MCA Course Structure
Effective from session 2008-2009

Semester – I

S.No.	Course Code	Course Name	Credits(L T P)
1	COMP 712	Programming & Problem Solving with C	5(2+1+2)
2	COMP 714	Introduction to Softwares	4(3+0+1)
3	COMP 715	Computer Organization and Architecture	4(3+1+0)
4	MAS 621	Discrete Mathematics	3(3+0+0)
5	BAM 752	Bussiness Communication	3(2+1+0)
		Total Credits	**19**

Semester – II

S.No.	Course Code	Course Name	Credits(L T P)
6	COMP 723	Operating System	4(3+0+1)
7	COMP 724	Data Structures using C++	4(2+1+1)
8	COMP 725	Information System Analysis and Design	3(2+1+0)
9	COMP 726	Web Technologies	4(3+0+1)
10	MAS 661	Computer based Numerical and Statistical Techniques	4(2+1+1)
11	BAM 753	Essentials of Management	3(2+1+0)
		Total Credits	**22**

Semester – III

S.No.	Course Code	Course Name	Credits(L T P)
12	COMP 731	Design & Analysis of Algorithms	3(2+1+0)
13	COMP 732	Computer Networks	4(2+1+1)
14	COMP 733	Database Management Systems	5(3+1+1)
15	COMP 736	Object Modeling Techniques and UML	4(3+0+1)
16	COMP 837	Compiler Design	3(2+1+0)
17	BAM 796	Accounting and Finance Management	3(2+1+0)
		Total Credits	**22**

Semester – IV

S.No.	Course Code	Course Name	Credits (L T P)
18	COMP 842	Data Warehousing & Mining	4(2+1+1)
19	COMP 843	Artificial Intelligence and Expert Systems	4(3+0+1)
20	COMP 852	Advanced Java Programming	4(2+0+2)
21	MAS 721	Operations Research	4(4+0+0)
22	BAM 864	Management Information Systems	3(2+1+0)
23	COMP 799	Mini Project	3(0+0+3)
		Total Credits	**22**

Semester – V

S.No.	Course Code	Course Name	Credits (L T P)
24	COMP 741	. NET Framework & C#	4(2+0+2)
25	COMP 841	Software Engineering	3(2+1+0)
26	COMP 851	Network Programming & Security	4(2+1+1)
27	COMP 871-876	Elective	4(2+1+1)
28	COMP 856	Computer Graphics and Multimedia	4(2+1+1)
29	COMP 780	Seminar on Emerging Trends	3(0+1+2)
		Total Credits	**22**

Semester – VI

S.No.	Course Code	Course Name	Credits (L T P)
30	COMP 880	Seminar	2(0 +0+2)
31	COMP 899	Project	12(0+0+12)
		Total Credits	**14**

Note: Total Credits offered for six semesters are **121**

List of Elective Courses

1. Distributed Computing 2. Mobile Computing 3. Distributed DBMS
4. Advanced Computer Network 5. Advanced Computer Architecture 6. Advances in IT

Programming & Problem Solving with C

Code: COMP 712 **Credits: 5(2+1+2)**

UNIT-1

Introduction: Historical Developments of C, Introduction to Algorithms and Flowcharts, Basic features of C.

Types, Operators and Expressions:

Variable Names and constants, Data type and Sizes, Declarations, Operators (Arithmetical, relational, Logical, Bitwise, Conditional, Assignment…)

UNIT-2

Control Flow: Statements and Blocks, If (Simple if, if – else, nested if), Switch, Loops (while, do-while and for), Break and continue, goto and labels.

UNIT-3

Functions and Program Structure: Basics of Functions, Function , declaration and prototyping , Argument Passing (call by reference and call by value), Recursion

UNIT-4

Pointers : Pointers and Addresses,Pointers and function arguments, Pointer Arithmetic.

Arrays : Fundamentals, Types (Single and Multi-Dimensional), Passing array to a Function, Pointers and arrays, Pointer arrays, Searching and Sorting Techniques.

UNIT-5

Structures : Basics of structure, Structures and Functions, Array of structures, Pointers to structures, Self-referential structures, Enumerated data types, Unions.

Character Manipulation : Strings, Standard Library Functions (strlen (), strcpy (), strcat (), strcmp ()….), Two-dimensional array of characters, Array of pointers to strings

File Handling : Basic concepts, Creating and reading text files.

Text Book:

Kernighan and Ritchie, “The C programming Language”, Pearson

References:

Yashavant Kanetikar, “Let us C”, BPH Publications

E. Balaguruswamy, “ANSI C”, TMH

Introduction to Softwares

Comp-714 **4(3+0+1)**

Unit 1: Introduction to Computers

Definition of Computer, History of computer, Characteristics of computer, Applications of computer, Block Diagram, CPU, Memory: RAM, ROM, Secondary Memory, I/O Devices.

Unit-2: Information Concepts

Data and its Representation: - character, integer and float numbers, Information and its characteristics, Categories of Information, Levels of Information, Concept of file, Record, Field.

Unit 3: Software

System software, Operating System, Functions of OS, Overview of DOS, Windows and Unix.
Application software (Word Processor, MS-Excel, MS-PowerPoint)

Unit 4: Programming Languages and Software Development

Generation of Languages, Compiler, Assembler, Linker, Loader, Software Development Methodology, Software Development Life Cycle
Programming Languages*:* Programming Language Paradigm, Procedure-Oriented Language, Object- Oriented Language, Web Based Languages

Unit 5: Network and Data Base Concepts

Definition and Types of Network, Introduction to Internet- Search Engine, Web Page, Web Browser, Introduction to E-Commerce.
Data Base definition, Data Base Management System, overview of MS-Access

Text Books:

1. Fundamentals of Computer: - V. Raja Raman
2. Fundamentals of Computer: - P. K. Sinha

Reference Books:

1. Microsoft Office Black Book
2. UNIX: The Ultimate Guide: - Sumitabha Das
3. PC Software: - V.K. Jain “O Level”

Computer Organization & Architecture

Code: COMP-715 **Credits: 4(3+1+0)**

UNIT-1

Introduction: Types of computers: Analog, Digital and Hybrid Computers, Modern Digital Computer, Number systems- Binary, Octal, Decimal, Hexadecimal , 1's & 2's Complement.

Digital logic circuits and Components: Logic gates, Boolean Algebra, K-Map Simplification, Half Adder, Full Adder, Decoder, Encoders, Multiplexers, Demultiplexer, Flip Flops, Registers, Binary Counters.

UNIT-II

Register Transfer & Micro operation

Register Transfer Language, Bus and Memory Transfer, Bus Architecture, Arithmetic Micro operations: Binary Adder, Binary Subtractor, Binary Adder-Subtractor, Binary Increment and Binary Decrement.

UNIT-III

Memory Organization: Memory Hierarchy, Main Memory (RAM and ROM), Associative Memory, Cache Memory, Auxiliary Memory.

I/O Organization: I/O interface, Modes of transfer, Interrupt handling, Direct Memory Access, Input/ Output processor, Serial Communication.

UNIT-IV

Processor Design: General Register Organization, Stack Organization, Addressing Modes, Instruction Formats, Data Transfer & manipulation, A simple assembly language Program, Program Control, Reduced Instruction Set Computer and Complex Instruction Set Computer.

UNIT-V

Parallel Processing

Introduction, Linear and Nonlinear Pipeline Processors, Super Scalar and Super Pipeline Design, Vector Processing, Array Processors, Super Computer.

Text Book:

1. Mano M., "Computer System Architecture"

References:

1. William Stallings, "Computer Organization and Architecture", PHI
2. Mano M., "Digital Logic and Computer Design"
3. Kai Hwang, "Advanced Computer Architecture", McGraw Hill.

Discrete Mathematics

Code: MAS 621 **Credits: 3(3+0+0)**

1. **Propositions and logical operations**
    a. Notation, Connections, Normal Forms, Truth Tables
    b. Equivalence and Implications
    c. Theory of inference for statement calculus, predicate calculus
    d. Rules of logic
    e. Mathematical Induction and Quantifiers

2. **Sets, Relations and Digraphs**
    a. Review of set concepts
    b. Relations and digraphs
    c. Properties of relations
    d. Equivalence relations
    e. Computer representation of relations and digraphs
    f. Manipulation of relation
    g. Partially Ordered Sets (Posets)

3. **Graph theory**
    a. Definition, paths, circuits, reachability, connectedness
    b. Matrix representation of graphs, trees, spanning trees
    c. List structures and graphs, PERT related techniques
    d. Transitive closure, Warshall's Algorithms
    e. Eularian and Hamiltonian graphs

4. **Groups and applications**
    a. Monoids, semigroups
    b. Product and quotients of algebraic structures
    c. Isomorphism, homomorphism, automorphism
    d. Normal subgroups, codes and group codes

Books:

1. Discrete Mathematical Structure : Tremblay and Manohar, McGraw Hill
2. Discrete Mathematical Structure : Kolman, Busby and Ross, Printice Hall India, Edition 3
3. Elements of Discrete Structures : C.L. Liu

Business Communication

Code: BAM 752 **Credits 3(2+1+0)**

- Concept of Communication
- Communication process
- Barriers to Communication
- Written Communication-formal Reports, Technical report, Business Correspondence, Notices, Research Papers.
- Oral Communication-Dyadic Communication, Meetings, Seminars &Conferences, G..D., Audio Visual Aids.
- Non-Verbal Communication-Personal Appearance, Postures, Gestures, Facial Expressions, Eye Contact

References:

Lesikar & Pettit, “Business Communication”

MCA -II
Operating Systems

Code: **COMP – 723** Credit: **4 (3 + 0 + 1)**

UNIT –1

Definition and Types of Operating Systems – Batch, Multiprogramming, Time Sharing, Parallel, Distributed and Real Time Operating System. Structure of Operating Systems. Operating System Components and Services, System Calls, Systems Programs.

UNIT – II

Process Management - Process Concept, Process Scheduling, Cooperating Processes, Threads. CPU Scheduling - Criteria, Scheduling Algorithms, Multiple-processor Scheduling, Real Time Scheduling. Process Synchronization - The Critical - Section Problem, Synchronization Hardware, Semaphores, Classical problems of Synchronization, Critical Regions, Monitors, Interprocess Communication, Deadlocks - System Model, Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT – III

Memory Management - Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Virtual Memory - Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing, Other Considerations.

UNIT-IV

File System - File Concept, Access Methods, Directory Structure. File System Implementation – File System Structure, Allocation Methods, Directory Implementation, Efficiency and performance, Recovery. Secondary Storage Structure - Disk Structure, Disk Scheduling methods, Disk Management, Swap Space Management, Disk Reliability.

UNIT – V

Introduction to Distributed Operating Systems, Client / Server Operating Systems, Network Operating Systems.

History of UNIX / Linux, Basic Commands, Shell Programming

Text Books:

1. Abraham Silberschatz &Galvin, “Operating System Concepts”,Wiley J. Publication

References:

1. Operating Systems Concepts and Design - Milan Milenokovic, TMH.
2. Linux: The Complete Reference – Richard Peterson, Osborne TMH.

Practical List

1. Getting started with Linux (Boot, Shutdown, Login, vi Editor, Linux Commands).
2. Linux Shell Programming.
3. System Calls (open, read, write, close, lseek, stat, getdents)
4. Process Creation and Execution (fork, exec, wait, exit)
5. Thread Creation and Execution (PThreads).
6. Process / Thread Synchronization (Mutex and Condition Variables).
7. Interprocess Communication (Pipes & Signals).

Data Structures through C++

Subject Code : COMP-724 **Credits : 4(3+0+1)**

Unit-1

Introduction: Basic Terminology, Elementary Data Organization, Data Structure Operations, Algorithms Complexity, Time-Space Trade off.

Arrays: Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Implementation of 1-D arrays, Row and Column Major implementations of 2-D.

Unit-II

Stacks: Definition, operations on stacks, stack implementation using array and linked list, Applications of stacks: Infix, Postfix & Prefix expressions, Converting an expression from infix to postfix.

Queues: Definition and concepts, Operations on queue, Types of queues: Linear queue, Circular queue, Priority queue, Double Ended queue, Implementations of queue.

Unit-III

Linked List: Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, Polynomial Addition and other operations on linked list, Header nodes, Doubly linked lists, Generalized lists.

Unit-IV

Trees: Definition of trees and Binary trees. Properties of Binary trees and their implementation. Tree Traversal techniques such as pre-order, post-order, in-order traversal. Binary Search Trees, AVL trees, Threaded trees, Balanced multi way search trees, B-trees.

Unit-V

Sorting Techniques: Basic concepts**,** Insertion Sort, Quick sort, two-way Merge sort, Heap sort, Sorting on different keys, External sorting.

Searching Techniques: Linear Search and Binary Search. Hashing Techniques.

Graphs: Basic concept and Representation of graphs. Traversal algorithms: Breadth first & Depth first search. Spanning tree algorithms, Shortest path algorithms.

Text Books

Tananbaum, “Data Structure Using C & C++”,
Shahni,”Fundamentals of data structure with C++”, University Press

Reference Books

Data Structures & Program Design in C++ by Kruse & Ryba
Data Structures and Other Objects Using C++ by Michael Main, Walter Savitch
Data Structures via C++: Objects by Evolution by A. Michael Berman

Practical List

1. Arrays (One dimensional and two dimensional)
2. Implementing stacks, queues and circular queues and applications like infix, postfix, conversion postfix to infix, reverse string.
3. Application of linked list.
4. Binary tree creation, deletion of a node, traversal.
5. Searching & Sorting Techniques.
6. Graph representation and traversal using BFS & DFS,

Information System Analysis and Design

Sub. Code: COMP 725 **Credits: 3 (2+1+0)**

Unit 1: *Data and Information*:

Types of information: operational, tactical, strategic and statutory. Why do we need information systems. Requirement of information at different levels of management, Requirement of information for various functions. Quality of information.

Unit 2:*Systems Analysis and Design Life Cycle*:

Requirements determination, requirements specifications, feasibility analysis, final specifications, hardware and software study, system design, system implementation, system evaluation, system modification. Role and attributes of a systems analyst.

Unit 3:

***Information gathering*:** Strategies and methods. System requirements specification.

***Feasibility analysis*:** Deciding project goals, examining alternative solutions, cost – benefit analysis, quantifications of costs and benefits, payback period, system proposal preparation for managements, parts and documentation of a proposal, tools for prototype creation.

Data flow diagrams: rules and conventions, levels of DFDs, logical and physical DFDs. Software tools to create DFDs.

Unit 4:

***Structured systems analysis and design*:** Procedure specifications in structured English, decision tables for complex logical specifications, specification oriented design vs procedure oriented design.

***Data oriented systems design*:** Entity relationship model, E-R diagrams, relationships, cardinality and participation, normalizing relations and their use.

Coding Practices: Coding techniques, requirements of coding schemes, error detection of codes

Data input methods: Input Design, validating input data, input data controls, interactive data input.

***Designing outputs*:** Designing output reports- screen design, graphical user interfaces, interactive I/O on terminals.

Unit 5: *Control, Audit and Security of information systems*: Need for controls, objectives of controls, techniques used in controls, Gantt Chart, PERT. Auditing information systems. Testing information systems – types of tests, generating test cases. Security of information systems. Disaster and recovery management. Ethics in system development.

Text book:

1. **Elias M. Award, "*System Analysis and Design*", II Ed., Galgotia Publishing Ltd.**

Reference Books:

1. Hussain K.M, & D. Hussain, "*Information System Analysis, Design & Implementation*", TMH
2. James A. Senn, "*Analysis and Design of Information Systems*", II Ed., TMH
3. Don Yeates, "*System Analysis and Design*", McMillan India Ltd.
4. Hawryszkiewycz, I.T., "*Introduction to System Analysis and Design*", III Ed., PHI,
5. Rajaraman V., "*Analysis and Design of Information Systems*", PHI

Web Technologies

Code: COMP 726 **Credits: 4(3+0+1)**

Unit-1

Internet and World Wide Web : Introduction to Internet, www, Internet browsers Netscape & Explorer, Introduction to Client Server Architecture/Computing, History of the web, Growth of the web, Protocols governing the web, resources of Internet, H/W & S/W requirements of Internet, Internet service providers, Internet Services, Internet Clients and Internet Servers. Concept of E-Commerce and E-governance.

Unit-2

Markup Languages: Introduction to HTML, Formatting Tags, Links, Lists, Tables, Frames, Forms, Comments in HTML, DHTML and XML Documents, Data Interchange with an XML document, Document type definition, Features and Applications, . Working with Style sheets.

Unit-3

Client Side Scripting: Scripting basics, Introducing JavaScript, Documents, Statements, Functions, Objects in javascript, Events and Event handling, Arrays, Forms, Buttons, Checkboxes, Text Fields and Text Area.

Unit-4

Server Side Scripting: Introduction to server side scripting language, RMI, Introduction to ASP, Active Server Objects, Active Server Components, Database Management with ASP, Development of interactive commercial sites using ASP.

Unit-5

Contemporary Web Technologies : ActiveX Controls for the WWW, COM, DCOM, Introduction to Web 2.0 (Service Oriented Architecture), Web Services Computing Model.

Textbooks:

1. John Pollock, "Javascript : A biginers Guide", McGraw Hill
2. Mercer, "ASP 3.0: A Biginers Guide", McGraw Hill

References:

1. Shelly Powers et al., "Dynamic web publishing ", Techmedia, 1998.
2. Scot Johnson et. al., "Using Active Server Pages", Que, 1997.
3. E-Commerce – Cutting Edge of Business – Kamlesh K. Bajaj, Debjani Nag – Tata McGraw Hill, 1/e, 2003.

List of lab Exercises

1. Creating static WebPages using HTML.
2. Create a web site with minimum details using DHTML.
3. Create your Personal website and check the validations using JavaScript
4. List out the Web sites dealing with E-commerce
5. Log on to Web sites with E-commerce and list out the facilities available.
6. Create a Educational website using ASP.

Computer based Numerical and Statistical Techniques

Code : MAS 661 **Credits : 4(2+1+1)**

Introduction:

Errors in Numerical Computation, Mathematical Preliminaries, Errors and their Analysis, Machine Computations, Computer Software.

Algebraic & Transcendental Equation:

Bisection Method, Iteration Method, Method of False Position, Rate of Convergence, Method for Complex Root, Newton Raphson Method.

Interpolation:

Introduction, Errors in Polynomial Interpolation, Finite Differences, Decision of Errors, Newton's Formulae for Interpolation, gauss, Stirling, Bassels formula, Evertt's formula, Interpolation by unevenly spaced points, Lagrange's interpolation formula, divided difference, Newton's general interpolation formula

Curve Fitting, Cubic Spline and Approximation

Introduction, Method of Least Square Curve Fitting Procedures, Fitting a Straight Line, Approximation of functions.

Numerical Integration and Differentiation:

Introduction, Numerical differentiation, Numerical Integration, Trapezoidal Rule, Simpson 1/3 Rule, Simpson 3/8 Rule, Eulers Maclaurin formula, Predictor and Corrector formula

Statistical Computation:

Frequency Chart, Correlation, Regression Analysis, Least Square Fit, Polynomial Fit, Linear & Non Linear Regression, Multiple Regressions, Statistical Quality Control Methods, Multiple regression algorithms, time series and forcasting.

References:

Jain, Iyengar, Jain, "Numerical Methods for Scientific & Engineering Computation", New Age International.
Balaguruswamy, "Numerical Methods", TMH.
Sastry, "Introductory Method of Numerical Analysis", PHI.

Essentials of Management

Code: BAM 753 **Credit: 3 (2+1+0)**

- Nature and Functions of Management
- Development of Management Thought
- Co-ordination
- Planning
- Decision Making
- Organizing
- Delegation of Authority
- Staffing, Training & Development
- Direction
- Communication
- Leadership
- Controlling

References:

Essentials of Management- Koontz and Weirich,
Principles and Practices of Management-L.M. Prasad
Management- Stoner, Gilbert & Freeman

DESIGN & ANALYSIS OF ALGORITHMS

Course Code: COMP-731 **Credit: 3(2+1+0)**

Unit -I

Introduction to Algorithms, Analysis of algorithms, Growth of Functions, Recurrences: Master's Theorem and Substitution Method. Analysis of sorting algorithms: Merge Sort, Heap Sort, and Quick Sort. Sorting in Linear time.

Unit -II

Advanced Data Structure: Red-Black Trees, Augmenting Data Structures. B-Trees, Binomial Heaps, Fibonacci Heaps, Hash tables.

Unit -III

Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithms, Backtracking, Branch and Bound, Amortized Analysis.

Unit -IV

Graph Algorithms: Elementary Graphs Algorithms, Minimum Spanning Trees, Single-source Shortest Paths, All-Pairs Shortest Paths, Traveling Salesman Problem.

Unit -V

Selected Topics: String Matching, Randomized Algorithms, NP-Completeness, and Approximation Algorithms.

Text Book :

Coreman, Rivest, Lisserson, : “Introduction to Algorithms", PHI.

References:

1. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addision Wesley.
2. Horowitz & Sahani, "Fundamental of Computer Algorithm", Galgotia.

Computer Networks

Code: COMP 732 **Credit: 4(2+1+1)**

Introduction

Concepts of Computer Network,
Network hardware: LAN, WAN, MAN
Network s/w: Protocol hierarchies, Design issues for the layers, Connection – oriented and connection less services
Reference Models :OSI and TCP/IP reference models, comparison of the OSI and TCP/IP model
Example Networks: Novell NetWare, Arpanet, and Internet

Physical layer

Theoretical basis for data communication,
Transmission Media: Twisted pair, Coaxial, Optical Fiber, Wireless Transmission
Multiplexing: FDM, TDM, WDM
Switching: Circuit switching, Packet switching, Message Switching

Data link Layer

Data link Layer design Issues, Error detection and correction, Sliding Window protocols, Data Link Protocols (HDLC, PPP)
MAC: Channel allocation problem, multiple access protocols, IEEE standard 802.X for LAN (Ethernet, Token Bus, Token Ring), high speed LANs, Wireless LANs

Network Layer

Network layer design issues, routing algorithms, congestion control algorithms (Leaky Bucket and Token Bucket) , internetworking, the network layer in the internet , Protocols - IP,ICMP,ARP
Internetworking devices: repeaters, Bridge, Router, Gateway

Transport Layer

Transport service, elements of the transport protocols, the Internet transport protocol (UDP & TCP)

Application Layer:

Application layer Protocols – FTP, HTTP, SMTP, TELNET

Introduction to Network security issues.

References:

A.S. Tanenbaum, “Computer Networks”by
Forouzan, “Data Communication and networks”

Database Management Systems

Code: COMP 733 **Credits: 5(3+1+1)**

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 languages, 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.

UNIT- II

Relational Data Model and Languages: 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 Indices, Queries and sub queries, Aggregate functions, Insert, update and delete operations. Set Operations: Union, Intersection, Minus. Join Operations, Cursors in SQL.

UNIT- III

Data Base Design & Normalization: Need of Normalization, Various Functional dependencies, Normal forms: first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using MVD, and JDs, alternative approaches to database design.

UNIT- IV

Transaction Processing Concepts: Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

UNIT- V

Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transactions.

Text book:

1. Korth, Silbertz, Sudarshan, “Database Concepts”, McGraw Hill
2. Elmasri, Navathe, “Fundamentals Of Database Systems”, Addision Wesley

Reference books:

1. Date C J, “An Introduction To Database System”, Addision Wesley
2. Bipin C. Desai, “An introduction to Database Systems”, Galgotia Publication
3. Majumdar & Bhattacharya, “Database Management System”, TMH
4. Ramakrishnan, Gehrke, “Database Management System”, McGraw Hill

Practical list

MS-Access : Creating and Querying tables , Generating forms and reports

Oracle / MS-SQL

1. Write the queries for Data Definition and Data Manipulation language.
2. Write SQL queries using Logical operators (=,<,>,etc.).
3. Write SQL queries using SQL operators (Between…. AND, IN(List), Like, ISNULL and also with negating expressions).
4. Write SQL query using character, number, date and group functions.
5. Write SQL queries for Relational Algebra (UNION, INTERSECT, and MINUS, etc.).
6. Write SQL queries for extracting data from more than one table (Equi-Join, Non-Equi-Join , Outer Join)
7. Write SQL queries for sub queries , nested queries.
8. Write programs by the use of PL/SQL.
9. Practice on ROLL BACK, COMMIT & CHECK POINTS statements.
10. Create VIEWS, CURSORS, and TRIGGERS & write ASSERTIONS.

Object Modeling Techniques and UML

COMP 736 **4(3+0+1)**

Unit I

Introduction, Characteristics of objects, object oriented development, Object Orient themes- Abstraction, Encapsulation, Polymorphism and Inheritance

Unit II

Objects and Classes, Links and Associations, Generalization, Inheritance

Aggregation, Abstract Classes, Generalization as Extension and Restriction, Multiple Inheritance, Metadata, Candidate Keys, Constraints

Unit III

Events and States, Operations, State Diagrams, Concurrency

Advanced Dynamic Modeling Concepts- Entry and Exit Actions, Internal Actions, Automatic Transitions, Sending Events, Synchronization of Concurrent Activities.

Unit IV

Functional Models, Data flow Diagrams, Specifying Operations, Constraints, Relation of Functional to Object and Dynamic Models

Unit V

Introduction to the UML, Use Case Diagrams, Class Diagrams, Interaction Diagrams - Sequence & Collaboration, Activity & State Diagrams, Implementation Diagrams - Component & Deployment

Text Book(s)

Object oriented Modeling and Design with UML, Michael Blaha et. al., Pearson LPE

References

1. Object oriented Modeling and Design, James Rumbaugh et. al., Pearson LPE
2. Object oriented Analysis & Design, Atul Kahate, TMH
3. Visual Modeling with Rational Rose 2002 and UML, Terry Quatrani, Pearson LPE
4. Object Oriented Programming in C $^{++}$, Robert Lafore, Galgotia Pub.
5. Object Oriented Programming in C^{++}, Nabajyoti Barkakati, PHI
6. Object oriented Programming with C^{++}, E. Balaguruswamy, TMH
7. C^{++} How to program, Dietel & Dietel, Pearson Education Asia
8. Problem Solving with C^{++} , Walter Savitch, Pearson Education Asia
9. C++ Primer - Stanley B Lippman, Josee Zajoie, Pearson Education Asia
10. Object-oriented programming using C^{++} , Ira Pohl, Pearson Education Asia

Compiler Design

Code : COMP 837 **Credits : 3 (2+1+0)**

UNIT - I

Introduction: Compilers, compiler and translator, phases of compilers.

Finite Automata & Lexical Analysis: The role of lexical analyzer, Regular Expressions, Finite Automata, regular expressions to finite automata, Implementation of Lexical analyzer, Compiler construction tool - lex.

UNIT - II

Syntactic specification of programming languages: Context free grammar, derivation trees and parse trees

Syntax analysis: The role of syntax analyzer, Basic parsing techniques: Tow down parsing, recursive and non-recursive predictive parser, Bottom-up parsing- Shift reduce parsing, LR parsers, construction of SLR parsing table, Compiler construction tool - yacc**.**

UNIT -III

Syntax Directed Translation: Syntax Directed Translation schemes, Implementation of Syntax Directed Translators, intermediate code, postfix notation, syntax trees, three address code, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser.

UNIT - IV

Code optimization: Introduction to code optimization, the principle sources of optimization, loop optimization basic blocks, flow graphs, loop unrolling, Loop jamming, The DAG representation of basic blocks application of DAGs ,Global data flow analysis

UNIT – V

Symbol table: Basic concept, Data structures for Symbol tables.

Code generation: Issues in the design of a code generator, the target machine, a simple code generator

Text Book:

A.V. Aho, Ravi Sethi, J.D. Ullman, Compilers - Principles, Techniques and Tools, Addison- Wesley Publishing Company.

Reference:

- Allen I. Holub,Compiler Design in C, Prentice Hall of India, 1993.
- Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.

Accounting & Finance Management

Code: BAM 761 **Credits: 3(2+1+0)**

- Basic principles of Accounting
- Preparing books of accounts- Journal, ledger including cash book.
- Trial Balance
- Preparation of financial statements- Balance Sheet, Profit & Loss A/c.
- Bank Reconciliation Statement
- Depreciation
- Financial Statement Analysis: Ratio Analysis
- Functions of Financial Management
- Financial Institutions
- Financial planning & budgeting
- Capital Budgeting

References:

Khan & Jain, “Financial Management”, TMH
I.M. Pandey, “Financial Management” Vikas Publication
Van Horne, “ Financial Management and Policy”

Data Warehousing and Data Mining

MCA

Course Code: COMP – 842 **Credit: 4 (2 + 1 + 1)**

UNIT – I

Data Warehousing.
Introduction, Characteristics of a Data Warehouse, Data Mart, Types of Data Mart, Loading a Data Mart, Metadata for a Data Mart, Data Model for a Data Mart, Maintenance of a Data Mart, Nature of Data in Data Mart, Software components for a Data Mart, Tables in Data Mart, External Data, Reference Data, Performance issues, Monitoring requirements for a Data Mart, Security in Data Mart.

UNIT – II

OLTP and OLAP Systems.
Data Modeling, Star Schema for multidimensional view, Multifact Star Schema, categories of OLAP tools, Managed Query Environment (MQE), OLAP tools and the Internet.

UNIT – III

Data Mining.
Introduction, from Data Warehouse to Data Mining, Steps of Data Mining, Data Mining Algorithms, Database Segmentation, Predictive Modeling, Link Analysis, Tools for Data Mining.

UNIT – IV

Developing Data Warehouses.
Building a Data Warehouse, Data Warehouse architectural strategies, Design considerations, Data content, Metadata distribution of Data, Tools for Data Warehousing, Performance considerations, Crucial decisions in designing a Data Warehouse, Various technological considerations.

UNIT – V
Applications.

Applications of Data Warehousing and Data Mining, National Data Warehouses, Census Data.

References:

1. Data Warehousing – C. S. R. Prabhu, PHI.
2. Data Warehousing and Knowledge Management – Mattison, TMH
3. Data Mining – Claude Seidman, PHI

Artificial Intelligence and Expert System

Comp-843 **4(3+0+1)**

Unit 1: Introduction

Definition of AI, Foundations of AI, Importance of AI, AI Technique, Criteria for Success: Turing test

Unit 2: Knowledge Representation

Definition and Importance of Knowledge, Knowledge based system, Prepositional Logic, Predicate Logic, Clausal form, Resolution, Representing Knowledge using Rules, Dealing with Uncertainty: TMS**,** Fuzzy Logic, Probabilistic Reasoning: Baye's Theorem, Structured Knowledge Representation

Unit 3: Search and Control Strategies

Introduction, Example of search problems, Informed Search, Uninformed Search, Heuristic Search Techniques

Unit 4: Knowledge Acquisition

Definition, Learning: Definition, types of learning

Unit 5: Advance topics

Game Playing, Planning, Natural Language Understanding, Robotics, Expert Systems: Definition, Expert Systems Shell, Rule Based System, Knowledge Acquisition And Validation, Knowledge System Building Tools

Text Book:

1.Artificial Intelligence and Expert System: - Patterson

Reference Books:

1.Artificial Intelligence: - Elaine Rich and Knight
2.Artificial Intelligence, A Modern Approach: - Russell Norvig
3.Lisp: - Patrick Winston, Horn

ADVANCED JAVA PROGRAMMING

COMP 852 **4(2-0-2)**

UNIT I: INTRODUCTION TO BASICS OF JAVA : Features of Java, Object oriented concepts, Data types, Variables, Arrays, Operators, Control statements Classes,. Objects, Constructors, Overloading method, Access control, Static and final methods, Inner Classes, Inheritance, Overriding methods, super abstract class, String class, String objects, String buffer, Char Array

UNIT II: PACKAGES, INTERFACES &THREADS: Packages , Access protection , Importing packages, Interfaces , Exception handling , Throw and throws , Thread , Synchronization, Messaging, Runnable interfaces , Inter thread communication , Deadlock , Suspending, Resuming and stopping threads , Multithreading

UNIT III: APPLETS: Java Utilities, Applets, Working with windows using AWT Classes, AWT Controls, Layout Managers and menus

UNIT IV: INPUT/OUTPUT & NETWORKING: I/O streams, File streams, Networks basics, Socket programming, TCP/IP

UNIT V: ADVANCED TOPICS

SERVLETS: Introduction – Overview of Servlet Technology, Downloading the Java Servlet Development Kit, Handling HTTP GET Requests – Handling HTTP POST Requests, Session Tracking

REMOTE OBJECTS : Introduction to Remote method invocations. Settling up RMI, Parameter passing in remote Methods – Using RMI with Applets – Java IDL and CORBA

TEXT BOOKS

- Naughton and H.Schildt - **"Java 2 - The complete reference"** - Fourth edition.- 2002.

- S. Horstmann, Gary Cornell – "Core Java 2 Volume II – Advanced Features" Addison Wesley.(Chapters : 2,3,5,8)
- Java – How to Program Deitel & Deitel., Third Edition - Pearson Education Asia.- 1999(Chapters :19)

REFERENCE BOOKS

- S.Horstmann, Gary Cornell - "**Core Java 2 Volume I - Fundamentals**" - Addison Wesley – 2001
- Arnold and J.Gosling - "**The java programming language**" - Second edition
- Art Gittleman – "**Ultimate Java Programming**" –Wiley Publications-2002

Operations Research

Code: MAS 721 **Credit : 4(4+0+0)**

- Linear Programming
- Simplex Method
- Duality
- Assignment Problem
- Transportation Problem
- Inventory Models
- Simulation

References:

Hamdy A. Taha, “Operations Research : An Introduction”, PHI

Management Information System

Code: BAM 864 **Credit: 3 (2+1+0)**

- Organizational Foundations of Information System.
- Overview of Management Information System.
- Information Systems and System Organization.
- Technical Foundation of Information Systems.
- Computer and Information Processing.
- Information Systems Software.
- Enterprise-Wide Computing and Networking.
- Building Information System.
- Alternate System Building Methods.
- Management & Organization Support System
- Information and Knowledge Work System.
- Artificial Intelligence.
- Controlling Information System.

References:

Kenneth Laudon & Jane Laudon, "Management Information System", PHI
Davis & Olson, "Management Information System", TMH
Suresh Basandra, "Management Information System" Wheeler Publishing.

Mini Project

Course Code:COMP-799 **Credit: 3(0+0+3)**

The Mini Project is designed to help students develop practical ability and knowledge about practical tools/techniques in order to solve real life problems related to the industry, academic institutions and computer science research. The course Mini Project is one that involves practical work for understanding and solving problems in the field of computing.

.NET Framework & C#

Code: COMP-741 **Credits: 4(2+0+2)**

1. Introduction to .NET Technology & C#

The .NET strategy-Origins of .NET Technology-.NET Framework-Common Language-Runtime-Framework base classes- User and Program interfaces-Visual Studio .NET-.NET Languages-Benefits of the .NET approach.

Evolution-Characteristics-Applications Of C#, Diffrence between C#, C++ and Java. Literals, Variables, Data types of C#.

Decision Making, Branching and looping in C#.

2. Methods

Introduction- Declaration- The main method- invoking methods- nesting of methods-method parameters- pass by value- pass by reference- The output parameters- Variable argument lists- methods of overloading

3. Handling strings, Arrays & Structures in C#

Strings:- Introduction- Creating strings- string methods- inserting and comparing strings-finding substring- mutable string-arrays of string- regular expressions.

Arrays:- Types- The System.Array Class- ArrayList Class-

Structures:- Introduction- Struct with methods- Nested structs.

4. Object Oriented features in C#

Class & Objects: Basic principles of OOP- Defining a class- Adding variables- Adding methods- Member access modifier- creating objects- accessing class members-constructors- static members and constructors- private constructors- Destructors.

Inheritance, Polymorphism and Operator overloading: Introduction to Inheritance-classical, Containment, multilevel and hierarchical inheritance- Abstract class- Abstract method- Polymorphism.

Managing Errors and Exceptions in C#: Types of errors- Exceptions and Handling exceptions- Exception catch handlers- Using finally statement- Nested try block.

5. Multithreading in C#

Introduction- System.Threading Namespace- creating and starting a thread- scheduling a thread- Thread pooling.

Text Books

1. E.Balagurusamy, “Programming in C#” , Second edition, McGraw-Hill

References

1. MSDN, C# Language Specification, Microsoft Press 2001.

SOFTWARE ENGINEERING

COMP 841 **3(2+1+0)**

Unit-I

Introduction: Introduction to software engineering, Importance of software, The evolving role of software, Software Characteristics, Software Components, Software applications, Software Crisis, Software engineering problems, Software Development Life Cycle, Software Process.

Unit-II

Software Requirement Specification: Analysis Principles, Water Fall Model, The Incremental Model, Prototyping, Spiral Model, Role of management in software development, Role of matrices and Measurement, Problem Analysis, Requirement specification, Monitoring and Control.

Software-Design: Design principles, problem partitioning, abstraction, top down and bottom up-design, Structured approach, functional versus object oriented approach, design specifications and verification, Monitoring and control, Cohesiveness, coupling, Fourth generation techniques, Functional independence, Software Architecture, Transaction and Transform Mapping, Component – level Design, Fourth Generation Techniques

Unit-III

Coding: Top-Down and Bottom –Up programming, structured programming, information hiding, programming style and internal documentation.

Testing: Testing principles, Levels of testing, functional testing, structural testing, test plane, test case specification, reliability assessment, software testing strategies, Verification & validation, Unit testing, Integration Testing, Alpha & Beta testing, system testing and debugging.

Unit-IV

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-V

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.

CASE (Computer Aided Software Engineering): CASE and its Scope, CASE support in software life cycle, documentation, project management, internal interface, Reverse Software Engineering, Architecture of CASE environment.

Textbook:

1. Pressman, Roger S., “Software Engineering: A Practitioner’s Approach, McGraw Hill, 2001

References

1. Jalote, Pankaj, “Software Engineering Ed.2”, New Delhi: Narosa 2002
2. Schaum’s Series, “Software Engineering”, TMH
3. Ghezzi, Carlo and Others, “Fundamentals of Software Engineering”, PHI
5. Sommerville, Ian, “Software Engineering”, AWL, 2000
6. Fairly, “Software Engineering”, New Delhi: TMH

Network Programming & Security

Code: COMP 851 **Credit 4 (2+1+1)**

Unit-I
Introduction:
The TCP/IP reference model architecture. Comparison of TCP/IP architecture over OSI reference architecture. Classful & classless addressing. Delivery. Routing of IP Packets. ARP and RARP protocol.

Unit-II
Internet Protocol (IP)
Routing in Internet. Data gram. IP addressing and classes. Direct and Indirect Delivery. Table. Driven IP routing with IP addressing.

Supporting Protocol
Internet Control Protocol: Types of message. Message Format. Error reporting Vs Error Correction.ICMP.Message Delivery. PING.

Unit-III
Transmission Control Protocol
TCP: The need of stream delivery. TCP Ports. Connection and End Points.Passive and Active opens. Segments. Streams and Sequence numbers .TCP Segment Format. Establishing a TCP connection. Closing a TCP connection .TCP connection reset. TCP finite state machine. Reserved TCP port numbers.

Unit-IV
Introduction to Cryptography:
Network security concepts. Security attacks and mechanisms. Cryptography: Symmetric Encryption, Public- Key encryption. Introduction to digital signatures.

Unit-V
Security in internet:
Introduction of concepts in: IP layer security (IP-Sec). Transport layer security (SSL/TSL). Application layer security (e-mail security /PGP). Introduction to firewalls.

Textbook:
Douglas E. Comer “Internetworking with TCP/IP” LPE

Reference Books:
William Stallings, “Cryptography and network security: Principles & Practice”. Prentice Hall.
Forouzan A, “TCP/IP protocol Suite:
Davis R , “ Windows network Programming “, Addison Wesley
Steven R,”Uuix Network programming” PHI

Computer Graphics & Multimedia

Code : COMP 856 **Credits : 4(2+1+1)**

Unit I

Introduction: Definition of computer graphics, Applications, Interactive devices, Graphics hardware.

Output Primitives : Attributes of Output Primitives. points and lines, line drawing algorithms, Circle generating algorithms, Ellipse generating algorithms polynomials and spline curves, polygon filling algorithms

Unit II

2D transformations: 2-D Viewing and Clipping: Viewing transformations, Point Clipping algorithms, Line Clipping algorithms, Polygon Clipping algorithms

2D geometric transformations: Basic transformations (Translation, Rotation, Scaling), Matrix representation and homogeneous coordinates, Composite transformations, Reflection and Shear

Unit III

3D transformations: 3D Viewing Transformation: Projections: Parallel Projection (Orthographic & Oblique Projections, Isometric Projections) , Perspective Projections

3D geometric transformations: Basic transformations, (Translation, Rotation, Scaling), Matrix representation and homogeneous coordinates

3D Object representations: Polygon surface and polygon table, Bezier curves and surfaces

Unit IV

Multimedia:

Concepts and Applications, Multimedia Applications (Education, Video Conferencing, Training….), Multimedia Tools, Multimedia Development Process, Digital representation of data, data compression techniques

Multimedia Elements: Text processing, Pictures and Images, Audio and Video(Analog and Digital Sound and Video, file formats)

Unit IV

Animations:

Basics of Animation, Types of Animation, Simulating Accelerations, Computer Animation Tools

Text Books:

Donald Hearn & Pauline Baker, “Computer Graphics”, Prentice Hall Ltd.
Ranjan Parekh “Principles of Multimedia”, TATA Mc Graw Hill

References:

D.F. Rogers, Procedural Elements for Computer Graphics, McGraw-Hill.

J.D. Foley and A.D. Van, Fundamentals of Interactive Computer Graphics, Addison-Wesley.

Rogers and Adam, Mathematical Elements for Computer Graphics, McGraw-Hill.

Tay Vaughan, “Multimedia: Making it work”, TMH, 1999

Seminar On Emerging Trends

Code: COMP 780 **Credit: 3(0+1+2)**

Objective:

It is devised to enhance the communication skills as well as to enable the students to be updated with the emerging trends. Students are required to research on approved topic and submit their report to concerned faculty member and for presentation.

Seminar

Subject Code : COMP 880 **Subject Credit** : 2(0 +0+2)

Development of creativity and innovation in an industry is crucial for making it competitive in the wake of globalization. Young professionals are expected to work proactively and pragmatically. They need to relish challenges, explore strategic ways to advance the organization's bottom line, manage mature products for profitability and transfer the existing competencies to new products. The only way this can be done is by continuously upgrading professional knowledge, skills and attitudes. Therefore, it is imperative for today's practitioners to have some understanding of the emerging trends in the field of Information Technology and their potential strategic relevance. Provision and promotion of such an understanding is the purpose of this Seminar. The seminar will thus lead to widening the mental horizon and exposure of students to different working environments in the industry.

Project

Subject Code : COMP 899 **Subject Credit** : 12(0 +0+12)

The aim of the project is to give the students an integrated experience in solving a real life problem by applying knowledge and skills gained through out the MCA course. It provides an opportunity for students to realize the importance of resource and time management, ownership of task towards deliverables, innovation and efficiency in task management. It also provides a good opportunity for students to build, enhance and sustain high levels of professional conduct and performance and evolves a problem solving frame of mind. The project also prepares a student for taking up job in industry and elsewhere.

Elective

COMP-871 **4(2-1-1)**

1. Distributed Computing

Unit 1:

Introduction :
Definition, Goals, H/W concepts, S/W concepts, Client-Server Model, Examples of Distributed Systems
Communication:
Layered protocols, Remote Procedure Call, Remote object Invocation, Message-Oriented Communication, Stream-Oriented Communication

Unit 2:

Processes
Threads, Clients, Servers, Code Migration, S/w Agent
Naming:
Naming Entities, Locating Mobile Entities, Removing Un-Referenced Entities

Unit 3:

Synchronization
Clock Synchronization, Logical Clocks, Global State, Election Algorithms, Mutual Exclusion, Distributed Transactions
Consistency and Replication
Introduction, Data Centric Consistency Models, Client Centric Consistency Models, Distribution Protocols, Consistency Protocols

Unit 4:

Fault Tolerance
Introduction, Process Resilience, Reliable Client Server Communication, Reliable Group Communication, Distributed Commit, Recovery
Security
Introduction, Secure Channels, Access Control, Security Management

Unit 5:

Distributed File System
SUN Network File System, CODA File System
Case Study
CORBA, Distributed COM, Globe, Comparison or CORBA, DCOM and GLOBE

Text Book:

1. Concepts and Design: G. Colouris, J. Dollimore and T.Kindberg
2. Distributed Systems: Principles and Paradigms, A. Tannenbaum

Reference Book:

1. Advanced Concepts in Operating Systems: M.Singhal, N. shivaratri

2. MOBILE COMPUTING

COMP-872 **4(2-1-1)**

Unit – I

Introduction: issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

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: Architecture, protocol stack, 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 computing: Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit – V

Ad Hoc networks: Localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Books:

1. J. Schiller, Mobile Communications, Addison Wesley.

References:

1. A. Mehrotra, GSM System Engineering.
2. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
3. Charles Perkins, Mobile IP, Addison Wesley.
4. Charles Perkins, Ad hoc Networks, Addison Wesley.

Distributed Database Management System

Course Code: COMP-873 **Credit: 4(2+1+2)**

Unit-I: Introduction

Architecture of Distributed Systems: A detailed review of distributed system architecture (network operating system, distributed operating systems, etc.) will be presented leading to distributed database systems. This will then be categorized into (a) federated database systems, (b) multidatabase systems, and (c) Client/Server systems.
Advanced Transaction Model: For managing data processing on distributed platform the conventional transaction model needs some improvements. Discussion of some advanced transaction models suitable for different types of distributed database systems.

Unit-II: Workflow

It is a unit of business processing. From conventional viewpoint it is a set of tightly linked atomic processing units which requires special concurrency control and commit protocols. Discussion of existing ways of handling workflows.

Unit-III: Query Processing and Optimization: On distributed systems a query may be fragmented for processing on multiple nodes. This give rise to the problem of query fragmentation and distribution which must be addressed for improving performance.

Unit-IV: Application Distribution: To support parallel and concurrent processing of transactions processing application have to be distributed. This gives rise to application recovery problem. This course will explore new ways of managing application recovery which is more complex than database recovery.

Unit-V: Transaction Management, Commit Protocol and Database Recovery: These are system related issues. We will discuss commonly used schemes and advanced protocols for managing these activities.
Buffer management: Database maintains their own buffer for processing transactions. We will discuss the buffer architecture and buffer management schemes (replacement, allocation, etc.)

Text Book:

1. Distributed Systems: Concept and Design. Coulouris, Dollimore, and Kindberg. AW.

References:

2. Distributed Database Principles and Systems. Ceri and Pelagatti. McGraw Hill.
3. Recovery Mechanisms in Database Systems. Kumar and Hsu, Prentice Hall.
4. Concurrency Control and Recovery in Database Systems. Bernstein, Hadzilacos and Goodman, AW.

4. Advanced Computer Network

COMP-874 **4(2-1-1)**

Unit-I : Cellular Transmission

Radio Frequency communications, wireless services categories line–of-sight. Microwave Transmission, Frequency and characteristics, Wireless, Private Branch Exchange, Wireless Local Area Network, Satellite orbits, and Signal propagation delay, VSAT Satellite voice services. Wireless & mobile computing, cellular system cell, cells for coverage, Cell radius, Mobile switching office, Hands off, Base Station, Frequency reuse and cluster, Micro cell, Microwave link,

Unit-II: EDI & ATM

EDI Layered Architecture, EDI in action, advantage of EDI, Security of EDI messages, Indian Scenario, various types of switches, Crossbar switches, space division switches, Time division switches, Basics of ISDN, Broadband ISDN and ATM, ATM Switches. The knockout switch, Batcher Banyan switch. VLAN (virtual LAN), HDLC, PPP (WAN protocol).

Unit-III : Optical Network

Optical source, Physics of light emission and amplification in semiconductor, LED, Semiconductor lasers, edge-emitting laser. Vertical caving surface emitting laser, modulation of laser light, direct modulation, external modulation, Photoconductor, Photodiode, Optical receiver, Optical fiber, optical transmission FDDI, HPPI, Fast Ethernet.

Unit-IV : Wireless Network

WLL Time division duplex (TDD), FDD, TDMA wireless application protocol, definition of 2.5G and 3G, Overview of 3G GSM, GSM Services, FDMA, Mobile IP, CDMA, Wireless LAN 802.11, HIPER LAN, Blue tooth.

UNIT-V

Key services for the Mobile Internet Characteristics of the Mobile Internet current WAP Technology for Wireless application, HTTP, JAVA, HTML, XMX, Scripting languages overview of WAP Architecture, Network Infrastructure Services supporting WAP Clients, Overview of WML

Text books

1.“Communication and Networkcommunication” by Lewis Mackenzie (McGraw-Hill).
2.“Network Fundamental Concepts and Key Architecture” by Alberto Leon-Garcia & Indra Widjaya (McGrawHill).
3.“Computer Networks “ by Andrew S. Tanenbaum
4.“understanding Data Communication & Networks” by William A. Shay

5. Advanced Computer Architecture

COMP-875 **4(2-1-1)**

Unit 1.
Introduction to Parallelism: Parallel computer models, multiprocessor and multi-computers, multi-vector and SIMD computer, VLSI model, conditions of parallelism, program partitioning and scheduling, parallel processing applications
Processors: Advanced Processor Technology, Superscalar and Vector Processors, VLIW architectures.

UNIT 2.
Pipelining and Superscalar Techniques: Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design

UNIT 3.
Parallel and Scalable Architecture: Multiprocessor system interconnect, multiprocessor connected by a single bus, multiprocessor connected by a network, clusters, designing a cluster, Vector processing principles, multi-vector multiprocessors, Compound vector processing, SIMD computer organization

UNIT 4.
Memory Hierarchy Design: Introduction, Cache memory, Cache performance, reducing cache miss penalty, reducing miss rate, reducing hit time, main memory organization for improving performance, memory technology, virtual memory technology

UNIT 5.
Interfacing processor and peripherals: Introduction, I/O performance measure, Types and characteristics of I/O devices, Buses, interfacing I/O devices to the memory, processor and operating system, Designing and I/O system

Text Books:

1. Kai Hwang, “Advanced Computer Architecture”, McGraw Hill.
2. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/ Software Interface”, Morgan Kaufmann

Reference Books:

1. David A. Patterson and John L. Hennessy, “Computer Architecture: A Quantitative Approach”, Morgan Kaufmann.