Parallel Algorithms, Dhall et,al., Mc-Graw Hill In

(B) Elective Paper-II & III for V Semester

(i) Elective II (6 Credit)

1. Soft Computing   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT-I

Neural Networks: History, overview of biological Neuro-system, mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms- Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artifical Neural Networks.

UNIT-II

Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation on Fuzzy Sets: Compliment, Intersection, Unions, Combinations of Operations, and Aggregation Operations.

UNIT-III

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges. Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, and Fuzziness of Fuzzy Sets.

UNIT-IV

Introduction of Fuzzy image processing, Fuzzy Data Fusion; Fuzzy Diagnosis; Neural Networks: Supervised Learning: Hopfield Nets, Perceptrons, gradient descent, multilayer nets, backpropagation, overfitting. Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks. Application of Fuzzy Logic: Medicine, Economics etc. An Overview, GA in problem solving, Implementation of GA

Suggested Readings:

1. Anderson J.A, "An Introduction to Neural Networks", PHI, 1999.

2. Hertz J. Krogh, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison-Wesley, California, 1991.

3. G. J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy logic", PHI, 1995.

4. Melanie Mitchell, "An introduction to Genetic Algorithm", PHI, 1998.

5. "Neural Networks- A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.

 6. Freeman J.A. & D.M. Skapura. "Neural Networks: Algorithms, Applications and Programming Techniques", Addison Wesley, Reading, Mass, (1992).

2. Digital Image Processing (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT-I

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

Why Digital Images; The Digital Camera; Data Types And 2d Representation of Digital Images; Discrete Sampling Model; Quantisation; Noise Processes; Image Attributes Thresholding and Thresholding Algorithms; Performance Evalution And ROC Analysis;

Connected Components Labeling; Region Growing And Region Adjacency Graph (RAG);

Split And Merge Algorithms; Grey Level Transformations; Histogram Equalization; Geometric Transformations; Affine Transformation; Polynomial Warps.

UNIT-II

Erode And Dilate As Max And Min Operators On Binary Images; Open, Close, Thinning And Other Transforms; Medial Axis Transform; Introduction To Grey- Level Morphology; Calculation Of Region Properties; Moment Features; Boundary Coding; Fourier Descriptors Line Descriptors From Boundary Coding And From Moments.

UNIT-III

Linear And Non-Linear Filtering Operations; Image Convolutions; Separable Convolutions Sub-Sampling And Interpolation As Convolution Operations; Alternative Approaches; Edge Enhancement By Differentiation; Effect of Noise, Edge Detection And Canny; Implementation; Edge Detector Performance Evaluation, Image Structure Tensor;

Relationship To Image Auto- Correlation; Characterisation And Harris Corner Detector.

UNIT-IV

Sub-Pixel Accurracy And Performance Evaluation; Representations of Colour In Digital Images; Colour Metrics; Pixel- Wise (Point) Operations; Colour Invariants And Finlayson Colour Contancy Algorithm similarity and Dissimilarity Matching Metrics; L2 Metric And Relationship To Cross- Correlation; Image Search And Multi- Resolution Algorithms, 2D Object Detection, Recognition, Location

Suggested Reading:

1. A.K. Jain, Fundamentals of Digital Image Processing, PHI Publication.

2. E. Charniak, D. s

3. M.A. Ahmed, Image Processing, TMH.

4. Earl Gose, Richard, Johnsonbaugh, Pattern Recognition & Image Analysis, PHI.

3. Digital Signal Processing   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT-I

Introduction of Signals System and Signal processing, Classification of Signal and System, Advantages of digital over Analog Signal processing, Signal models- Continuous Time Versus Discrete time signals, Periodic and Aperiodic Signals, Phasor Signals and Spectra, Energy and Power Signals, System Modeling Concepts, The superposition integral foe fixed and linear Systems. Impulse Response of Fixed and Linear System- Fourier Series – Trigonometric Series- Exponential Fourier Series- Exponential Fourier Series- Symmetry Properties of the Fourier Coefficients.

UNIT-II

Fourier Integral, Energy Spectral Density, Fourier Transforms in the Limit, Fourier Transform Theorems and Paris, System Analysis with Fourier Transform, Laplace Transform Theorems, Network Analysis using the Laplace Transform.

Discrete Time signals and system- Review of sampled data System, Time Domain representation of Discrete Time Signals, Frequency Domain Representation of Discrete ime Signals, Discrete Time Signal obtained by sampling, Discrete Fourier

UNIT-III

Transform. Z- Transform- Definition and Examples, Inverse Z- Transform, Properties of the Z- Transform, Introduction to Realization of Digital System- Block Diagram and Signal Flow Graph.

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

Introduction to Realization of an IIR and FIR systems, Discrete Fourier Transforms (DTF) and Fast Fourier Transform (FFT)

UNIT-IV

Design of Digital Filters: Introduction to Filters, A comparison of IIR and FIR Digital Filters. Design of IIR Digital Filters- Impulse Invariant Transformation, Bilinear Transformation, Design of Digital Butterworth and chebyshev Filters. Design of FIR Digital Filters- Windowing wing and Rectangular Window, Filter Designs using windows, Frequency Sampling Techniques in various applications.

Suggested Readings:

1. Digital Signal Processing by Alan.V.Oppenheim, Ronal W. Schafer, Prentice Hall of India.

2. Digital Signal Processing by J. Defatta, John Willey & Sons.

3. Digital Signal Processing by Prokians, PHI.

4. Distributed Computing   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT-I

Distributed Operation System: Distributed Computing System Models, Issues In Design of Distributed Operating System, Message Passing, Remote Procedure Calls, Synchronization, Process Management, Distributed File Systems, Introduction to Distributed Data –Bases

UNIT-II

Distributed Algorithms: Introduction To Distributed Algorithms, Synchronous and Partial Synchronous Models, Algorithms In General Synchronous Leader Election, Breadth First Search, Shortest Path, Randomized Algorithms

UNIT-III

Distributed Consensus With Link And Process Failures. Asynchronous System Model, I/o Automata, Operation of Automata, Complexity Measures, Randomizations, Asynchronous Shared Memory Model, Mutual Exclusion, Resource Allocation, Consensus.

UNIT-IV

Asynchronous Network Model, Basic Asynchronous Network Algorithms, Shared Memory Vs Networks. Introduction To Parallel Distributed Processing: General Framework, Methods Of Learning.

Suggested Readings:

1. PK Sinha, Distributed Operating System, PHI, 1997.

2. AS Tanenbaum, Modern Operating System, PHI.

3. Nancy A Lynch, Distributed Algorithms, Morgan Kaufmann Pub. Inc., 1996.

(ii) Elective III (3 Credit)

1. Embedded Systems   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT- I

Introduction to Embedded systems, Architectural Isuues: CISC, RISC, Architectures, Memory, Component Interfacing: Interrupts, DMA,I/O Bus Structure, I/O Devices, OS for Embedded Systems, Real Time Systems & Issues

UNIT-II

Designing of Embedded System: Design Isuues, Hardware Software Codesign, Specification Language, USE of UML Design in Embedded System, Modeling Methods of Design, Software Design of Programming Embedded System

UNIT-III

Testing of Embedded System, Coding Techniques, Optimization of Code Techniques, Introduction to VHDL Based PGA Design, Networked Embedded System.

UNIT-IV

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

Distributed Embedded Architectures, Protocol Design Issues, Wireless Network, Introduction to Embedded Multimedia and Telecommunication Application like Digital Camera, Digital TV, etc.

Suggested Readings:

1. Arnold Berger-Embedded System Design, TMH.

2. Krishna, C.M, "Real Time System", McGraw Hill.

3. D. Gajski et al., Designing of Embedded System by Prentice Hall.

4. Jane W.S. Liu, "Real Time Systems", Pearson Education Asia

5. Kluwer Academic Publisher, Hardware Software Co- Design: Principles & Practice

6. Frank Vahid et al., Embedded System Design, John Wiley & Sons.

2. Neural Network   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT-I

Introduction: Neural Network, Human Brain, Biological and Artificial Neurons, Model of Neuron Knowledge Representation, Artificial Intelligence and Neural Network, Network Architecture, Basic Approach of the working of ANN- Training, Learning and Generalization.

UNIT-II

Supervised Learning: Single Layer Networks, Perception- Linear Separability, Limitations of Multi Layer Network Architecture, Back Propagation Algorithm (BPA) and Other Training Algorithms, Application of Adaptive Multi- Layer Network Architecture, Recurrent Network, Feed-Forword Networks Radial-Basic-Function (RBF) Networks.

UNIT-III

Unsupervised Learning: Winner- Task-All Networks, Hamming Networks, Maxnet, Simple Competitive Learning Vector- Quantization, Counter-Propoagation Network, Adaptive Resonance Theory, Kohonen's Self Organizing Maps, Principal Component Analysis.

UNIT-IV

Associated Models: Hopfield Networks, Brain-In-A-Box Network, Boltzman

Machine Optimization Methods: Hopfield Networks For-TSP, Solution of Simultaneous Linear Equations, Iterated Rafiant Descent, Simulted Annealing, Fenetic Algorithm.

Suggested Readings:

1. Simon Haykin,"Neural Network – A Comprehensive Foundation', Macmillan Publishing Co., New Yourk, 1994.

2. K.Mahrotra, C.K. Mohan and Sanjay Ranka, " Elements of Artifical Neural Network", MIT Press, 1997- Indian Reprint Penram International Publishing (India), 1997

3. A Cichocki and R. Unbehauen, " Neural Networs for optimizttion and Signal processing", John Wiley and Sons, 1993.

4. J.M. Zurada," Introduction to Artificial Neural network", (Indian edition) Jaico Publihers, Mumbai, 1997.

5. Limin Fu. "Neural Networks in Computer Intelligence", TMH.

3. Natural Language Processing   (2-1-0)   Credit 3   (Contact Hours: 30)

UNIT-I

Introduction to Natural Language Understanding, Language as Knowledge Base Process, Basic Linguistics, Computers & Natural Language Understanding, Grammer & Parsing-Top Down Parsing, Bottom Up Parsing

UNIT-II

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar   Shalini Chandra

Transition Network Grammer, Grammer and Logic Programming, Semantic Interpretation-Semantic and Logical Form, Linking Syntax and Scemantics, Ambiguity Resolution

UNIT-III

Introduction to Semantic Grammer, Template Matching, Semantically Driven Parsing Techniques Context and World Knowledge, Knowledge Representation and Reasoning

UNIT-IV

Local Discourse Context and Reference, Discourse Structure and Understanding Using World Knowledge, Language Learning and Concept Learning

<u>**Suggested Readings:**</u>

1. James Allen, Natural Language Understanding, Pearson Education.

2. Rich & Knight, Artificial Intelligence, TMH.

3. Dan W. Patterson, Artificial Intelligence: A Modern Approach, Pearson Education.

4. Russell Norwig, Artificial Intelligence: A Modern approach, Pearson Education.

4. Mobile Computing   (2-1-0)   Credit 3   (Contact Hours: 30)

Unit – I
Introduction, issues in mobile computing, overview of wireless telephony: cellular concept,GSM: air-interface, channel structure, location management: HLRVLR, hierarchical, handoffs, channel allocation in cellular systems.

Unit II
Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP application environment, applications.

Unit – III
Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit IV
Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment, CDMA, GPRS.

References:
1. J. Schiller, Mobile Communications, Addison Wesley.
2. Charles Perkins, Mobile IP, Addison Wesley.
3. Charles Perkins, Ad hoc Networks, Addison Wesley.
4. Upadhyaya, "Mobile Computing", Springer

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