

**SRI SAI UNIVERSITY, PALAMPUR**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

**SEMESTER FIRST**

SR. NO.	SUB_CODE	SUBJECT_TITLE	L	T	P	CR.	HRS.
1	MA003	Discrete Mathematics	3	1	0	3.5	4
2	CA001	Computer Organization and Architecture	3	1	0	3.5	4
3	CA003	Problem Solving and Programming in C	3	0	4	5	7
4	CA004	Data and File Sturcture	3	0	2	4	5
5	CA007	Operating System Concepts and Networking	3	0	2	4	5
6	HU001	Communication Skills	2	0	2	3	4
			<b>17</b>	<b>2</b>	<b>10</b>	<b>23</b>	<b>29</b>

**SEMESTER SECOND**

SR. NO.	SUB_CODE	SUBJECT_TITLE	L	T	P	CR.	HRS.
1	CA005	Introduction to Database Management System	3	0	4	5	7
2	CA006	Object Oriented Programming using C++	3	0	4	5	7
3	CA040	Management Information System	3	1	0	3.5	4
4	CA023	Data Communication and Networks	3	1	0	3.5	4
5	BM002	Accountancy and Financial Management	3	1	0	3.5	4
			<b>15</b>	<b>3</b>	<b>8</b>	<b>18.5</b>	<b>26</b>

**SEMESTER THIRD**

SR. NO.	SUB_CODE	SUBJECT_TITLE	L	T	P	CR.	HRS.
1	CA030	Programing in Visual Basic	3	0	4	5	7
2	CA024	Design and Analysis of Algorithms	3	1	0	3.5	4
3	CA014	Internet Concepts and Web Design	3	0	4	5	7
4	CA010	System Analysis and Design	3	1	0	3.5	4
5	MA004	Statistical and Numerical Computing	3	1	2	4.5	6
			<b>15</b>	<b>3</b>	<b>10</b>	<b>21.5</b>	<b>28</b>

**SEMESTER FOURTH**

SR. NO.	SUB_CODE	SUBJECT_TITLE	L	T	P	CR.	HRS.
1	CA015	Computer Graphics	3	0	2	4	5
2	CA028	Advanced Database Management System	3	0	2	4	5
3	CA026	Software Engineering	3	1	0	3.5	4
4	MA005	Operation Research	3	1	0	4	5
5	PM001	Mini Project	0	0	4	2	4
6		Elective - I	3	0	2	4	5
			<b>15</b>	<b>2</b>	<b>10</b>	<b>21.5</b>	<b>28</b>

**SEMESTER FIFTH**

SR. NO.	SUB_CODE	SUBJECT_TITLE	L	T	P	CR.	HRS.
1	CA037	.Net Programming	3	0	4	5	7
2	CA040	Programming with Java	3	0	4	5	7
3	CA029	Enterprise Resource Planning and Tools	3	0	2	4	5
4		Elective - I	3	0	2	4	5
5		Elective - II	3	0	2	4	5
			<b>15</b>	<b>0</b>	<b>14</b>	<b>22</b>	<b>29</b>

**SEMESTER SIXTH**

SR. NO.	SUB_CODE	SUBJECT_TITLE	L	T	P	CR.	HRS.
1	PM002	System Development Project				10	

**LIST OF ELECTIVES**

SR. NO.	SUB_CODE	SUBJECT_TITLE	L	T	P	CR.	HRS.
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**ELECTIVE - I**

1	CA021	E - Commerce	3	0	2	4	5
2	CA018	Artificial Intelligence and Applications	3	0	2	4	5
3	CA027	Advanced Computer Graphics and Animation	3	0	2	4	5
4	CA035	Parallel Computing	3	0	2	4	5
5	CA036	Software Testing and Quality Management	3	1	0	3.5	4
6	CA043	Object Oriented Analysis and Design	3	0	2	4	5

**ELECTIVE - II**

1	CA039	Wireless Networks and Mobile Computing	2	0	4	4	6
2	CA041	System Software	3	1	0	3.5	4
3	CA044	System Simulation and Modelling	3	1	0	3.5	4
4	CA038	J2EE and Applications	3	0	4	5	7
5	CA042	Web Applications and PHP	3	0	4	5	7

## MA003: DISCRETE MATHEMATICAL STRUCTURE

L	T	P	Cr
3	1	0	3.5

**Mathematical Logic:** Statement and notations, normal forms, theory and Inference for statement calculus, predicate calculus, Inference theory for predicate calculus.

**Relations and Functions:** Binary relations, Composition of relations; Equivalence relations and partitions; Transitive Closure, Partially ordered sets and lattice Hasse diagrams; Functions, Injection, Surjection and bijection; Composition of functions.

**Discrete Structures:** Bit vector and Bit Map implementation, Weighting Rule for Disjoint Union (i,j), Collapsing Rule for Find, Application of Set Union-Matrix.

**Graph and Tree:** Introduction to Tree and graph, Adjacency list, Traversal of graph, Breadth First Search, Depth First Search, Spanning Tree, Kruskal's algorithm, Prim's Algorithm. Shortest Path, Topological sort, Activity network.

**Boolean Algebra:** Special types of Lattices, Boolean Algebra, Basic circuits and theorems, Boolean expressions; Logic gates and relation of Boolean function.

**Algebraic structures:** Introduction to algebraic structures, semi groups, Groups and subgroups, Applications of algebra to control structure of a program, congruencies, applications of Congruence.

**Recursion and Recurrence Relations:** Recursive functions, iteration, sequences and discrete functions, Recurrence relations, Generating function and their applications.

### ***Text Books***

1. Trembley, J.P. and Manohar, R., *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw Hill (2008).
2. Doerr, Alan. and Levasseur, K. , *Applied Discrete Structures for Computer Science*, Galgotia Publications (2005)..

### ***Reference Books***

1. Liu, C.L., *Elements of Discrete Mathematics*, Tata McGraw Hill
2. Ram Babu, *Discrete Mathematics*, Vinayak Publications

## CA001: COMPUTER ORGANISATION AND ARCHITECTURE

<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**Basic Computer Organization** Principles of Computer design - Software, hardware interaction layers in computer architecture. Central processing unit. Machine language instructions, Addressing modes, instruction types, Instruction set selection, Instruction cycle and execution cycle.

**Control Unit and Arithmetic Unit:** ALU, data path design, control path design, hardwired control, micro programmed control, micro programming control Vs hardwired control, RISC Vs CISC, hardware implementation of algorithms for addition, subtraction, multiplication and division.

**Pipeline:** Parallel processing, pipeline general consideration, arithmetic pipeline, instruction pipeline, complexities in pipeline, super scalar processing.

**Memory System:** Memory, memory hierarchy, main memory, associative memory, cache memory, virtual memory, architectural tools to implement these different memories.

**Input Output Organization:** Input & output interface, asynchronous data transfer, Modes of transfer, DMA, I/O interrupts, channels.

**Secondary Storage Techniques:** Secondary Storage Systems; Hard Drives Removable Drives Removable Storage Options- Zip, Jaz & Other Cartridge Drives, Recordable CDs & DVDs, CD-R vs CD-RW, Tape Backup

**I/O Technology:** Keyboard ; Mouse; Video Cards; Monitors ; Liquid Crystal Displays (LCD) ; Digital Camera ; Sound Cards; Printers ; Modems; Scanners; Power Supply- SMPS (Switched Mode Power Supply)

**Performance evaluation** - SPEC marks, Transaction Processing benchmarks.

### *Text Books*

1. *Mano, Morris M., Computer System Architecture, Dorling Kindersley*
2. *Hayes, J.P., Computer Architecture and Organization, McGraw Hill*

### *Reference Books*

1. *Patterson, David, A., Hennessy, J.L., and Arpacidusseau, A.C., Computer Architecture – A Quantitative Approach, Morgan Kaufmann Publishers*
2. *Stallings, W., Computer Organization and Architecture: Designing for Performance, PHI*

## CA003: PROBLEM SOLVING AND PROGRAMMING IN C

<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
<b>3</b>	<b>0</b>	<b>4</b>	<b>5.0</b>

**Problem Solving:** Problem - Solving Techniques: Steps for Problem – Solving, Using Computer as a Problem-Solving Tool: Design of Algorithms-Definition, Features of Algorithm, Criteria to be followed by an Algorithm, Top Down Design; Analysis of Algorithm Efficiency: Redundant Computations, Referencing Array Elements, Inefficiency Due to Late Termination, Early Detection of Desired Output Condition, Trading Storage for Efficient Gains

**Introduction to C:** History and salient features of C, structure of C program, writing and compiling C program, Errors – syntax, semantic, linker, logical and runtime. The C preprocessor, #define, #ifdef, Predefined Names Defined by Preprocessor; Macros Vs Functions

**Variables and Constants:** Character Set; Identifiers and Keywords- Rules for Forming Identifiers, Keywords; Data Types and Storage; Data Type Qualifiers; Variables; Declaring Variables; Initialising Variables; Constants-Integer Constants, Floating Point Constants, Character Constants, String Constants, Symbolic Constants

**Operators and Expressions** Assignment Statements, Arithmetic Operators, Relational Operators, Logical Operators, Comma and Conditional Operators, Type Cast Operator, Size of Operator, C Shorthand, Priority of Operators

**Control statements:** Decision Control Statements - The *if* Statement, The *switch* Statement; Loop Control Statements- The *while* Loop, The *do-while* Statement, The *for* Loop, The Nested Loop; The *Goto* Statement; The *Break* Statement; The *Continue* Statement

**Arrays and Strings:** Array Declaration-Syntax of Array Declaration, Size Specification; Array Initialization - Initialization of Array Elements in the Declaration, Character Array Initialization; Subscript; Processing the Arrays; Multi-Dimensional Arrays. Declaration and Initialization of Strings; Display of Strings Using Different Formatting Techniques; Array of Strings; Built-in String Functions and Applications.

**Functions and Pointers:** Definition of a Function; Declaration of a Function; Function Prototypes; The Return Statement; Types of Variables and Storage Classes- Automatic Variables, External Variables, Static Variables, Register Variables; Types of Function Invoking; Call by Value, Recursion. Pointers and their Characteristics; Address and Indirection Operators; Pointer Type Declaration and Assignment- Pointer to a Pointer, Null Pointer Assignment; Pointer Arithmetic; Passing Pointers to Functions - A Function Returning More than One Value, Function Returning a Pointer; Arrays and Pointers; Array of Pointers; Pointers and Strings

**Structures and Unions:** Declaration of Structures; Accessing the Members of a Structure; Initializing Structures; Structures as Function Arguments; Structures and Arrays; Unions; Initializing an Union; Accessing the Members of an Union

**Files:** File Handling in C Using File Pointers - Open a file using the function `fopen ( )`, Close a file using the function `fclose( )`; Input and Output using file pointers - Character Input and Output in Files, String Input / Output Functions, Formatted Input / Output Functions, Block Input / Output Functions; Sequential Vs Random Access Files; Positioning the File Pointer; The Unbuffered I/O - The UNIX like File Routines

**Laboratory Work:** The laboratory work will be based on contents of course material like expression, control statements, functions arrays, strings, pointers, structures, File handling.

### Text Books

1. Kernighan, B.W. and . Ritchie D.M, *The C Programming Language ( ANSI-C version)*, PHI
2. Kanetkar, Y.P. *Let us C*, BPB

### Reference Books

1. Schildt, Herbert, *The Complete Reference C++*, Tata Mcgraw Hill
2. Kaicker, Sudhir, *The complete ANSI C*, BPB

## CA004: DATA AND FILE STRUCTURES

L	T	P	Cr
3	0	2	4.0

**Analysis of Algorithms** - Mathematical Background, Process of Analysis, Calculation of Storage Complexity, Calculation of Run Time Complexity.

**Arrays** ; Arrays and Pointers; Sparse Matrices; Polynomials; Representation of Arrays-Row Major Representation, Column Major Representation; Applications

**Lists:** Abstract Data Type-List; Array Implementation of Lists; Linked Lists-Implementation;Doubly Linked Lists-Implementation; Circularly Linked Lists-Implementation; Applications.

**Stacks:** Abstract Data Type-Stack; Implementation of Stack using Arrays and Stack using Linked Lists; Algorithmic Implementation of Multiple Stacks; Applications

**Queues:** Abstract Data Type-Queue; Implementation of Queue - Array and Linked List Implementation; Implementation of Multiple Queues ; Implementation of Circular Queues- Array Implementation, Linked List Implementation of a circular queue; Implementation of DEQUEUE - Array Implementation of a *Dequeue*, Linked List Implementation of a *dequeue*

**Trees:** Abstract Data Type-Tree; Implementation of Tree; Tree Traversals; Binary Trees; Implementation of Binary Tree; Binary Tree Traversals - Recursive Implementation of Binary Tree Traversals, Non Recursive Implementations of Binary Tree Traversals; Applications

**Advanced Trees:** Binary Search Trees- Traversing a Binary Search Trees, Insertion of a node into a Binary Search Tree, Deletion of a node from a Binary Search Tree; AVL Trees- Insertion of a node into an AVL Tree, Deletion of a node from and AVL Tree, AVL tree rotations, Applications of AVL Trees; B-Trees- Operations on B-Trees ; Applications of B-Trees.

**Searching and Sorting:** Linear Search; Binary Search; Internal Sorting - Insertion Sort, Bubble Sort, Quick Sort, 2-way Merge Sort, Heap Sort; Sorting on Several Keys and their applications.

**Advanced Data Structures:** Splay Trees - Splaying steps, Splaying Algorithm; Red-Black trees- Properties of a Red-Black tree; Insertion into a Red-Black tree; Deletion from a Red-Black tree; AA-Trees

**File Structures:** Terminology; File Organisation; Sequential Files – Structure, Operations, Disadvantages, Areas of use; Direct File Organisation; Indexed Sequential File Organisation

### **Laboratory Work**

Implementation of Stacks, Queues, Linked Lists, Trees, Graphs, Sorting and Searching algorithms.

### *Text Books*

1. Weiss, Mark, A., *Data Structures and Algorithm Analysis in C*, Dorling Kindersley
2. Kruse, R.L., *Data Structures and Program design in C*, Dorling Kindersley

### *Reference Books*

1. Aho, Alfred V., Ullman, Jeffrey D., and Hopcroft, John E., *Data Structures and Algorithms*, Addison Wesley
2. Tenenbaum, A. M., *Data Structures Using C*, Dorling Kindersley
3. Seymour Lipschutz, *Schaum's Outline Series of Theory and problems of data structures*, TMH

## CA007: OPERATING SYSTEM CONCEPTS AND NETWORKING MANAGEMENT

L	T	P	Cr
3	0	2	4.0

**Introduction to Operating System :** Meaning and Evolution of Operating System - Serial Processing, Batch Processing, Multiprogramming; Operating System Structure- Layered Structure Approach, Virtual Machine, Client-Server Model, Kernel Approach. Classification of Advanced Operating System - Architecture Driven Operating System, Application Driven Operating System; Characteristics of Modern Operating System - Microkernel Architecture, Multithreading, Symmetric Multiprocessing

**Introduction to Networking Concepts:** The Topologies; Characteristics of the OSI Layers; OSI Models and Communication between Systems; Interaction between OSI Model Layers; Protocols Types of Networks- Local Area Network (LANs), Metropolitan Networks (MANs), Wide Area Network (WANs); Medium; Data Flow; Physical Connection, Transmission Media; Connecting Devices- Repeaters, Hubs, Bridges, Routers, Gateways

**Internetworking Concept, Architecture and Protocols:** History of internetworking; Packet Switching; Internetworking Concepts; Internet Addresses Object-Based Programming; Configuring IP Addresses; TCP/ IP; Additional TCP/ IP – Related Protocols; Application Layer Protocols- File Transfer Protocols, Trivial File Transfer Protocol (TFTP), TELNET, Remote login, Electronic Mail (Email); World Wide Web; Domain Name System; SNMP and UDP

**Linux Operating System:** Features; drawbacks; and components of Linux- Memory Management Subsystems, Linux Process and Thread Management, File Management System, Device Drivers, : linux Commands ,Utilities and Editor; User to User communication; Unix System Administration – System administration, Installing Linux, booting the system, Maintaining User Accounts, File Systems and Special Files, Backups and Restoration.

**Windows 2000:** Windows 2000 Operating System Architecture - Peer-To-Peer Network-Domains, Network Protocols, File Services, Shared Folders, Distributed File System, Print Services; Using the Mapped Drive - Printing a Mapped Drive, Disconnecting a Mapped Drive, Viewing Directory Information, Creating a Shared Folder, Logging off a Client. Using Windows 2000 and Client-Logging on to the Network, Browsing Network Resources 1, Accessing Network Resources Using My Network Places, Mapping a Folder; Advanced Windows 2000 Networking -Windows 2000 Domains, Workgroups & Trusted Relationships- Concept of Domains, Trust Relationships, Building Domains; User Administration; Remote Access. Introduction to Windows XP Networking - TCP/IP Protocol Setting for Windows XP, To Select a Network Protocol, Virtual Private Networks and Remote Networking; Windows XP in File System; Sharing Network Resources in Windows XP- Sharing Files Folders and drives in Windows XP; Enabling Offline File Features.

**Security and Management:** Goals of Computer Security; Security Problem and Requirements; Threat and Vulnerabilities; User Authentication; Security System and Facilities- System Access Control, Password Management, Privileged User Management, User Account Management, Data Resource Protection, Sensitive System Protection; Cryptography ; Intrusion detection; Computer-Security Classifications. Computer Security- Hardening Operating System and Application Code, File System Security, Local Security Policies, Services, Default Accounts, Network Activity- Malicious Code, Firewall; Fault Tolerant system; BACKUP and UPS

**Main Issues In Windows Security Management-** Physical Security Management, Logon Security Management, Users and Groups Management, Managing Local and Global Groups, Managing User Accounts, Windows NT Domain Management; Domain Controller-the Primary Domain Controller (PDM), Backup Domain Controller (BDC); Windows Resources Management; Registry management; Printer Management; Managing Windows 2000 Operating System; Active Directory- Logical Structure, Physical Structure; Windows 2000 DNS Management; Managing Group Policy

**Laboratory Work:** The laboratory work will be based on contents of course material like – Windows, Linux/Unix, installation and management of users on windows 2000.

**Text Books**

1. Comer D. E. , *"Inter Networking with TCP/IP: Principles, Protocol And Architecture"*, PHI
2. Janet Valade, *" Spring into Linux"* PE.
3. Michael Bech, Harold Bohma... *"Linux Kernel Programming"*, PE
4. Johnson M. Hart *"Windows System Programming"*PE

**Reference Books**

- 1 Nameth Hein , et. All *" Linux Administration Hand book"*PE



## HU001: COMMUNICATION SKILLS

L T P Cr

2 0 2 3.0

**The Process of Communication:** Concept and process of communication; Barriers to Communication; Different Types of Communication; Written vs. Oral Communication; Different Types of Face-to-Face Interactions; Characteristics and Conventions of Conversation; Difference between Conversation and Other Speech Events;

**Telephone Techniques:** Warm Up; Speaking and Listening; Commonly Used Phrases in Telephone Conversations; Reading: Conference Calls; Vocabulary; Writing and Listening: Leaving a Message; Grammar and Usage- The Perfect Tenses; Pronunciation- Contracted Forms.

**Job Applications and Interviews:** Vocabulary-Apply for a Job; Curriculum Vitae; Language Focus; Some Useful Words; Study Skills-Preparing for an Interview; Listening; Speaking; Writing.

**Group Discussions:** Reading; Writing Skills; Listening: How to be Successful in a Group Discussion; Study Skills ; Language Focus; Vocabulary; Speaking; Connectives; Pronunciation. Case discussions.

**Managing Organisational Structure:** Ability to Influence and Lead; The Role of a Manager; Vocabulary-Leadership; Speaking and Listening; Writing: Reports, Business letters, Internal Communication; Pronunciation.

**Meetings:** A Successful Meeting; Speaking: One to One Meetings; Language Focus: Opening, Middle and Close; Study Skills- Editing; Listening: Criteria for Successful Meetings; Vocabulary; Grammar: Reporting Verbs; Writing: Memos; Pronunciation: Stress According to Part of Speech.

**Taking Notes and Preparing Minutes:** Taking Notes- The Essential Components, Preparing Minutes- Format of Minutes, Language and Style of Minutes, Using the Passive Voice.

**Presentation Skills :** Reading: Presentation Skills; Grammar-Verbs often Required in Presentations; : Importance of Body Language in Presentations; Speaking- Preparing an Outline of a Presentation; pronunciation; Structure of presentation; Visual Aids; Ending the Presentation; Listening: Podium Panic Pronunciation: Emphasizing the Important Words in Context

**Negotiation Skills:** Idiomatic Expressions; Process of Negotiations; Phrasal Verbs; Listening: Effective Negotiations; Speaking; Writing

**Practice Sessions:** Students should be asked to prepare and present seminars during the practice session. Group discussions and case discussions should also be used and feedback given to students.

### **Text Books:**

1. Sen, L., *Communication Skills*. PHI
2. Dhar, M., *The Funda of Mixology: What bartending teaches that IIM does not*, Srishti Pub.

### **Reference Books:**

1. Lesikar R. V., and Flatley M. E., *Basic Business Communication Skills for empowering the internet generation*. TMH
2. Sharma R. C., and Mohan K., *Business Correspondence and Report Writing*, TMH
3. Rodrigues, M. V., *Effective Business Communication*. Concept Publishing Company.

## CA005: INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

L	T	P	Cr
3	0	2	4.0

**Basic Concepts:** Need for a Database Management System - The file based system, Limitations of file based system, The Database Approach; The Logical DBMS Architecture - Three level architecture of DBMS or logical DBMS architecture, Mappings between levels and data independence, The need for three level architecture; Physical DBMS Architecture- DML Precompiler, DDL Compiler, File Manager, Database Manager, Query Processor, Database Administrator, Data files indices and Data Dictionary, Commercial Database Architecture, Data Models

**Relational and ER Models:** The Relational Model- Domains, Attributes, Tuple and Relation, Super keys Candidate keys and Primary keys for the Relations; Relational Constraints- domain, Key and integrity, Dealing with Constraint Violations; Relational Algebra- Basic Set Operation, Cartesian Product, Relational Operations; Entity Relationship (ER) Model- Entities, Attributes, Relationships; E-R Diagram; Conversion of E-R Diagram to Relational Database.

**Database Integrity and Normalization:** Relational Database Integrity- The Keys, Referential Integrity, Entity Integrity; Redundancy and Associated Problems; Single-Valued Dependencies; Single-Valued Normalisation- The First Normal Form, The Second Normal Form, The Third Normal Form, Boyce Codd Normal Form; Desirable Properties of Decomposition - Attribute Preservation , Lossless-join Decomposition, Dependency Preservation, Lack of redundancy; Rules of Data Normalisation - Eliminate Repeating Groups, Eliminate Redundant Data, Eliminate Columns Not Dependent on Key

**File Organisation in DBMS:** Physical Database Design Issues; Storage of Database on Hard Disks; File Organisation and Its Types - Heap files (Unordered files), Sequential File Organisation, Indexed (Indexed Sequential) File Organisation, Hashed File Organisation; Types of Indexes; Index and Tree Structure; Multi-key File Organisation<sup>99</sup> - Need for Multiple Access Paths, Multi-list File Organisation, Inverted File Organisation; Importance of File Organisation in Databases

**Structured Query Language and Transaction Management:** What is SQL?; Data Definition Language; Data Manipulation Language; Data Control; Database Objects: Views, Sequences, Indexes and Synonyms; Table Handling; Nested Queries. The Transactions; The Concurrent Transactions; The Locking Protocol- Serialisable Schedules, Locks, Two Phase Locking (2PL); Deadlock and its Prevention; Optimistic Concurrency Control. Recovery- Kinds of failures, Failure controlling methods, Database errors; Recovery Techniques; Security & Integrity- Relationship between Security and Integrity, Difference between Operating System and Database Security; Authorization.

**Distributed and Client Server Databases:** Need for Distributed Database Systems; Structure of Distributed Database; Advantages and Disadvantages of DDBMS; Design of Distributed Databases- Data Replication, Data Fragmentation; Client Server Databases- Architecture, Computing, Structure and Advantages

**Application Development: Development of a Hospital Management System:** Need, Creating a Database for HMS; Developing Front End Forms; Reports ; Using Queries and Record set.  
Issues relating to Software Development, Testing and Maintenance

**Laboratory Work:** The laboratory work will be based on contents of course material – design of databases and query in SQL using any database package.

### Text Books

- 1 Elmasri, R, Navathe S.B., *Fundamentals of Database Systems*, Addison Wesley
- 2 Korth, H.F., Silberschatz, S., Sudarshan, A., *Database Systems Concepts*, McGraw Hill
- 3 Date, C.J., *An Introduction to Database Systems*, Dorling Kindersley

### Reference Books

- 1 Garcia-Molina, Hector, Ullman, J.D. and Widom, J.D., *Database Systems: The Complete Book*, Dorling Kindersley
- 2 Desai, Bipin C., *An Introduction to Database Concepts*, Galgotia Publication

## CA006: OBJECT ORIENTED PROGRAMMING USING C++ AND JAVA

L	T	P	Cr
3	0	4	5.0

**Introduction:** Object Oriented vs. Procedural Programming ,OOP Features & Benefits, Identifying Object Classes, Class Identification Example, Sample C++ Class Definition, Enhancement of C++ over C.

**Classes and Objects:** Defining member functions, Members access control, Use of scope resolution operator, Inline functions, Nesting of member functions, Static data members, Static member functions, Array of objects, Friend functions.

**Constructors and Destructors:** Types of constructors- default, parameterized and copy constructors, Dynamic constructors. Destructors for destroying objects, new and delete operators.

**Operator Overloading and Type Conversions:** Overloading unary, binary operators, Operator overloading using friend functions, Rules for overloading operators, Type conversions.

**Inheritance:** General concepts of Inheritance, Types of derivation. Types of inheritance. Constructors in derived classes, Containership, Polymorphism with pointers, Pointers, Virtual functions and Polymorphism.

**Files and Streams:** Streams, Unformatted and Formatted I/O operations, Managing output with manipulators, File Streams, opening, reading, writing to file.

**Templates and Exception Handling:** Class templates and function templates, overloading of template functions, Basics of exception handling, Exception handling mechanisms.

**Java:** Primitive Data Types and Variables, Operators, Expressions and Statements, Decision and Interactive Constructs, Classes and Objects, Inheritance and Polymorphism, Packages and Interfaces, Exception handling, I/O in Java, Strings and Characters, Exploring Java I/O, Introduction to Applets, Graphics and User Interfaces, Networking Features and Java Servlets.

### **Laboratory Work**

Implementation of object-oriented features using C++ and Java including inheritance, overloading, Polymorphism, Visual Programming etc.

### *Text Books*

- 1 *Balaguruswamy, E., Objected Oriented Programming with C++, Tata McGraw Hill.*
- 2 *Cornell, Gary, and Horstmann, Cay, S., Core Java 2 Vol I- Fundamentals PHI*
- 3 *Cornell, Gary, and Horstmann, Cay, S., Core Java 2 Vol II- Advanced features , PHI*

### *Reference Books*

- 1 *Deitel, H.M. and Deitel,P.J., C++ How to Program, PHI*
- 2 *D. Ravichandran, Programming with C++, TMH*

## CA010: SYSTEM ANALYSIS AND DESIGN

<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
<b>3</b>	<b>1</b>	<b>2</b>	<b>4.5</b>

**Introduction to System Development:** Categories of Information Systems, Structured Analysis Method, System Prototype Method, Succeeding as System Analyst., Systems Development Life Cycle. Concept and Models requirements determination. Logical design. Physical design, communication, interviewing, presentation skills; group dynamics; group-based approaches. JAD structures walkthroughs.

**Requirement Analysis:** Basic Requirements, fact-Finding Techniques, Various Tools: Data Flow Diagrams, Data Dictionaries, Decision Tables, Decision Trees; Feasibility Study, feasibility considerations, steps in feasibility analysis, Cost and benefit analysis, Procedure for cost and benefit determination.

**Design:** System design considerations, Process and stages of system Design: Logical and Physical, selection of best alternate design strategy, Design of Input: Capturing data for Input, Input, validation, Design of Output: Output objectives, Types of Output, Presentation format of Output, user interface design.

**System Engineering and Quality Assurance:** Program Structure Chart, Purpose, Data Passing, Quality Software Design: Top Down Structure, Coupling, Cohesion, Span of Control, Module Size, and Shared Modules.

**Testing:** Managing Testing practices, Testing Strategies, Levels of Testing

**System Implementation:** Training, Conversion Methods,

**Computer Aided System/Software Engineering Tools:** Role and Benefit of CASE Tools, Categories of Automated Tools, Various components of CASE tools, CASE Repository.

**Design and Implementation of OO Platforms:** Object oriented analysis and design through object modeling technique, object modeling, dynamic modeling and functional modeling, object oriented design and object oriented programming systems for implementation, Unified Modeling Language.

**Case Study of Some Common Systems:** Inventory Control, Laboratory Management Systems, Hotel Reception System, Hospital Management System etc

The course should be based on lectures, case analysis and laboratory work. Cases should be used to illustrate each major topic in the course.

### **Laboratory work**

The laboratory work will be based upon the major assignment based upon the various case study like- Inventory control, Hospital management, Library management, Railway/ airline reservation, Banking system, Loan management etc.

### *Text Books*

- 1 Senn, James A., *Analysis and Design of Information Systems*, TMH
- 2 Rumbaugh, James, Jacobson, Ivar, and Booch, Grady, *Unified Modeling Language Reference Manual*, Addison-Wesley Object Technology Series

### *Reference Books*

- 1 Hoffer, Jeffrey, A., George, Joey, F. and Valacich, Joseph, S., *Modern Systems Analysis and Design*, Pearson Education
- 2 Whitten, J.L., and Bentley, L.D., *System Analysis and Design Methods*, TMH

## CA014: INTERNET CONCEPTS AND WEB DESIGN

L	T	P	Cr
3	0	4	5.0

### Scripting Languages:

**The Internet:** Classification of Networks; Networking Models ; Packet Switching; Accessing the Internet; Internet Protocols- Internet Protocol (IP), Transmission Control Protocol (TCP); Internet Address- Structure of Internet Servers Address, Address Space; How does the Internet work; Intranet & Extranet; Internet Infrastructure; protocols and Services on Internet - Domain Name System, SMTP and Electronic Mail, Http and World Wide Web, Usenet and Newgroups, FTP, Telnet, Internet Tools, Search Engines, Web Browser

**Introduction to HTML:** What is HTML; Basic Tags of HTML- HTML Tag, TITLE Tag, BODY Tag; Formatting of Text – Headers, Formatting Tags, PRE Tag, FONT Tag, Special Characters; Working with Images; META Tag;

**Advanced HTML:** Links- Anchor tag; Lists- Unordered Lists, Ordered Lists, Definition Lists; Tables - TABLE, TR and TD Tags, Cell Spacing and Cell Padding, Colspan and Rowspan; Frames – Frameset, FRAME Tag, NOFRAMES Tag; Forms- FORM and INPUT Tag, Text Box, Radio Button, Checkbox, SELECT Tag and Pull Down Lists, Hidden, Submit and Reset; Some Special Tags – COLGROUP, THREAD, TBODY, TFOOT, \_blank, \_self, \_parent, \_top, IFRAME, LABEL, Attribute for <SELECT>, TEXTAREA.

**Introduction to JavaScript:** JavaScript Variables and Data Types- Declaring Variables, Data Types; Statements and Operators; Control Structures- Conditional Statements, Loop Statements; Object-Based Programming – Functions, Executing Deferred Scripts, Objects; Message box in Javascript- Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes; Javascript with HTML – Events, Event Handlers; Forms- Forms Array.

**VB Script:** What is VBScript; Adding VBScript Code to an HTML Page - VB Script Basics, VBScript Data Types, VBScript Variables, VBScript Constants, VBScript Operators; Using Conditional Statements; Looping Through Code; VBScript Procedures; VBScript Coding Conventions; Dictionary Object in VBScript- Methods and Object Properties; Err Object - Methods and Properties.

**Dreamweaver:** Using Dreamweaver; Create a Site Home Page; Design a Page in Layout View; Insert Images; Insert Text; Work in Standard View; View the Site Files; Link your Documents;

**Laboratory Work:** The laboratory work will be based on contents of course material like – web designing using HTML, JavaScript, VBScript and Dreamweaver.

### *Text Books*

1. Raj Kamal, *Internet and Web Technology*, TMH
2. P. Naughton and H.Schildt, *The Complete Reference Java 2*, TMH

### *Reference*

- 1 Margaret Leaven Young, *The Complete reference Internet Millennium Edition* ,TMH

## BM002: ACCOUNTANCY AND FINANCIAL MANAGEMENT

L	T	P	Cr
3	1	0	3.5

**Accounting System:** Scope of Accounting; Accounting as an Information System; Role and Activities of an Accountant; Accounting Personnel; Nature of Accounting Function; Organisation Chart for Accounting and Finance.

**Accounting Concepts and Standards:** Accounting Framework; Concepts; Standards; Accounting Principles (GAAP); Attempts towards Standardization; Accounting Standards in India

**Basic Accounting Process: Preparation of Journal, Ledger and Trial Balance:** Accounting Equation; Classification of Accounts; Definitions of Journal and Ledger- Journalising Process , Ledger Posting, Balancing an Account; Trial Balance- Objectives, Total and Balance Method of Preparing the Trial Balance, Limitations of Trial Balance; Accounting Cycle

**Preparation and Analysis of Final Accounts:** Trading Account; Profit And Loss Account; Difference between Trading and Profit & Loss Account; Balance Sheet; Constructing a Balance Sheet; Classification of Balance Sheet's Items; Adjustment Entries- Closing Stock, Depreciation, Bad Debts, Provision for Bad and Doubtful Debts, Salaries and Wages, Outstanding Expenses, Prepaid Expenses, Accrued Income, Income Received in Advance,

**Funds Flow and Cash Flow Statements:** Statements of changes in Financial Positions; Fund Flow Statement; Analyzing Changes in Working Capital; Sources of Funds; Uses (Applications) of Funds; Cash Flow Statement; Sources and Uses of Cash

**Ratio Analysis :** Long-term Solvency Ratios, Short-term Solvency Ratios, , Activity or Turnover Ratios, Profitability Ratios, Market Test Ratios

**Introduction to Financial Management:** Evolution and Significance of Financial Management; Principles of Financial Management, Agency Relationship

**Time Value of Money and Investment Decisions:** Determining The Future Value, Annuity

**Working Capital Management:** Characteristics of Current Assets; Operating Cycle Concepts, Factors Influences Working Capital Environment, Estimating working capital Requirement. **Cash and Treasury Management-** Treasury Risk Management, Functions of Treasury Department; Cash Management- Motives for Holding Cash, Cash Planning, Determining the Optimum Cash Balance; Methods of Cash Flow Budgeting; Investing Surplus Cash; Cash Collection and Disbursements.

**Receivables Management:** Terms of Payment, Credit Policy Variables, Credit Evaluation, Monitoring Receivables, Factoring., **Inventory Management-** Reasons for Holding Inventory, Objectives of Inventory Management, Techniques of Inventory Control, Modern Techniques , Traditional Techniques.

### Text Books

1. J.C.Katyal, " Principles A Book-Keeping".
2. Jain and Narang, " Principles of Accounting".
3. I.M.Pandey, " Financial Management, Vikas Publications.

### Reference Books

1. P.H.Barrett, " Computerized Accounting", BPB.

## CA023: DATA COMMUNICATION AND NETWORKS

L	T	P	Cr
3	1	2	4.5

**Introduction to Computer Networks:** What is computer Network?, Network Goals / Motivation; Application of Networks; Point to Point or Switched Networks - Circuit Switched Networks, Packet-Switched Networks; Broadcast Networks - Packet Radio Networks, Satellite Networks, Local Area Networks; Network Protocols; Networking Model

**Data Transmission :** Transmission Terminology- Simplex, Half duplex & full duplex spectrum and Bandwidth, frequency; Serial & Parallel Communication; Analog and Digital Data Transmission; Bandwidth & Data Rate Throughput; Transmission Impairments - Attenuation and Distortion, Delay Distortion, Noise, Concept of Delays, How to reduce delays. Transmission Media and its Characteristics- Twisted Pair, IBM Cable, Coaxial Cable, Twin Axial Cable, Optical Fiber, Terrestrial Microwave, Satellite Microwave; Wireless Transmission – Radio, Infra red, Wireless LAN

**Data Encoding & Communication Technique:** Pulse Code Modulation (PCM) ; Amplitude ; Modulation; Frequency and Phase Modulation; Asynchronous Transmission; Synchronous Transmission

**Multiplexing and Switching:** Frequency Division Multiplexing; Synchronous Time Division Multiplexing; Statistical Time Division Multiplexing; Modems; Switching. Media Access Control and Data Link Layer

**Media Access Control and Data Link Layer :**Data Link Layer Fundamentals- Framing; Basics of Error Detection; Forward Error Correction; Cyclic Redundancy Check codes for Error Detection; Flow Control; Retransmission Strategies- Stop-&-Wait ARQ; Go-Back-NARQ; Selective Repeat ARQ; Pipelining; Contention-based Media Access Protocols- The advantages of Multiple-Access Sharing of Channel Resource; Pure ALOHA; Slotted ALOHA; Carrier Sense Multiple Access (CSMA); CSMA with Collision Detection (CSMA/CD); Polling-based Media Access Control Protocols- Token Ring, Token Bus; Media Access Control Protocols for High Speed Networks- FDDI-I and FDDI-H; DQDB with Bandwidth Balancing for Fair Access; Asynchronous Transfer Mode (ATM)

**Network Layer: Introduction to Layer Functionality and Design Issues-** Connection Oriented Vs Connectionless Services, Addressing, Concept of Congestion, Routing, Network Layer in ATM Protocols, Network Layer Design Issues; **Routing Algorithms** - Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing Multicast Routing. **Congestion Control Algorithms** - General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual Circuit Subnets, Load Shedding, Jitter Control; **Internetworking & Network Layer in the Internet** – Tunneling, Internetworking Routing, Fragmentation, IP Protocol, IP Addresses, Internet Control Protocols, OSPF – The Interior Gateway Routing Protocol, BGP – The Exterior Gateway Routing Protocol, Internet Multicasting, Mobile IP, IPv6

**Transport Layer and Application Layer Services: Transport Services and Mechanism-**Type of Services, Quality of Services, Data Transfer, Connection Management Transport Control Mechanism, Addressing, Multiplexing, Flow Control and Buffering, Connection Establishment, Crash Recovery;

**TCP/UDP-** Introduction to UDP, Remote procedure Call, The Real-Time Transport Protocol, Introduction to TCP, TCP Service Model, TCP Protocol, TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management. **Network Security** - Symmetric Key Algorithms, Public Key Algorithms, Digital Signatures, Management of Public Keys, Communication Security, Web Security

**Text Books:**

1. Forouzan, B.A., *Data communications and networking*, TMH
2. Tannenbaum, A.S., *Computer Networks*, Pearson Education

**Reference Books:**

- 1 Stalling, W., *Data and Computer Communication*, Pearson Education
- 2 Antonako, J.L. and Mansfield, K.C., *An Introduction to Computer Networking*
- 3 William Stallin Maxwell, “ *Data And Computer Communication*”,
- 4 D.E. Corner, “*Inter Networking With TCP/IP: Principles, Protocol And Architecture*”,



## CA024: DESIGN AND ANALYSIS OF ALGORITHMS

L	T	P	Cr
3	1	0	3.5

**Introduction and Models of Computation:** Quick revision of Data Structures-stacks, queues, trees, heaps, sets and graphs. Algorithm Definition, Analysing algorithms, order arithmetic, time and space complexity.

**Algorithm Design Techniques:** Divide and Conquer: general method, binary search, merge sort, quick sort, selection problem. Greedy method: Job Sequencing, Knapsack problem, optimal merge patterns, minimum spanning trees.

**Dynamic Programming:** Use of table instead of recursion, all pair shortest path, 0/1 knapsack, optimal binary search tree, traveling salesperson problem,

**Search And Traversal:** Search techniques: breadth first search, depth first search, code optimization.

**Backtracking:** 8 queens problem, sum of subsets, graph coloring, knap sacking problem.

**Integer Programming:** Branch and Bound Algorithm: 0/1 knapsack problem, Traveling salesperson problem.

**Lower Bound Theory:** Comparison trees for sorting and searching, Oracles and adversary arguments, techniques for algebraic problems.  
Internal And External Sorting And Merging Techniques.

**Problem Cases:** P, NP, NP- Hard and NP-complete, deterministic and non deterministic polynomial time algorithm approximation, algorithm for some NP complete problems.

### *Text Books*

1. Horowitz, Ellis, Sahni, S. and Rajasekaran, S., *Fundamentals of Computers Algorithms*, University Press
2. Cormen, Thomas, H., Leiserson, Charles E., Rivest, Ronald L., Stein, Clifford, *Introduction to Algorithms*, MIT Press

### *Reference Books*

1. Levitin, Anany, V., *Introduction to the design and analysis of algorithms*, Addison Wesley Aho,
2. A.V., Hopcraft, J.E. and Dulman, J., *Design and Analysis Algorithms*, Dorling Kindersley

## CA025: OPERATING SYSTEMS

L	T	P	Cr
3	0	2	4.0

### Introduction

Evolution of operating systems. Types of operating systems. Different views of the operating system, operating system concepts and structure.

### Processes

The Process concept, systems programmer's view of processes. The operating system services for process management. Scheduling algorithms. Performance evaluation.

### Memory Management

Memory management without swapping or paging, swapping, virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging systems, segmentation.

### Interprocess Communication and synchronization

The need for interprocess synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion. queuing implementation of semaphores, classical problems in concurrent programming, critical region and conditional critical region, monitors, messages, deadlocks.

### File Systems

File systems, directories, file system implementation, security protection mechanisms.

Input/Output

**Principles of I/O Hardware:** I/O devices, device controllers, direct memory access.

**Principles of I/O Software :** Goals, interrupt handlers, device drivers, device independent I/O software. User space I/O software.

**Disks:** Disk hardware, scheduling algorithms, Error handling, trac-at-a-time caching, RAM Disks.

**Clocks:** Clock hardware, memory mapped terminals, I/O software. Terminals: Terminal hardware, memory mapped terminals, I/O software.

**Processes and Processors in Distributed Systems:** Threads, system models, processor allocation, scheduling.

**Distributed File Systems:** Design, implementation, trends.

### Performance Measurement, monitoring and evaluation

Introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.

**Case Studies:** MS, DOS. MS WINDOWS, LINUX (UNIX) operating system.

### Text Books

1. Galvin, P. and Silberschatz, A *Operating systems concept with Java*, Addison Wesley
2. Nutt, Gary J. *Operating Systems- A Modern Perspective*, Pearson Education

### Reference Books

1. Dhamdhere, D.M., *Operating Systems - A Concept-Based Approach*, TMH

## CA026: SOFTWARE ENGINEERING

	<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
<b>Prerequisite(s): None</b>	<b>3</b>	<b>0</b>	<b>4</b>	<b>5.0</b>

**A Generic view of Software Engineering:** Process Models, Software Requirements, Fundamentals, Requirements Process, Requirements Elicitation, Requirements Analysis, Requirements Specification, Requirements Validation, Practical Considerations

**Software Design:** Software Design Fundamentals, Key Issues in Software Design, Software Structure and Architecture, Software Design Quality Analysis and Evaluation, Software Design Notations, Software Design Strategies and Methods.

**Software Construction and Maintenance:** Software Construction Fundamentals, Minimizing Complexity, Anticipating Change, Constructing for Verification, Standards in construction, Managing Construction: Construction Models, Construction Planning, Construction Measurement, Practical Considerations: Construction Design, Construction Testing, Reuse, Construction Quality, Integration Software Maintenance Fundamentals, Key Issues, Maintenance Process, Techniques for Software Maintenance

**Software Configuration Management:** SCM Process, Organizational Context for SCM, Constraints and Guidance for SCM Process, Planning for SCM, Software Configuration Identification, Identifying Items to be controlled, Software Configuration Control, Software Configuration Status Accounting, Software Configuration Auditing, Software Release Management and Delivery

**Software Testing:** Fundamentals, Levels of Testing, Testing Techniques, Testing Strategies

**Software Engineering Tools and Methods:** Software Requirements Tools, Software Design Tools, Software Construction Tools, Software Maintenance Tools, Software Configuration Management Tools, Software Engineering Process Tools, CASE Environments, Miscellaneous Tools

### **Laboratory work**

Study of Rational Rose software including UML diagrams like class diagram, State diagram, Activity diagram, Competent diagram, Use case diagram.

### *Text Books*

1. *A Guide to the Software Engineering Body of Knowledge (SWEBOK), IEEE Computer Society, (<http://www.nt.fh-koeln.de/fachgebiete/inf/nissen/softeng/swebok.pdf>)*
2. *Pressman, Roger S., Software Engineering: A Practitioner's Approach, McGraw Hill*

### *Reference Books*

1. *Peters, James F. and Pedrycz, Witold, Software Engineering - An Engineering Approach, John Wiley*
2. *Sommerville, Ian, Software Engineering, Pearson Education*
3. *Jalote, Pankaj, An Integrated Approach to Software Engineering, Narosa*

## MA004: STATISTICAL AND NUMERICAL COMPUTING

L	T	P	Cr
3	1	2	4.5

**Combinatorics:** Permutation and Combination, Repetition and Constrained Repetition, Binomial Coefficients, Binomial Theorem.

**Probability:** Definition of Probability, Conditional Probability, Baye's Theorem  
[No. of Hrs: 10]

**Pseudo Random Number Generation:** Uniform Distribution- Method of Generation (Discrete Case), Inversion Method (Exponential Distribution), Acceptance and Rejection

**Probability Distributions:** Review of Mean & Standard Deviation, Mathematical Expectation, Moments, Moment Generating Functions, Binomial, Poisson and Normal Distributions.

**Correlation:** Karl Person Coefficient of Correlation, Spearman's Rank Correlation, Least Square Method: Straight Line, Parabola and Exponential Curves: Regression Analysis.  
[No. of Hrs: 15]

**Floating Point Arithmetic and Errors:** Floating Point Representation; Sources of Errors; Propagated Errors

**Interpolation:** Operators: Shift, Forward Difference, Backward Difference Operators and their Interrelation, Interpolation Formulae-Newton's Forward, Backward and Divided Difference Formulae: Lagrange's Formula.

**Solution Of Non Linear Equation:** Bisection Method, False Position Method, Newton – Raphson Method for Solving Equation Involving One Variable only.  
[No. of Hrs: 12]

**Solution Of Linear Simultaneous Equations:** Gaussian Elimination Method with and without Row Interchange: LU Decomposition: Gauss - Jacobi and Gauss-Seidel Method; Gauss – Jordan Method and to find Inverse of a Matrix by this Method.

**Numerical Differentiation-** First and Second Order Derivatives at Tabular and Non-Tabular Points, Numerical Integration, Trapezoidal Rule, Simpsons 1/3 Rule: Error in Each Formula (without proof).  
[No. of Hrs: 12]

### Text Books

1. Hogg, Robert V., Tanis, Elliot A. and Rao, Jagan M., *Probability and Statistical Inference*, Prentice Hall
2. Conte, S.D and Carl D. Boor, *Elementary Numerical Analysis: An Algorithmic approach*, TMH
3. Johnson, R., Miller, I. and Freund, J., *Miller and Freund's Probability and Statistics for Engineers*, Pearson Education
4. S.S. Sastry, "Numerical Analysis PHI

### Reference Books

1. Meyer, P.L, *Introductory Probability and Statistical Applications*, Addison Wesley Press
2. Gerald C.F and Wheatley P.O., *Applied Numerical Analysis*, Pearson Education
3. Mathew, J.H., *Numerical Methods for Mathematics, Science and Engineering*, Prentice Hall Inc
4. Jain M.K., Iyengar, S.R.K., and Jain, R.K. *Numerical Methods for Scientific and Engineering Computation*, New Age International

## CA015: COMPUTER GRAPHICS & MULTIMEDIA

L	T	P	Cr
3	0	2	4.0

**Introduction:** The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Applications, Development of Hardware and Software for Computer Graphics, Conceptual Framework for Interactive Graphics, Overview, Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses.

**Graphics Hardware:** Hardcopy Technologies, Display Technologies, Raster-Scan Display Systems, The Video Controller, Random-Scan Display Processor, Input Devices for Operator Interaction, Image Scanners, Working exposure on graphics tools like Dream Weaver, 3D Effects etc.

**Clipping:** Southland-Cohen Algorithm, Cyrus-Beck Algorithm, Midpoint Subdivision Algorithm

[No. of Hrs.: 12]

**Geometrical Transformations:** 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations, The Window-to-Viewport, Transformation, Efficiency, Matrix Representation of 3D Transformations, Transformations as a Change in Coordinate System.

[No. of Hrs.: 10]

**Representing Curves & Surfaces :** Polygon Meshes, Parametric Cubic Curves, Quadric Surfaces.

**Solid Modeling:** Representing Solids, Regularized Boolean Set Operations, Primitive Instancing, Sweep Representations, Boundary Representations, Spatial Partitioning Representations, Constructive Solid Geometry, Comparison of Representations, User Interfaces for Solid Modeling.

[No. of Hrs.: 10]

**Introductory Concepts of Multimedia,** Definition, CD-ROM and the multimedia highway, Uses of Multimedia, Introduction to making multimedia – The stages of Project, the hardware & software requirements to make good multimedia, Multimedia skills and training, Training Opportunities in Multimedia, Motivation for Multimedia usage

[No. of Hrs.: 12]

### **TEXT BOOKS:**

1. Foley, Van Dam, Feiner, Hughes, *Computer Graphics Principles & Practice*
2. Ralf Skinmetz and Klana Naharstedt, “*Multimedia: Computing, Communications and Applications*”, Pearson

### **REFERENCES BOOKS:**

1. D. Harn & Baker: *Computer Graphics*, PHI
2. D.J. Gibbs & D.C. Tsichritzis: *Multimedia Programming Object, Environment & Framework*
3. Foley, J.D. & Van Dam, A: *Fundamentals of Interactive Computer Graphics*.
4. Rogers & Adams, “*Mathematical Elements for Computer Graphics*”, McGraw Hill,
5. Tay Vaughan, “*Multimedia: Making it Work*”, TMH

## CA028: ADANCED DATABASE MANAGEMENT SYSTEMS

	L	T	P	Cr
Prerequisite(s): None	3	0	2	4.0

### Database Design and Implementation

**Relational Database Design :** Features of good database design ; Enhanced ER tools - Subclasses, Super class, and Inheritance , Specialization and Generalization , Constraints and Characteristics of Specialization and Generalization; Converting EER diagram to tables; Functional dependency theory and normalization ; Multi value dependency and 4NF; Join Dependency and 5NF; Inclusion Dependencies and Template Dependency; PJNF/DKNF; Modeling temporal data

**Database implementation and Tools:** Information system and organization ; Data Design and Implementation in an Organization; Use of UML and its support for database design specifications; Representing specialization and generalization in UML Class diagram.; UML based design tools;Automated database design tools.;

**Advanced SQL :** Assertion and views; Cursors, triggers and stored procedures; Embedded SQL,dynamic SQL, SQLJ; Advanced Features of SQL Examples of above in Oracle

**Database System Catalog :** Catalogs for relational DBMS; System Catalog in Oracle; Data dictionary and data repository system; Catalog in Distributed database and object oriented database systems; Role of system catalog in administration

### DBMS Advanced Features and Distributed Database

**Query Processing and Evaluation:** Measures of Query Cost- Selection Operation, Sorting, Join Operation, other Operations ; Evaluation of Expression ; Transformation of Relational Expressions; Role of Relational Algebra and Relational Calculus in query optimization; Estimating Statistics of Expression ; Choice of Evaluation Plans; Views and query processing Storage and query optimization

**Transaction Management and Recovery:** Advanced feature of Transactions; Enhanced Lock Based and timestamp based Protocols; Multiple Granularity; Multi-version Schemes ; Deadlock Handling; Weak Levels of Consistency; Concurrency in Index Structures; Recovery and Atomicity; Recovery with Concurrent Transaction; Buffer Management ; Advanced Recovery Techniques; Remote Backup Systems; Use of SQL in recovery; Examples of e-transactions

**Database Security and Authorization:** Levels of database security; Access control; Multilevel security; Statistical database security; Audit trails in the databases; Examples of e security

**Distributed Databases :** Centralized versus non centralized Databases; Homogeneous and Heterogeneous DDBMS and their comparison; Functions and Architecture; Distributed database design, query processing in DDBMS; Distributed concurrency management, deadlock management; Distributed Commit Protocols: 2 PC and 3 PC; Concepts of replication servers;

### ENHANCED DATABASE MODELS

**Object Oriented Database:** Limitations of Relational databases; The need of Object oriented databases; Complex Data Types; Structured Types and Inheritance in SQL; Table Inheritance; Data types (arrays, multi-set etc) and structure in Object oriented databases using SQL; Object-Identity and Reference Types in SQL; ODL and OQL; Implementing O-R Features ; Persistent Programming Languages; Object-Oriented versus Object-Relational ; An Example of Object oriented and object relational database implementation.

**Database and XML:** Structured Semi structure and unstructured data ; XML hierarchical tree data model ; Documents DTD and XML schema; XML Documents & Database; XML query and tranasformation; Storage of XML data; XML database applications.

**Introduction to data warehousing:** What is Data Warehousing, DSS and EIS? ; Characteristics and functioning and architecture of Data Warehousing; Data marts; Data warehousing Life Cycle; Data modeling (Multidimensional Database) for data warehousing ; Building of data warehouse ; OLAP, MOLAP, ROLAP; Data warehouse and views; Future open issue for data warehouse.

**Introduction to Data Mining :** What is data mining Technology and its relationship to Data warehousing; Association rules ; Classification ; Clustering ; Approaches to data mining problems; Applications of Data mining problem ; Commercial tools of data mining ; Knowledge Discovery.

### **Emerging Trends and Example DBMS Architectures**

**Emerging Database Models, Technologies and Applications I:** Multimedia database; Geography databases, Gnome databases; Knowledge databases, deductive databases and semantic databases; Spatial database; Information visualization.

**Emerging Database Models, Technologies and Applications II:** Mobile databases; Web databases (JDBC, ODBC); Personal databases; Digital libraries ; Data grids; Wireless networks and databases.

**PostgreSQL:** Important features and brief architecture; User Interfaces; SQL Variations and Extensions; Transaction Management; Storage and Indexing ; Query Processing and evaluation and optimization.

**Oracle:** Features and basic architecture; Database Design and Querying Tools; SQL Variations and Extensions; Storage and Indexing; Query Processing, evaluation and Optimization; Concurrency Control and Recovery ; Distributed Oracle; Database administration and other advanced tools.

### **Text Books**

1. *Date, C.J., An Introduction to Database Systems, Dorling Kindersley*
2. *Watson, John (OCP) and Bersinic, Damir, Oracle 10g Database OCP Certification All-in-One Exam Guide, TMH*
3. *Loney, Kevin, Oracle Database 10g DBA Handbook, McGraw Hill*
4. *Inmon, W.H., Building the Data Warehouse,, John Wiley*

### **Reference Books**

1. *Garcia-Molina, Hector, Ullman, J.D. and Widom, J.D., Database Systems: The Complete Book, Dorling Kindersley*
2. *Fayyad, Usama M, Advances in knowledge discovery and Data Mining., MIT Press*
3. *Jiawei, Han, Micheline, Kamber, Data Mining: Concepts and Techniques, Morgan Koffman Elsvier*
5. *Inmon, W.H., Developing the Data Warehouse, John Wiley*
6. *Mattison, Data Warehousing and Knowledge Management, TMH*

## CA029: ENTERPRISE RESOURCE PLANNING AND TOOLS

	L	T	P	Cr
Prerequisite(s): None	3	0	2	4.0

**Introduction to ERP:** ERP Overview, Benefit, Business Process Reengineering, Data ware Housing, Data Mining, LAP, Supply chain Management.

**ERP:** A Manufacturing Perspective, ERP Module, ERP Market, ERP implementation life cycle, Options of various paradigms, Identification of suitable platforms, Role of SDLC/SSAD, Object oriented architecture.

**ERP & Future Directives:** ERP and Internet, Critical Factors guiding selection and evaluation, Strategies for successful implementation, Impediments and initiatives to achieve success, Critical success and failure factors, Integrating ERP into organizational culture

**SAP:** Architecture of SAP R/3, Three-tier Architecture, SAP settings, Assigning user role, SAP user interface, Creating favorites ,starting and shutting the SAP system , Handling Tasks in SAP, Reports in SAP, Variants in Report, Background Scheduling, Scheduling Background jobs, Status of a background jobs.

SAP system Administration Utilities, SAP R/3 Basis system, Understanding ABAP workbench, Data types and Tables in ABAP, ABAP programming Language, ABAP User Dialogs, Running ABAP programs, Accessing Database Access, open SQL, Native SQL, Programming database Updates, ABAP Object Orientation, Classes and objects in ABAP, Object Handling, Declaring and Calling methods, Inheritance, Interfaces, Triggering and Handling Events, ABAP data dictionary, Batch Data Communication

### **Laboratory Work**

Implementation of ERP concepts using any ERP package.

### **Text Books:-**

1. Garg ,Vinod Kumar and VenkitaKrishnan, N.K., *Enterprise Resource Planning- Concepts and Practice*, PHI
2. Dreamtech Software Team, *SAP Architecture, Administration, Basis, ABAP Programming with MM and SD modules*, Dreamtech Press (2005).

### **Reference Books :-**

1. Hernandez, Jose A., martinez,f., Keogh,J., *The SAP R/3 Handbook*, TMH
2. Buck-Emden, Rudiger, *The SAP R/3 System: An Introduction to ERP and Business Software Technology*, Pearson Education
3. Ptak, Carol A and Schragenheim, Eli, *ERP Tools, Techniques and Applications for Integrating the Supply Chain*, CRC Press



## CA030 VISUAL PROGRAMMING USING VC++

L	T	P	Cr
3	0	2	4.0

**Introduction to Visual programming:** Introduction of popular visual programming tools. VC++ as sample language for visual programming. Introduction to VC++ development environment-IDE, Compiler, linker.

**Concepts:** Program development using Object Oriented Approach, Windows Programming basics, Comparative View: C++ vs. VC++

**Programming in VC++:** Creation of various kinds of projects in VC++ without and with project wizard. Introduction to Object Orientation, Class' definition in C++: Aggregation Inheritance Function & Operator Overloading, Input - Output streams, Exception handling.

**Basics of Windows Programming:** Win API, Resource editor, Programming with MFC Windows XP/Vista and NT programming techniques. Introduction to ActiveX component development using VC++.

**Web Forms & Web Services:** Creating a Web Form Project, Develop a Web Services Project, Access a Web Service from a Web Forms Project, Delete, Exclude, or Remove Solution, Project, or Folder Items using Java/ .NET Technologies.

### **Laboratory Work**

The lab work will be based on the general programming, windows programming in VC++ and programming using .NET technologies.

### **Text Books**

1. *Swanke, John, Visual C++ MFC Programming by Example, McGraw Hill*
2. *Pearce, Windows Programming Using MFC, Addison Wesley*

### **Reference Books**

1. *Deitel, H. M., Getting Started with Microsoft Visual C++ 6 with an Introduction to MFC, PHI*
2. *Archer, Tom, Extending MFC Applications with .NET Framework, Addison Wesley*

## MA005: OPERATIONS RESEARCH

	L	T	P	Cr
Prerequisite(s): None	3	1	2	4.5

**Definition of Optimization:** Meaning of Operations Research, Modeling in operation research, principles of modeling, Introduction to linear and non-linear programming problems and formulation.

**Linear Programming:** Characteristics, Assumptions and Applications, Graphical solutions of two variables LP Problem, Linear programming in standard form, Solution of LP by Simplex and revised Simplex methods, Special cases of LP, Duality and dual Simple method, Sensitivity analysis of LP problems.

**Network Models:** Transportation problem, Transshipment problem, Assignment problem, Traveling-salesman problem, Shortest route problem, Minimal spanning tree problem, Maximum flow problem,

**PERT and CPM :** Arrow networks - time estimates- earliest expected time, latest allowable occurrence time and slack - critical path - probability of meeting scheduled date of completion of project – calculations on CPM network - various floats for activities - critical path - updating project - operation time cost trade off curve - project time cost trade off curve - selection of schedule based on cost analysis.

**Inventory theory:** Costs involved in inventory problems - single item deterministic models-economic lot size models without shortages and with shortages having production rate infinite and finite. (Remarks: No mathematical derivations included).

### **Laboratory Work**

Introduction to some optimization software, implementation of, simplex, revised simplex methods, assignment and transportation algorithms, programs for queuing models, implementation of CPM ,PERT and inventory models

### Text Books

1. Taha, H.A., *Operations Research: An introduction*, PHI
2. Gillett, Billy, E., *Introduction to Operations Research: A Computer Oriented Algorithmic Approach*, TMH

### Reference Books

1. Rardin, Ronald, R., *Optimization in Operations Research*, Pearson Education (2007)
2. Pant, J.C., *Introduction to Optimization*, Jain Brothers (1998).
3. Kasana, H.S., *Introduction to operation Research*, Springer-Verlag (2005).

## EC002: FUNDAMENTALS OF MICROPROCESSORS AND INTERFACING

L	T	P	Cr
3	0	2	4.0

**Introduction to Microprocessors:** Need for flexible logic, Evolution of Microprocessors, Microprocessor applications, Generic Architecture of Microprocessor, Microcomputer system.

**Intel 8085 Microprocessor:** Pin functions, Architecture, Addressing Modes, Instruction set, Microprocessor

**Programming Techniques: Counters & Delays, Subroutines & Stacks,** Programming Examples, Timing Diagrams, Interrupts.

**Intel 8086 Microprocessor:** PIN Functions, Architecture, Characteristics and Basic Features of Family, Segmented Memory, Instruction Set: Data Transfer Instructions, Arithmetic, Logical, Shift & Rotate Instructions, String Instructions, Flag Control Instructions, Transfer of Control Instructions, Processor Control Instructions. Programming Examples, Interrupt Structure.

**Intel 8086 System Configuration:** Basic 8086 CPU Hardware Design, Generating the 8086 System Clock and Reset Signals, Min/Max Mode System Configuration.

**Main Memory System Design:** Types of Main Memories, Memory Organization, CPU Read/Write Timing Diagrams, RAM and ROM Interface Requirements, DRAM Interfacing and DRAM Controller (8203).

**Basic Input/Output:** Serial I/O, Parallel I/O, Programmed I/O, Interrupt driven I/O, Direct Memory Access, DMA Controller (8237).

**Peripheral Controllers:** Programmable Peripheral Interface (8255), Programmable Interrupt Controller (8259), Programmable Timer (8253/8254), Programmed Keyboard and display Interface (8279), Serial Interface controller (8251), interfacing with A/D & D/A converters.

Main Features of Advanced Microprocessors like 80286, 80386, 80486 & Pentium Processors

### Laboratory Work

1. Familiarization with Microprocessor Kit, System Specifications, Facilities, Hardware Description and Keyboard Description.
2. Programs based on various addressing modes, Data Transfer techniques.
3. Testing all Arithmetic and Logical Instructions and their affect on various flags. (Using various data Types).
4. Programs on Branch and Loop, String Instructions.
5. Programs of Sorting, Sum Of natural Numbers, Multiplication, Division, Factorial, etc.
6. Programs using built-in Software Routines.
7. Interfacing experiments like programs to introduce delays, to generate square & rectangular waves at different frequencies,
8. Familiarity with Assembler.

### Text Books

1. Gaonkar R.S., *The 8085 Microprocessor – Architecture, Programming and Applications with the 8085*, Penram International
2. Liu, YU-Cheng and Gibson, Glenn A., *Microcomputer Systems: The 8086/8088 Family Architecture, Programming and Design*, Dorling Kindersley

### Reference Books

1. Hall, D.V., *Microprocessor and Interfacing, Programming and Hardware*, TMH
2. Brey, Barry B., *The Intel Microprocessors – 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium li, Pentium lii, Pentium 4, and core 2 with 64-bit extensions*, PHI
3. Uffenbeck, J., *The 8086/8088 Family – Design, Programming and Interfacing*, PHI

## CA031: ADVANCED INTERNET TECHNOLOGIES

L	T	P	Cr
3	0	2	4.0

### Servlet and JSP Programming

**Introduction to Servlet:** Servlet life Cycle; HTTP Servlet Class; Request Interface; Response Interface; Session Tracking (Cookies VRL); Database Connectivity from Servlet; Interservlet Communication ; Handling Servlet; Servlet Collaboration

**Database Connection:** JDBC Drivers; JDBC APIs; JDBC Techniques; Statements & its Types; Record Sets; Various Operations (Insertion, Deletion & updation).

**JSP:** Overview of JSP; Relation of Applets and Servlets with JSP; Scripting Elements; JSP Expressions; JSP Scriptlets; JSP Declarations ; Predefined Variables; Creating Custom JSP Tag Libraries Using Nested Tags; Structuring Generated Servlet in JSP Pages; Including Files and Applets in JSP Documents; Integrating Servlet and JSP

### EJB and XML

**Introduction to Beans:** Types of Beans, Session Beans, Counting Beans, Message Beans, Context and Naming Convention

**Creating Beans:** How to Create Beans; Create Web Application; Create Application Client

**Deploying Beans:** Deploying J2EE Applications

**XML:** Overview of XML, Overview of SGML, Differentiate Between SGML and XML, XML Development Goal, Structure of XML Document, Using DTD, XML Parser, Using XML Introduction, XML Entities

### Web Security

**Web Security Concepts:** HTTP Authentication, Application Types (BASIC, DIGEST, FORM and Client CERT)

**Security Implementation:** Retrieving Authentication Information, Security in Servlet, Form Based Custom Authorisation, Retrieving SSL Authentication

### Text Books

1. Geary M. David , “Core JSTL Mastering the JSP standard Tag Library” Pearson Edu.
2. Ghaly R and Krishna Kotha palli, . “Teach Yourself EJB” Pearson Edu.
3. Mukhi, Sonali and Neha Katecha, “ JAVA SEVLETS, JSP”, BPB
4. Deitel, H.M. ... “XML Technologies” Pearson Edu.

### Reference Books

1. Jain V.K. “ Advanced Programming in Web Design” Cyber Tech Publications

## CA032: INFORMATION AND NETWORK SECURITY

L	T	P	Cr
3	1	0	3.5

**Introduction** - Security problem in computing, Elementary Cryptography Introduction, Substitution ciphers, Transpositions Encryption Algorithms DES, AES, Public key encryption, Uses of encryption. Program security, Secure programs, Nonmalicious program errors, Viruses and other malicious code, Targeted malicious code, Controls against program threats

**Protection in general purpose operating systems**- Protected objects and Methods of protection Memory and address protection Control of access to general objects File protection mechanisms User authentication Designing Trusted operating systems Security policies Models of security Trusted operating system design Assurance in trusted operating systems.

**Security in Networks**, Threats in networks, Network security controls, Firewalls, Intrusion detection systems. Sniffers: Passive Sniffing, Active Sniffing, Spoofing and Sniffing Attacks, ARP Poisoning and countermeasures, Denial of Service: Goals, Impact and Modes of Attack, Internet Security Architectures- Basic security deficits of Internet protocol, IPSec, Authentication Header (AH), Encapsulating Security Payload (ESP).

Session Hijacking, Spoofing vs Hijacking, Steps in Session Hijacking, Types of Session Hijacking, Protocol vulnerabilities- examples of protocol vulnerabilities, Secure socket layer/ Transport layer security, secure shell (SSH), Firewall architectures, packet filtering, proxy services and bastion hosts.

**Network Administration** – Introduction, configuration of DNS, DHCP, and NAT, Mail services- email, news, administration of mail services, File services, directory services, print services, LAN and WAN fundamentals, Network designing, configuration and management

### **Laboratory Work**

The lab work will include implementation of algorithms of cryptography. In network security, the lab work will include firewall implementation, SSH, certificates and security tools implementation, database security, program security etc. The lab work will also include configuring DNS, DHCP, NAT etc., router configuration, WAN networking, Building VPN.

### **Text Books**

1. Pfleeger, Charles. P., and Pfleeger, Shari Lawrence ,*Security in Computing*, Pearson Education
2. Stallings, W., *Network Security Essentials, Applications and Standards*, Pearson Education

### **Reference Books:**

1. Stallings W., *Cryptography and Network Security Principles and practice*, Pearson Education
2. Whitman, Michael. E. and Mattord, Herbert J. , *Principles of Information Security, Course Technology*

## BM103: ORGANIZATIONAL BEHAVIOUR

L	T	P	Cr
3	1	0	3.5

**Introduction to Organizational Behaviour:** Today's Organizations, Challenges, Foundations of Organizational Behaviour, Individual Behaviour: Perception, Values, Attitudes Motivation theories. Employees Motivations in Organization, Management by Objectives Learning Processes, Reward and Punishment.

**Foundations of Group Behaviour:** Interpersonal Communication, Leadership, Emotional Intelligence. Power & Politics, Conflict Process, Negotiations, Stress and Coping, Inter-Group Relations, Team Working.

**A Macro Perspective of Organizational Behaviour:** Organization Structure – Key Elements, Types and Basic Models, Work Design, Organizational Change, and Learning Organizations.

**Organizational Behaviour:** Future Challenges Gender Diversity at the place of work, Changing world Scenario, Role of External Environment.

**Achieving Competitive Advantage:** Management of change, International issues in Organizational Behaviour.

### **Text Books:**

1. Robbins, S.P., *Organizational Behaviour*, PHI
2. Luthans F., *Organizational Behaviour*, Irwin Mc-Graw Hill.

### **Reference Books:**

1. Hellriegel, D., and Slocum, J.W., *Organizational Behaviour*, Southwestern Educational Publishing

## CA018: ARTIFICIAL INTELLIGENCE AND APPLICATIONS

L	T	P	Cr
3	0	2	4.0

**Introduction to expert systems**, various subsets of expert systems as AI, ANNs, Fuzzy Set theory, the differences & comparisons of various theories

**Introduction and Overview of AI:** Historical foundations, development of logic, turning test, problem spaces, problem characteristics, characteristics of intelligent algorithm, structures and strategies for state space search.

**Problem solving techniques:** Heuristic search, A\* algorithm, AO\* algorithm, generate and test, hill climbing. Problem reduction, Constraint propagation

**Knowledge representation:** predicate logic, resolution in predicate logic, question answering, theorem proving.

**Semantic networks**, Frames and scripts, conceptual graphs. Game playing: Minimax and alpha beta procedures

**AI Programming Languages:** Introduction to LISP; Syntax and Numeric Functions; Basic List Manipulation Functions in LISP Functions; Predicates and Conditionals; Input, Output, and Local Variables; Iteration and Recursion; Property Lists and Arrays; PROLOG: List, Operators, Arithmetic; Cut & Fail; Backtracking

**Handling Inconsistent and Incomplete Knowledge:** Truth Maintenance Systems; Reasoning Techniques; Concept of Uncertainty; Bayes' Theorem; Certainty Factors and Rule-Based Systems; Bayesian Networks; Dempster-Shafter Theory

**Fuzzy set Theory:** Introduction, Basic definitions & terminology, Fuzzy union, intersection, complement. Fuzzy rules, relations & principles, Fuzzy inference systems

**Laboratory Work:** Programming in Prolog to implement Arithmetic operators, List Processing, Defining Human Relationships, Cut Operations, Files, Trees, Graphs and Natural Language Processing. Implementation of Heuristic and Minimax Searches using C/C++/Java.

### **Text Books**

1. *Patterson, Dan W., Introduction to Artificial and Expert Systems, PHI*
2. *Luger, G.F., Artificial Intelligence, Pearson Education*

### **Reference Books**

1. *Sasikuma, r M. and Ramani, S., Rule Based Expert System, Norosa*
2. *Rich, E. and Knight K., Artificial Intelligence, TMH*

## CA021: E-COMMERCE

L T P Cr

3 0 2 4.0

**Introduction to E-Commerce:** The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic Commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, E-Commerce in Perspective.

**Business Strategy in an Electronic Age:** Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains, Competitive Strategy, Porter's Model, First Mover Advantage, Sustainable Competitive Advantage, Competitive Advantage using E-Commerce, Business Strategy, Introduction to Business Strategy, Strategic Implications of IT, Technology, Business Environment, Business Capability, Existing Business Strategy, Strategy Formulation & Implementation Planning, E-Commerce Implementation, E-Commerce Evaluation.

**No. of Hrs.: 12]**

**Business-to-Business Electronic Commerce:** Characteristics of B2B EC, Models of B2B EC, Procurement Management Using the Buyer's Internal Marketplace, Supplier-Oriented Marketplace, Intermediary-Oriented Marketplace, Just-in-Time Delivery, Other B2B Models, Auctions and Services from Traditional to Internet-Based EDI, Integration with Back-end Information Systems, The Role of Software Agents for B2B EC, Electronic Marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.

**Intranet and Extranet:** Automotive Network Exchange, The Largest Extranet, Architecture of the Internet, Intranet, and Extranet, Intranet Software, Applications of Intranets, Intranet Application Case Studies, Considerations in Intranet Deployment, The Extranets, The Structure of Extranets, Extranet Products & Services, Applications of Extranets, Business Models of Extranet Applications, Managerial Issues.

**[No. of Hrs.: 12]**

**Electronic Payment Systems:** Is SET a Failure, Electronic Payments & Protocols, Security Schemes in Electronic Payment Systems, Electronic Credit Card System on the Internet, Electronic Fund Transfer and Debit Cards on the Internet, Stored-Valued Cards and E-Cash, Electronic Check Systems, Prospect of Electronic Payment Systems, Managerial Issues.

**Public Policy: From Legal Issues to Privacy:** EC-Related Legal Incidents, Legal, Ethical & Other Public Policy Issues, Protecting Privacy, Protecting Intellectual Property, Free Speech, Internet Indecency & Censorship, Taxation & Encryption Policies, Other Legal Issues: Contracts, Gambling & More, Consumer & Seller Protection in EC.

**[No. of Hrs.: 10]**

**Infrastructure for EC:** It takes more than Technology, A Network of Networks, Internet Protocols, Web-Based client/ Server, Internet Security, Selling on the Web, chatting on the Web, Multimedia delivery, Analyzing Web Visits, Managerial issues.

**Economics, Global & Other Issues in EC:** Competition in Marketspace, Some Issues in Digital Economy and Success Factors, Impacts on Industry Structure, Intermediaries, and Others, virtual Communities, Global Electronic Commerce, Electronic Commerce in Small companies, Research in EC, The Future of EC

**[No. of Hrs.: 10]**

### **TEXT BOOKS:**

1. David Whiteley, "E-Commerce", Tata McGraw Hill
2. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", Pearson Education



## CA027 : ADVANCED COMPUTER GRAPHICS AND ANIMATION

L	T	P	Cr
3	0	2	4.0

**Introduction to Computer Graphics:** Introduction, Interactive and Passive graphics, advantages of interactive graphics, interactive devices, graphics hardware

**Scan Conversions:** Scan converting lines, circles, ellipses, arcs and sectors. DDA algorithm, Bresenham Algorithm, midpoint algorithms for line and circle, scan converting curves using midpoint algorithms

**Filling Polygons:** Boundary fill, flood fill, scan line polygon fill algorithm

**Transformations:** 2D transformations, 3D transformations, Homogeneous coordinates and matrix representation of 2D transformations and 3D transformations: translation, scaling, rotation. Composition of 2D Transformations and 3D Transformations.

**Viewing Transformations And Clipping:** Window-to-Viewport transformation, clipping Lines, clipping Polygons, clipping Circles.

**Mathematics of Projection:** Perspective projection, parallel projection.

**Geometric Forms and Models:** Polygon surfaces, curved surfaces, parametric equations, Bezier curves, spline curves, Bezier surfaces, spline surfaces.

**Visible Surface Determination:** Algorithms for visible line determination, z-buffer algorithm, list priority algorithm, scan-line algorithm, visible ray tracing, painter's algorithm, subdivision algorithm.

**Illumination And Shading:** Illumination models, shading models for polygons, shadows, transparency.

**Animation:** Computer Animation- Basic of Animation; Types of Animation; Simulating Accelerations; Computer Animation Tools; Applications. Multimedia Concepts and Applications- Concepts of Hypertext/ Hypermedia; Multimedia Applications( Education, Video Conferencing, Training, Entertainment, Electronic Encyclopedia.); Images; Audio and Video-Analog and Digital Sound and Video, Mpeg, mp3, wav, etc.; Multimedia Tools

**Laboratory Work:**The lab work will be based on: line generation using DDA, midpoint, Bresenham algorithm midpoint/ Bresenham, circle algorithm, midpoint ellipse algorithm ,curve generation using midpoint algorithm ,flood fill ,boundary fill, scan line polygon fill algorithms, transformation techniques (2D ,3D):translation, rotation, scaling, reflection, orthographic ,oblique projections ,Line clipping ,polygon clipping, Bezier curves, piecewise Bezier curves with zero order continuity, Bezier surface, sphere and ellipsoid generation using parametric equations, Animation using multimedia software (like flash)

### Text Books

1. Hearn, Donald D and Baker, M. P., *Computer Graphicswith openGL*, Pearson Education
2. Rogers, D.F. and Adams, J.A., *Mathematical Elements for Computer Graphics*, TMH

### Reference Books

1. Xiang,Z., and Plastock R., *Schaum's Outline of Theory and Problems of Computer Graphics*, TMH
2. Foley J.D., Dam,A.V., Feiner, S.K., and Hughes J., *Computer Graphics: Principles and Practice*, PE

## CA035: PARALLEL COMPUTING

L	T	P	Cr
3	0	2	4.0

### Elements of Parallel Computing and Architecture

**Introduction to Parallel Computing:** Basic concepts about program/process/ thread concurrent Execution Parallel Execution, granularity, Potential of Parallelism; Need of Parallel Computation; Levels of parallel processing; Parallel processing Vs. Parallel computing; Dataflow Computing concept; Applications of parallel processing- Scientific Applications / Image processing, Engineering Application, Database query / Answering applications, A I Applications, Mathematical simulations and modeling

**Classification of Parallel Computers:** Types of Classification; Flynn's/ Handler classification; UMA / NUMA /COMA ; Loosely coupled / tightly coupled; Classification based grain size and Instruction level parallelism.

**Interconnection Network:** Need of Interconnection Network; Concept Bandwidth Nod degree diameter bisection bandwidth, In degree and Out degree; Static and Dynamic Interconnection network; Omega, Parallel Shifter, Bens, permutation, hypercube, butterfly; Shuffle exchange Network

**Parallel Computer Architecture:** Introduction to various computer architecture; Pipeline processing; Vector / Array processing; VLIW and Super scalar architecture; Associative architecture - Multithreaded architecture

### Parallel Algorithm & Parallel Programming

**Parallel Algorithm:** Introduction to Parallel Algorithms; Analysis of Parallel Algorithms; Different models of computation- Combinational circuit, Permutation Circuit, Sorting circuit, Matrix computation

**PRAM Algorithms:** Message passage programming - Shared memory, Message passing libraries, Data Parallel programming; Data Structures for parallel algorithms- Link list, Arrays pointers, Hypercube network.

**Parallel Programming:** Introduction to Parallel Programming; Types of parallel programming - Programming based on message passing, data parallelism, Programming for shared memory systems, Example programs for parallel systems

### Advanced Topics

**Operating System for Parallel Computers:** Basic issues of Operating Systems for Parallel Computers; Process Management; Resource Management; Memory management; I/O Management; Inter-Processor Communication; Vectorisation Compiler

**Performance Evaluation:** Introduction to performance evaluation; Metric of Parallel overhead; Law Speedup; Measurement Tools

**Recent Trends:** Multicomponent CPU; Apex architecture IA 64; Hyperthreading

### *Text Books*

1. Hwang, K., *Advanced Computer Architecture: Parallelism, Scalability, Programmability*, TMH
2. Sasikumar M., Shikhare, D., Ravi Prakash, P., *Introduction to Parallel Processing*, PHI

### *Reference Books*

1. Hwang, K., Briggs, F. A., *Computer Architecture and Parallel Processing*, McGraw Hill
2. Kumar, Vipin, Grama, A., Gupta, A., and Karypis, G., *Introduction to Parallel Computing*, Pearson Education.

## CA036: SOFTWARE TESTING AND QUALITY MANAGEMENT

L	T	P	Cr
3	0	2	4

**Software Testing Fundamentals:** Testing-Related Terminology, Key Issues: Test selection criteria/Test adequacy criteria, Testing effectiveness/Objectives for testing, Testing for defect identification, Theoretical and practical limitations of testing, the problem of infeasible paths, Testability, Relationship of Testing with other activities, Testing Levels: Unit Testing, Integration Testing, System Testing, Acceptance Testing.

**Testing Techniques:** Based on the software engineer's intuition and experience, Ad hoc testing, Exploratory testing, Specification-based techniques, Equivalence partitioning, Boundary-value analysis, Decision Table Testing, Testing with Formal Specifications, Finite State Machine based, Code Based, Data Flow Based, Mutation Testing, Techniques based on nature of the application: Object-oriented testing, Component-based testing, Web-based testing, GUI testing, Testing of concurrent programs, Protocol conformance testing, Testing of real-time systems, Testing of safety-critical Systems, Selecting and combining techniques

**Software Quality:** Software Engineering Culture and Ethics, Value and Cost of Quality, Models and Quality Characteristics: Software Engineering Process Quality, Software Product Quality, Quality Improvement, Software Quality Management Processes: Quality assurance process, Verification process, Validation process, Review process, Audit process, Practical Considerations: *Software Quality Requirements*, Dependability, Integrity levels of software, *Defect Characterization*,.

**Software Quality:** Management Techniques, Software Quality Measurement, ISO 9000:2000 Quality management systems --Fundamentals and vocabulary, ISO 9001:2000 Quality management systems --Requirements, ISO 9004:2000 Quality management systems --Guidelines for performance improvements, Quality Management Processes: Quality Planning, Quality Assurance, Quality Control.

Quality Planning: Inputs, Tools and Techniques, Outputs

**Quality Assurance:** Inputs, Quality Management Plan, Results of Quality Control Measurements, Operational Definitions, Quality Planning tools and techniques, Quality Audits, Quality Improvements

**Quality Control:** Inputs, Tools and Techniques: Inspection, Control Charts, Pareto Diagrams, Statistical Sampling, Flowcharting, Trend Analysis, Outputs: Quality Improvements, Acceptance Decisions, Rework, Completed Checklist, Process Adjustments.

### Text Books

1. Beizer, Boris B. ,*Software Testing Techniques*, Wiley Dreamtech Publication
2. Tian,Jeff, *Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement*, Wiley-IEEE Computer Society Press

### Reference Books

1. *A Guide to the Software Engineering Body of Knowledge (SWEBOK)*, IEEE Computer Society, (2004). (<http://www.nt.fh-koeln.de/fachgebiete/inf/nissen/softeng/swebok.pdf>)
2. *A Guide to the Project Management Body of Knowledge (PMBOK)*, Project Management Institute, PA, USA (2004).

## CA037: .NET FRAMEWORK AND C# PROGRAMMING

L	T	P	Cr
2	0	4	4.0

**Introduction to C#**, CLR, Visual studio console app, Simple windows forms, C# language fundamentals, Enumerations, structures, Namespaces

**C# Object oriented programming-** OOPs, Encapsulation, Inheritance, Polymorphism, Object Lifetime, Components, Modules, Windows Forms, Interface, Cloneable objects, Comparable objects, Collections Namepaces

**Advanced Class Construction-** Custom Indexer, Overloading operators, Delegates, Events

**Assemblies, Thread, and AppDomains-** C# assemblies, GAC, threads, contexts, Appdomains, Processes concepts, Concurrency and synchronization- Locks, Monitors, Reader WriterLock, Mutexes, Thread pooling,

**IO, Object serialization and remoting-** System.IO, Streams, TextWriter, TextReader, BinaryWirter, BinaryReader, Serialized Object Persistence and formatters, Remoting

**ADO.Net, C# windows forms for data control-** Grid, Datasource and databinding controls, Connected and disconnected scenarios, ADO.Net system, Data, Dataset, connections, Adapters, commands, datareaders,

**ASP.net-** Introduction, Architecture, Web forms, Server controls, Data connectivity using ASP.net,

### **Laboratory Work**

The lab work will be based on the C# programming concepts, console applications, window forms, database connectivity using ADO.net and ASP.net, web services and server controls .net technologies

### **Text Books**

1. Deitel, H.M., Deitel, P.J., Hoey, P.R., and Yaeger, C.H., *Simply C#: an application-driven tutorial approach*, Pearson Education
2. Platt, David S., *Introducing Microsoft .NET*, PHI

### **Reference Books**

1. Balagurusamy, E., *Programming in C#*, TMH
2. Microsoft, *C# Langauge Specifications*, Addison Wesley

## CA038: J2EE AND APPLICATIONS

L	T	P	Cr
2	0	4	4.0

**Prerequisite(s):** None

**Integrated Application Development:** Introduction to Integrated Application Development, Web Server Versus Application Server

**Servlets and Java Server Pages (JSP) :** MVC (Model View Controller) Architecture, Servlet, Servlet life cycle, web application structure, Session management, Handling cookies, Creating war files, JDBC, JSP elements - declaration, directive, scriptlet, expression, and action, JSP Architecture and implementation, Java Beans, JSP Bean tags, JSP session handling, JSP Authentication, Introduction to JSTL (JSP Standard Tag Library), JSTL Expression Language (EL), Miscellaneous Tags, Writing a Custom Tag Library

**Web Application Frameworks:** Java Server Faces (JSF) and Struts architecture, Struts classes – Action Forward, Action Form, ActionServlet, Action classes, config.xml, Action Mappings, Struts flow, Combining Struts and Tiles, Building and using tiles, Creating a Definition in XML file and deploying, JSF specification and API Javadoc

**Enterprise JavaBeans (EJB) Fundamentals:** Enterprise JavaBeans Communication, EJB Details, Session Beans, Entity Bean, Message Driven Bean, Writing Beans, EJB Development Overview, The Enterprise Bean Class, The Remote Interface, The Home Interface, Deployment Descriptors and EJB-JAR files, Writing an EJB Client, Persistence

**Advanced Concepts and Technologies :** Introduction to Java Message Service (JMS), Portal Server and Portlet architecture, Advanced J2EE Security, Performance, Profiling Technologies and Tools, IDEs and Development Tools, Xdoclet, J2EE App Server Products, Web Services support, Internationalization and localization, Rich client Hibernate, Spring framework, Web services, SOA, SOAP, AXIS, WSDL, UDDI, Endpoint, Callback, AJAX etc.

### **Laboratory Work**

Implementation of JNI, Servlets, Java Server Pages, JDBC, Session beans, Entity beans and JSF and Struts Based applications development etc.

### **Text Books**

1. Alur, Deepak, Malks, Dan and Crupi, John, *Core J2EE Patterns: Best Practices and Design Strategies*, Prentice Hall India
2. Horton, I., *Beginning J2EE 1.5, SPD*

### **Reference Books**

1. Austin, C., and Pawlan, M., *Advanced Programming for JAVA 2 Platform*, Pearson Education

## CA039 : WIRELESS NETWORKS AND MOBILE COMPUTING

L	T	P	Cr
2	0	4	4.0

**Introduction:** Introduction to wireless networking, advantages and disadvantages of wireless networking, Characteristics of radio propagation, Fading, multipath propagation

**Wireless Communication systems-** Evolution of mobile communication generations, Cellular Concept- Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Trunking and grade of services, Improving coverage and capacity in cellular systems

**Medium Access Control-** MAC protocols for digital cellular systems such as GSM, MAC protocols for wireless LANs such as IEEE 802.11,a, b, g and HIPERLAN I and II, The near far effect, Hidden and exposed terminals, Collision Avoidance (RTS, CTS) protocols.

**Bluetooth-** Radio specification, baseband specification, Link manager specification, Logical link control and adaptation protocol.

**Transport over wireless networks-** Introduction, TCP over wireless networks, Approaches to improve transport layer performance.

**Security:** Security and Fraud detection in Mobile and wireless networks, Mobile adhoc networks.

### **Laboratory Work**

The lab work will be based on the configuration of wireless LANs using access points, routers etc, implementation of WAP protocol stack, wireless programming using Bluetooth, RFID, GSM and Wi-Fi development kits etc.

### **Text Books**

1. Stallings, W., *Wireless Communications and Networks*, Pearson Education
2. Stojmenic, I., *Handbook of Wireless Networks and Mobile Computing*, John Wiley
3. Rappaport, T.S., *Wireless Communications- Principle and Practices*, PHI

### **Reference Books**

1. Lin Yi Bing and Chlamtac Imrich, *Wireless and Mobile Network Architectures*, John Wiley
2. Pandya, R., *Mobile and Personal Communications Systems and Services*, PHI

## CA035 SYSTEM DEVELOPMENT PROJECT

All MCA students are required to do a “SYSTEM DEVELOPMENT PROJECT” in their sixth semester in an industrial or a service organization under the joint supervision of the organization’s supervisor and a department faculty member of the university. The duration of the project shall be 18-20 weeks. The students are required to develop software using all principles of system analysis and design and software engineering practices. Topics selected should be large enough to justify effort and time available for the project. The end product should find acceptability and use by the host organization.

Detailed written guidelines will be given to each of the students regarding the handling, monitoring, personal conduct and evaluation of the project before he/ she proceed to the organization.