Annexure A

DETAILED SYLLABUS
MASTER OF COMPUTER APPLICATION (MCA)
W.e.f. 2015-16

Semester I

MCA-101 Computer Architecture (3-1-0) Credit-06
(Contact Hours: 45 Max.)

UNIT-I
Introduction to Computer Organization, I/O Storage Devices, CPU Processor, Data Representation, Number System, Computer Arithmetic and Boolean Algebra, Generations of Computer, Introduction to Operating Systems, and system Software.

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 Subtractor, 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:
5. Tannenbaum, “Structured Computer Organization”, PHI
7. Peter Norton’s, “Introduction to Computers”, TMH
8. Hahn, “The Internet Complete Reference”, TMH
UNIT-I
Relation: Type and Composition of relations, Pictorial Representation of Relations, Closures of Relations, Equivalence Relations, Partial Ordering Relation Posets, Hasse Diagram.
Function: Type, Composition of Function, Recursively Defined Function.
Mathematical Induction: Piano’s Axioms, Mathematical Induction, Discrete Numeric Functions and Generating Functions, Simple Recurrence Relation with Constant Coefficients, Linear Recurrence Relation without Constant Coefficient, Asymptotic Behavior of Functions.

UNIT-II
Algebraic Structure: Properties, Semi Group, Monoid Group, Abelian Group, Properties of Group, Sub-Group, Cyclic Group, Cosets, Permutation Groups, Homomorphism, Isomorphism and Automorphism of Groups.

UNIT-III
Introduction to defining Language, Kleene Closure, Arithmetic Expressions, Chomsky Hierarchy, Regular Expression, Generalized Transition Graph, Conversion of regular Expressin to finite Automata, NFA, DFA, Conversion of NFA TO DFA, Optimizing a DGA, FA with output: Moore Machine, Mealy Machine Conversions.

UNIT-IV

Suggested Readings
1. Liptschutz, Seymour, “Discrete Mathematics”, TMH
5. Gersting, “Mathematical Structure for Computer Science”, WH Freeman & Macmillan

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar
MCA-103 Object Oriented Programming & C++ (3-1-0)

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

UNIT-II

UNIT-III

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

Suggested Readings:

2. Bjarne Stroustrup, “C++ Programming Language”, Addison Wesley
MCA-104  Computer Based Numerical & Statistical Techniques (2-1-0)
Credit-03
(Contact Hours: 30)

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
Measure of Central Tendency and Dispersion, Linerar 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++

Suggested Readings:
2. Gerald & Wheatley, “Applied Numerical Analyses”, AV.
7. Francis Scheld, “Numerical Analysis”, TMH.

MCA-105  Programming Lab-I (0-0-4)  Credit-03
(Contact Hours: 30)
Semester-II

MCA-201  Graph Theory and Combinatorics (3-1-0)  Credit-06
(Credit Hours: 45)

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, Dijkstra Algorithm, Path between All Vertex, Depth First Search, Breadth
First Search.

UNIT-IV
Coloring of the Graph, Chromatic Number, Chromatic Polynomial, Planar Graph, Kurotowasky’s Two
Non Planar Graph, Kurotowaskes Theorem, Dual Graph, Geometric Dual & Combinational Dual,
Network Flow, Cut Set, Maximum Flow.

Suggested Readings:

1. Deo Narsingh, “Graph Theory with application to engineering and computer science”.
2. Tremblay and Manohar, “Discrete mathematical structure with application to computer”.

SP Tripathi    SK Dwivedi    Vipin Saxena    Deepa Raj    Manoj Kumar    Narander Kumar
MCA-202 System Programming (3-1-0)  
Credit-06  
(Contact Hours: 45)

UNIT-I  

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  
5. Ray Dunkan, “Advanced MS DOS Programming”, BPB Publication  
MCA-203  Data Structure (3-1-0)

Credit-06
(Contact Hours: 45)

UNIT-I
Introduction to Data Structure, Types and operations, Algorithm, Way of Writing Algorithm, Complexity, Memory Allocation of all the data structure. Array, Operations in the Array, Merging of two list, Sorting and Searching - Bubble, Insertion, selection, Quick, Shell, Sorting Networks, Sorting on Disk Files, Search - Linear and Binary Search..

UNIT-II
Linked List- Single and Double linked list, Creation, Insertion and Deletion Operation. Polynomial Addition Using Linked List, Queue, Circular Queue, Priority Queue, Stack, Implementation using array and Linked list, Infix to Prefix Representation using Stack and Value of Infix Expression Using Stack. Hash table, Collision in Hash Table, Collision Resolution Technique.

UNIT-III
Trees: Linear Tree, Binary Tree and their Representation, Implementation recursively and iteratively, Searching, Traversal (in order, Preorder, Post order), Deletion from tree, Threaded Tree, AVL Tree, Forests, Practical Application.

UNIT-IV
Graph: Introduction of Graph, Memory representation of graph using array and linked list, Traversal in graph, Breadth first search and depth first search. Shortest Path Matrix of the graph. Applications of Graph. All implementation using C++.

Suggested Readings:

1. Hadley, G., “Linear Programming and Massachusetts”, Addison-Wesley
MCA-204 Computer Based Optimization Techniques (2-1-0)  
Credit-03  
(Contact Hours:30)

UNIT-I  
Linear Programming-Graphical, Simplex, Two Phase & Big M Methods, Dual Linear Programming-Dual of a Problem, Dual Simplex Method.

UNIT-II  
Transportation Methods- North West Corner, Least Cost, VAM Methods, Optimal Solution by Modi & Stepping Stone Method, Assignment Problem

UNIT-III  
Queuing Theory, Inventory Control- EOQ, Price Break , Production Inventory Model, Lead Time, Inventory Control System, Inventory Models, Network Analysis-Time Estimation, PERT and CPM, Statistical Quality Control.

UNIT-IV  
Game Theory, Integer and Dynamic Programming, Quadratic Programming, Goal Theory, Simulation and Forecasting Techniques, Implementation in C++.

Suggested Readings:

1. Hadley, G., “Linear Programming and Massachusetts”, Addison-Wesley  

MCA-205  Programming Lab-II (0-0-4)  
Credit-03  
(Contact Hours: 30)
Semester-III

MCA-301 Operating System (3-1-0)  
Credit-06
(Contact Hours: 45)

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.

UNIT-III
Necessary Conditions, Prevention, Avoidance, Detection and Recovery, Synchronization of

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:
Wesley.
MCA-302  Analysis & Design of Algorithms (3-1-0)  
Credit-06  
(Contact Hours: 45)

UNIT-I  

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  

**Suggested Readings:**  
2. Cormen Leiserson et.al., “**Introduction to Algorithms**”, PHI  
3. Brassard bratley, “**Fundamental of Algorithms**”, PHI  
5. A.V. Aho et.al., “**The Design and Analysis of Algorithms**”, “Pearson Education

SP Tripathi  SK Dwivedi  Vipin Saxena  Deepa Raj  Manoj Kumar  Narander Kumar
UNIT-I

UNIT-II

UNIT-III
Coding: Top-down and Bottom-Up Programming, Structured Programming, Information hiding, Programming style and internal documentation.
Software Project Management: The Management Spectrum (The people, the product, the process, the project), Cost estimation, Project Scheduling, staffing, software configuration management, Structured Vs. Unstructured maintenance, quality assurance, Project monitoring risk management.

UNIT-IV
Software Reliability & Quality Assurance: Reliability issues, Reliability metrics, Reliability growth modeling, Software quality, ISO 9000 Certification for software industry. SEI Capability maturity model, Comparison between ISO &SEI CMM.

Suggested Readings:
5. Alexis, Leon and Mathews Leon, “Fundamental of Software Engineering”, Vikas
MCA-304  Internet and Java Programming (2-1-0)  Credit-03
(Contact Hours: 30)

UNIT-I
Internet: Connecting to Internet Telephone, Cable, and Satellite Connection, Choosing an ISP, Introduction to Internet Services, E-Mail Concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing.

UNIT-II

UNIT-III

UNIT-IV
Java Servlets: Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servelets, HTTP Redirects, Cookies, Introduction to Java Server pages(JSP).

Suggested Readings:

1. John Zukowski, Mastering Java
2. Evangelos P., Mastering VB6
3. Deborah, S., Roy & Eric Roy, Mastering HTML
4. Deitel & Deital, Java How to Program
5. A. Russel, Mastering ASP, BPB Publication
6. Ann Navarro, Mastering XML, BPB Publication
7. W.Boggs & M.Boggs, Mastering UML with Rational Rose, BPB Publication

MCA-305  Programming Lab III (0-0-4)  Credit-03
(Contact Hours: 30)

Includes
(i) Lab Practice on MCA-301/304 (ii) Seminar-on emerging & contemporary topics (2Hrs./Week)
SECOND YEAR  
Semester-IV

MCA-401  Data Base Management System (3-1-0)  
Credit-06  
(Contact Hours: 45)

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, and 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 Indexes, Queries and Sub Queries, Aggregate Functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL, PI/SQIL, 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.  
**Transaction Processing Concepts:** Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, Recoverability, Recovery from transation failures, log based recovery, checkpoints, deadlock handling.

UNIT-IV  
**Concurrence Control Techniques:** Concurrence control, Locking Techniques for concurrence control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multiversion schemes, Recovery with concurrent transaction. Transaction Processing in Distributed system, data fragmentation, Replication and allocation techniques for distributed system, overview of concurrency control and recovery in distrusted database.

**Suggested Readings:**

1. Date C.J., “An Introduction to Database System”, Addison Wesley  
MCA-402  Compiler Design (3-1-0)  Credit-06  
(Contact Hours: 45)

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

UNIT-II

UNIT-III

UNIT-IV
Code Optimization: Types, Local, Loop Optimization, basic blocks construction, Use of Data Flow Analysis in code optimization.
Code Generation: Features and Problems in Code Generation, Code Generation through GETREG, DAG.

Suggested Readings:

1. Aho & Ulman, Principles of Compiler Design, Narosa Publication
4. Trembley & Sorenson, Compiler Writing, TMH
5. Allen I Holub, Compiler Design in C, PHI
MCA-403  Data Communication and Computer Networks (3-1-0)
Credit-06
(Contact Hours: 45)

UNIT-I

UNIT-II

UNIT-III
Goals and Application of Networks, Networks Structure and architecture, the OSI reference model, services, networks topology, Physical Layer-transmission, switching methods, Integrated services digital networks, terminal handling. Medium access sub layer: Channel allocations, LAN protocols, ALOHA Protocols-Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision free Protocols, IEEE Standards, FDDI, Data Link Layer-elementary data link protocols, sliding windows protocols, error handling, high Level Data Link Control.

UNIT-IV

Suggested Readings:

3. Comer, “Computer Networks & Internet”, PHI
4. Comer, “Internetworking with TCP/IP”, PHI
5. Forouzan, “Data Communication and Networking”, TMH

MCA-404  Elective Paper  Credit-03
(Contact Hours: 30)

MCA-405  Programming Lab IV (0-0-4)  Credit-03
(Contact Hours: 30)
Includes: (i) LAB Practice on 401 (ii) Development of Mini Project (2 hrs/week)

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MCA III YEAR

Semester-V

MCA-501  Artificial Intelligence (3-1-0)  

Credit-06  
(Contact Hours: 45)

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


UNIT-III


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
2. N.J. Nilson, Principles of Artificial Intelligence, Narosa Publication
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
7. Peter Jackson, Introduction to Experts System, Addison Wesley
8. Tau & Genzales, pattern Recognition Principles, Addison Wesley.
MCA-502  Computer Graphics (3-1-0)    Credit-06
(Contact Hours: 45)

UNIT-I
Graphics Display Devices, Interactive Devices, Line and Circle Plotting Using Bresenham’s Algorithm
Windowing and Clipping, Suterland Cohen Approach, Cursus Back Method, Midpoint Subdivision
Algorithm, Curve Drawing, Hermit Polynomial.

UNIT-II
Bezier Curves, B-Splines, Picture Transformation, Scaling Mirror Images, 2D & 3D Graphics, Coordinate
System, 3D Transformation, Rotation about an Arbitrary Axis.

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 model, Ray Tracing.

UNIT-IV
Shading, Transparency, Shadows, Textures Colors, CGS Modelling, Graphic Standards GKS, PHIGS,
Animation Fundamentals-Control and Sequencing, Creating, Sealing and Saving Frames, Synchronising
Frames, Audio-Video Editing, Implementation in C++.

Suggested Readings:


MCA-503  Elective (3-1-0)    Credit-06
(Contact Hours: 45)

MCA-504  Elective (2-1-0)    Credit-03
(Contact Hours: 30)

MCA-505  Software Lab V (0-0-4)    Credit-03
(Contact Hours: 30)

Includes  (i). Lab Practice on MCA-502
Semester VI

MCA-601  Industrial Training and Project  24 Credits

(I) Internal assessment  30% weighrage
(II) External Assessment (Dissertation & Viva-voce examination  70% weighrage

List of Electives:-

A) FOR SEMESTER IV

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

B) FOR SEMESTER V

1. Distributed Computing
2. Advance Database Management System
3. Embedded Systems
4. Neural Network
5. Soft Computing
6. Natural Language Processing
7. Digital Image Processing
8. Digital Signal Processing
A) List of Elective Papers (For MCA-404)  Credit 3
(Contact Hours: 30)

1. Modeling & Simulation (2-1-0)

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

UNIT-IV
World Model: Critical Path Computation, Uncertainties in Activity Duration, Resource Allocation Simulation Software, General Purpose Vs Application-Oriented Simulation Packages

Suggested Readings:

2. Data Mining (2-1-0)

SP Tripathi    SK Dwivedi    Vipin Saxena    Deepa Raj    Manoj Kumar    Narander Kumar
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.

UNIT IV

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
5. Margaret H. Dunham, “Data-Mining, Introductory & Advance Topics”, Pearson Education

3. Real Time System (2-1-0)

SP Tripathi     SK Dwivedi     Vipin Saxena     Deepa Raj     Manoj Kumar     Narander Kumar
UNIT-I

UNIT-II

UNIT-III

UNIT-IV

Suggested Readings:

4. Software Project Management       (2-1-0)

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

Suggested Readings:

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

5. ELECTRONIC COMMERCE       (2-1-0)

SP Tripathi     SK Dwivedi     Vipin Saxena     Deepa Raj     Manoj Kumar     Narander Kumar
Unit I
**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 e Commerce and Law**: Cyber law in India. Comparative evaluation of Cyber laws of certain countries.

**Suggested Readings:**

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6. **Parallel Computing** (2-1-0)

SP Tripathi    SK Dwivedi    Vipin Saxena    Deepa Raj    Manoj Kumar    Narander Kumar
UNIT-I

UNIT-II

UNIT-III
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

Suggested Readings:
(B) List of Electives for V Semester (MCA 503 & MCA 504)

1. Distributed Computing

UNIT-I

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

UNIT-IV

Suggested Readings:
2. AS Tanenbaum, Modern Operating System, PHI.

2. Advance Database Management System

UNIT-I

UNIT-II
Extended Relational Model& Object Oriented Database System: New Data Types, User Defined Abstract Data Model, Data Log, Nested Relational Model and Expert Database System.

Distributed Database System:

SP Tripathi    SK Dwivedi    Vipin Saxena    Deepa Raj    Manoj Kumar    Narander Kumar
Structure of Distributed Database, Data Fragmentation, Data Model, Query Processing, Semi Join, Parallel & Pipeline Join, Distributed Query Processing In R* System, Concurrency Control in Distributed Database System, Recovery In Distributed Database System, Distributed Deadlock Detection And Resolution, Commit Protocols.

UNIT-III

UNIT-IV
Introduction to Expert Database And Fuzzy Database System:
Fuzzy Databases: Fuzzy Set & Fuzzy Logic, Use of Fuzzy Techniques to Define Inexact and Incomplete Databases.

Suggested Readings:
1. Majumda & Bhattacharya, “Database Management System”, TMH.

3. Embedded Systems

UNIT- I

UNIT-II

UNIT-III

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

Suggested Readings:

SP Tripathi   SK Dwivedi   Vipin Saxena   Deepa Raj   Manoj Kumar   Narander Kumar
4. Neural Network

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

UNIT-III

UNIT-IV

Suggested Readings:

5. Limin Fu. “Neural Networks in Computer Intelligence”, TMH.
5. Soft Computing

UNIT-I

UNIT-II

UNIT-III

UNIT-IV

Suggested Readings:

6. Natural Language Processing

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
Transition Network Grammer, Grammer and Logic Programming, Semantic Interpretation-Semantic and Logical Form, Linking Syntax and Semantics, 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

Suggested Readings:
1. James Allen, Natural Language Understanding, Pearson Education.
2. Rich & Knight, Artificial Intelligence, TMH.

7. Digital Image Processing

UNIT-I
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 Evaluation 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 Accuracy 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
8. Digital Signal Processing

UNIT-I

UNIT-II

UNIT-III

UNIT-IV

Suggested Readings:
3. Digital Signal Processing by Prokians, PHI.