

# MCA I YEAR - SEMESTER I

## CT1025: COMPUTER ORGANIZATION AND ARCHITECTURE

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total
								Theory	CW	SW	Pr.	
1.	CT1025	Computer Organization & Architecture	4	1	2	5	2	70	30	20	30	150

**Unit 1:** Introduction: Evolution of digital computer, multilevel model of a Computer, Von-Neumann model, ALU, Control Unit, System bus, Memory, I/O Devices, Concept of instruction execution. Number systems, Data and number representation, Character codes, Binary arithmetic. Logic gates, Flip Flops, Latches, Registers, Boolean algebra, Combinational and sequential circuits, Arithmetic circuits.

**Unit 2:** Memory: Secondary and main memory; Main memory organization, properties and technologies; Associative memory, Cache memory. Control Unit operation: Micro operations, Control of the CPU, Hardwired and Micro programmed control. Machine Level Instructions: Instruction formats, Addressing modes, Instruction types, Instruction cycle, Flow of control.

**Unit 3:** Input Output : I/O devices, their characteristic, Interfacing, I/O ports, Memory mapped and I/O mapped I/O, Programmed I/O, Concept of interrupts, Interrupt driven and DMA based I/O, I/O processors, Device controllers, I/O device interfaces, Device Drivers, I/O and system buses, Serial and Parallel Communication.

**Unit 4:** Introduction to Advanced Architectures: Pipelining, Vector Processing, RISC v/s CISC, Multiprocessors, Fault Tolerant architectures.

**Unit 5:** Introduction to System Software: Assemblers, Assembly language Programming: Use of imperatives, declaratives, directives and macros; Compiler: Overview of compilation process; Interpreters; Loading, linking and relocation; Functions of editors and debuggers.

### **Books Recommended:**

#### **Text Books:**

1. William Stalling, "*Computer Organization and Architecture*", Pearson Education.
2. Douglas V. Hall, "*Microprocessors and Interfacing*", TMH, 1991.
3. M. Morris Mano, "*Computer System Architecture*", Pearson Education.

#### **Reference Books:**

1. Andrew S. Tannenbaum, "*Structured Computer Organization*", Pearson Education.
2. Dhamdhare, "*System Programming & Operating System*", TMH, 1997.
3. Govindrajalu, "*IBM PC and Clones, Hardware, Troubleshooting & Maintenance*", TMH, 1996.
4. Peter Abel, "*IBM PC Assembly Language and Programming*", Pearson Education.

## CT1026: COMPUTER PROGRAMMING & NUMERICAL TECHNIQUES

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT1026	Computer Programming & Numerical Techniques	4	-	3	4	3	70	30	40	60	200

**Unit1:** Problem Solving on a computer :Various steps involved in problem solving, Algorithms, Flowcharting, Introduction to Programming Languages, Types of Programming Languages, Features of good programs - Structured program, Modular Program, Fundamentals of Programming.

**Unit 2:** (a) The C character set, Identifier, Keywords, Data types, Types of C constants, Variables, Instructions, Declarations. Arithmetic, Unary, Relational, Logical, Assignment and Conditional operators. Expression and Primitive statements, Input - output statements, Library functions, C Pre-processor commands.  
(b) Control Statements: Conditional and Iterative statements - while, do while, for statement and Nesting of loops, if-else, switch, break and continue statements.

**Unit 3:** (a) Functions and Storage classes : Functions and parameter passing, Recursion, Local and Global variables, Storage classes in C - automatic, external, static and register variables.  
(b) Data Structures: Arrays and Strings. Pointers - Pointer declarations, Pointer arithmetic and operations, applications / use of pointers, Linked lists, passing pointers to a function. Structures and Unions.

**Unit 4:** File Handling in C.

**Unit 5:** Introduction to Numerical Techniques:

- Error analysis: Errors and approximations, Errors and their sources, rounding off and truncation, absolute and relative errors, Accuracy in approximation.
- Finding roots of polynomials: Speeding up convergence, Solution of polynomial equations of one variable like Newton Raphson method.
- Matrix operations.

### **Books Recommended:**

#### **Text books:**

- Herbert Schildt, "*The Complete Reference C*", TMH, 2000.
- Yashavant Kanetkar, "*Let us C*", BPB, 1997.
- V.Rajaraman, "*Computer Oriented Numerical Methods*", PHI, 1998.

#### **Reference Books:**

- Byron S. Gottfried, "*Programming with C*", TMH, 1997.
- Yashavant Kanetkar, "*Understanding Pointers in C*", BPB, 1997.
- B.W. Kernighan & D.M. Ritchie, "*The C Programming Language*", Pearson Education.
- Conte and Boor, "*Elementary Numerical Analysis, an Algorithmic Approach*", TMH, 1984.

## CT1027: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total
								Theory	CW	SW	Pr.	
1.	CT1027	Mathematical Foundations of Computer Science	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Set theory and Counting techniques: Set, Subsets, Operations on set, finite infinite set, Principle of Inclusion – Exclusion, Principle of Mathematical induction, Principle of strong mathematical induction, Permutation and Combination, Logic Theory - Propositional calculus and Predicate calculus.

**Unit 2:** Relations, Functions and Lattice : Properties of relations, equivalence relation, Partial order relation, poset, onto function, one-to-one functions, pigeon hole principle, Lattices, Distributive law in lattices, complemented lattice.

**Unit 3:** Graphs and Trees: Definitions, Algorithms, Euler path and circuit, Hamiltonian path and circuit, Planner and non planner graphs, Characteristics of tree, theorems, minimum cost spanning tree.

**Unit 4:** Automata Theory:

Finite State Automata: Deterministic, Non – deterministic M/c, regular expressions, regular language and regular grammar.

Push down Automata: Deterministic, Non – deterministic push down automata, Context free language and grammar.

**Unit 5:** Turing Machine: Turing machine and compatibility, Types of turing machine, context sensitive language and grammar, Chomsky Hierarchy.

### **Books Recommended:**

#### **Text books:**

1. C. L. Liu, “Elements of Discrete Mathematics”, TMH, 2000.
2. S. Lipschutz & M. Lipson, “Discrete Mathematics”, TMH, 1999.
3. Peter Linz, “Introduction to Automata Theory, Languages, and Computation”, Narosa Pub., 1997.

#### **Reference Books:**

1. B. Kolman, R. Busby & S. Ross, “Discrete Mathematical Structures”, Pearson Education.
2. J. P. Trembley and R. Manohar, “Discrete Mathematical Structures with Application to Computer Science”, TMH, 1997.
3. John C. Martin, “Introduction to Languages and the Theory of Computation”, TMH, 1998.
4. Cohen, “Introduction to Computer Theory”, John Wiley & Sons, 1996.

## MB 1028: PRINCIPLES OF MANAGEMENT

S. No	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	MB1028	Principles of Management	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Concept of Management: Functions, Tasks, Responsibilities of Managers, Various Schools of management thoughts.

**Unit 2:** Planning: Nature and Purpose of Planning, Planning Process, Forecasting, Advantages and Limitations. Control and Decision Making: Concept and Process of Control, Controlling Techniques, Decision Making & its process, Decision making models.

**Unit 3:** Objectives, Strategies & Policies: Types of objectives, Strategies and policies, Management by Objectives, Formation of Strategies and Policies.

**Unit 4:** Organizing: Nature and Purpose of Organising, Departmentation, Delegation, Span of Control, Line and Staff Relationship, Decentralisation, Formal and Informal organization.

**Unit 5:** Directions: Direction process, Theory of motivation & leadership, Need Analysis, Communication.

**Unit 6:** Case Studies.

### **Book Recommended:**

#### **Text books:**

1. Harold Koontz & Wehrich, "*Essentials of Management*", TMH, 1997.
2. G. R. Terry, "*Principles of Management*", AITBS, 1999.
3. T. N. Chhabra, "*Principles & Practices of Management*", Dhanpat Rai & Sons, 1997.
4. L. M. Prasad, "*Principles & Practices of Management*", Sultanchand & Sons, 1996.
5. R. D. Agrawal, "*Organisation & Management*", TMH, 1982.
6. Keith Davis, "*Principles of Management*", McGraw Hills International, 1989.
7. Peter Drucker, "*Practice of Management*".

## CT1044: OFFICE AUTOMATION LAB

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT1044	Office Automation Lab.	-	-	2	0	2	-	-	20	30	50

1. Office Automation Tools (like MS Office).
2. DTP Softwares (like Corel Draw, Adobe, Photoshop, Ventura, Page maker).
3. Configuring PC for email and internet access.
4. Overview of Linux operating system and Open Office.
5. Web page designing (HTML, Dreamweaver, DHTML)

### **Books Recommended :**

#### **Text books:**

1. Stephen L. Nelson, "*The Complete Reference Office 2000*", TMH, 1999.
2. Machtelt Garrels, "*Introduction to Linux*", Fultus Corporation, 2004.

#### **Reference Books:**

1. Ed Bott, "*Using Microsoft Office 2000*", PHI, 1999.
2. Altman, "*Mastering Pagemaker 6 for Win 95*", 1997.

# MCA I YEAR - SEMESTER II

## CT1079: COMPUTER GRAPHICS AND MULTIMEDIA

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT1079	Computer Graphics & Multimedia	4	1	2	5	2	70	30	20	30	150

**Unit 1:** Introduction & Overview of Graphics Systems: Basic terminology, Raster systems, Graphics system architecture, Graphics workstations.

Multimedia display devices: CRT based devices, LED monitors, Hardcopy devices.

Output Primitives and it's Attributes : Point, Lines, Line drawing algorithms - DDA, Bresenham's algorithm; Line attributes, Circle generating algorithm, Polygon filling algorithm, Character generation, Character attributes. Antialiasing: Super Sampling, Pixel Phasing, Area Sampling.

**Unit 2:** 2D Geometric Transformation: Basic transformation, translation, rotation & scaling Matrix representations, Composite transformations, and other transformations like reflection & shear. 2D Viewing: Window, Viewport, Viewing transformation, 2D Viewing functions, Clipping operations – Point clipping, Line clipping, text clipping.

**Unit 3:** Introduction to 3D concepts : Basic 3D geometric and modeling transformation; translation, rotation, Scaling, shear and reflection. 3D viewing: Viewing pipeline, Projections: Parallel and Perspective.

**Unit 4:** Introduction to color models and their applications: XYZ, RGB, CMY, HSV, Computer animation, Surface rendering methods: Lighting & Shading models: Ambient light, Specular Reflection and Phong Model, Constant Intensity Shading, Gouraud Shading Model, Fast Phong Shading Model.

**Unit 5:** Introduction to Multimedia: Multimedia system, definition, applications, hardware, software requirements, introduction to media formats like video, audio, image, text. Compression Techniques: Types of compression: text, image, audio, video, Introduction to modern Input Output devices such as mobile screens, touchpads etc.

### **Books Recommended:**

#### **Text books:**

1. D. Hearn & M. Baker, "*Computer Graphics*", (C Version), Pearson Education.
2. Foley & Van Dam, "*Introduction to Computer Graphics*", Addison Wesley.
3. Zhigang xiang, Roy Plastock, "*C Theory and Problems of Computer Graphics*", TMH.
4. Adnleigh P.K. and Thakrar K., "*Multimedia System Design*", PHI
5. Ranjan parekh, "*Principle of Multimedia*"

#### **Reference Books:**

1. D. Rogers, "*Procedural Elements for Computer Graphics*", TMH, 2002.
2. Vaughan T., "*Multimedia*", TMH.

## CT1080: DATA STRUCTURES

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT1080	Data Structures	4	-	3	4	3	70	30	40	60	200

1. Review of Computer Programming, Definition of Data Structure, Types of Data Structures, Concept of data and information, Abstract Data Types, Design and Implementation issues of Data Structures and their memory representation.
2. Stacks: Stacks as ADT, Implementation of various operations on stack, Application of stack: Infix-Prefix expressions, their evaluation and conversions, Recursion.  
Queues: Definition, Queues as an ADT, Types of Queues: Circular Queue, Deque, Priority Queue, Implementation of various Operations on Queues, Applications of Queue.  
Linked List: Representation of linked list in memory, Implementation of linked list, Types of Linked List: Circular linked list, Doubly linked list, Header linked list, Linked Implementation of Stacks and Queues, Applications of linked list.
3. Trees: Definitions: height, depth, order, degree, etc., Binary Tree, Types of Binary Tree, Binary Search Tree: Introduction, Operations, Traversal, Search, Implementation, Applications of Trees: Representation and Evaluation of an expression with binary operators, Huffman's Algorithm, Heap; AVL Tree, Threaded Binary Tree, Multiway Trees: B tree, B+ tree.
4. Graphs: Introduction, Directed and Undirected graphs, Representation, Graph Traversal: Depth First search (DFS) and Breadth First Search (BFS), Minimum Spanning Tree: Kruskal, Prim's algorithms, Shortest Path Algorithm: Dijkstras and Warshalls algorithm, Applications of Graphs.
5. Sorting: Introduction, Different Sorting Techniques like: Bubble Sort, Quick Sort, Selection Sort, Heap Sort, Insertion Sort, Shell Sort, Merge Sort, Radix Sort, Comparison of various Sorting Techniques. Searching: Basic Search Techniques: Sequential Search, Binary Search, Indexed Sequential Search, Hashing, Comparison of various Searching techniques.

### **Books Recommended:**

#### **Text books:**

1. Langston, Augestine, Tannenbaum, "*Data structures using C & C++*", Pearson Education.
2. Seymour Lipschutz, Schaums's Outline Series, "*Theory and problems of Data Structures*", TMH.

#### **Reference Books:**

1. Kruse, Tondo, Leung, "*Data structures and Program Design in C*", Prentice Hall
2. H. Sahni, "*Fundamentals of Computer Algorithms*", Galgotia, 1984.
3. Wirth Niklaus, "*Algorithm + Data Structures= programs*", Pearson Education

## MA1077: STATISTICAL COMPUTING TECHNIQUES

S. No	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	MA1077	Statistical Computing Techniques	4	-	2	4	2	70	30	20	30	150

**Unit 1:** Elements of Characteristic Statistics: Data, Population, Sampling, Graphical Representation, Measures of Central Tendencies (Mean, Standard Deviation, Quartiles and Percentiles), Measures of Dispersion, Frequency Distributions, Moments, Correlation and Regression, Curve Fitting.

**Unit 2:** Sampling Distributions: Chi-square test, t-test and F-distribution, Laws of Large Numbers and Central Limit Theorem, Theory of Estimation, Theory of Sampling, Population and Sample Survey Methods, Statistical Inference, Different Methods of Estimation, Testing of Hypothesis and Inference.

**Unit 3:** Forecasting Methods and Models: Qualitative and Quantitative, Time Series Forecasting.

**Unit 4:** Statistical Quality Control: Control Charts, Single Sampling Plan, Double Sampling Plan, O.C. Curve, Factor Analysis, Test of Significance, Chi-Square Test and F-test Applications.

**Unit 5:** Statistical Simulation: Different types of Random Numbers and their Generation, Monte-Carlo Simulation Techniques.

### **Books Recommended:**

#### **Text books:**

1. Freund, “*Mathematical Statistics*”, Pearson Education.
2. Elhance, “*Statistical Methods*”, Kitab Mahal, Delhi.

#### **Reference Books:**

1. A. P. Baisnab and M. Jas, “*Elements of Probability and Statistics*”, Tata McGraw-Hills Publishing Company Ltd. New Delhi.
2. Makradikis & Wheelright, “*Methods of Forecasting Application*”, Prentice Hall.
3. Makradikis & Wheelright, “*Quantitative Forecasting Techniques*”, Prentice Hall.
4. Irvin R. Miller, John E. Freund and R. Johnson, “*Probability and Statistics for Engineers*”, Pearson Education.
5. Ramesh Sircar, “*Statistical Techniques and Applications*”, New Control Book Agency, Kolkata.



## MB1078: FINANCIAL MANAGEMENT & ACCOUNTING

S. No	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total
								Theory	CW	SW	Pr.	
1.	MB1078	Financial Management & Accounting	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Accountancy : Financial Statements, Trial Balance, Balance Sheet, Profit and Loss A/C, Depreciation, Equity & Preferential Shares, Debentures.

**Unit 2:** Introduction to Financial Management : Types of Business Organisations, Role of Finance Managers, Financial Statement Analysis, Fund Flow Statement.

**Unit 3:** Financial Analysis : Ratio Analysis, Leverage, Analysis, Break Even Analysis, Make or buy decisions, Fund Flow Analysis, Cost Sheet and Cash Budget.

**Unit 4:** Financial Decision Making : Financial & Investment decisions, Capital Budgeting, Credit Policy, and Working – Capital Management.

### **Books Recommended:**

1. Khan and Jain, "*Financial Management*".
2. S.N. Maheshwari, "*Financial Management*".
3. I.M. Pandey, "*Financial Management*".

## CT1094: COMPUTER SYSTEMS & PERIPHERALS LAB.

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT1094	Computer Systems & Peripherals Lab.	-	-	2	0	2	-	-	20	30	50

**Unit 1:** (a) Study of following peripheral devices (their principle of operation and different types)

-Floppy Disk Drives, Hard Disks, Printers, Keyboards, CRT and LCD Monitors, Magnetic Tapes, Optical disks – CDRoms, CD-R,CD-RW, DVDs, Zip Drives, Pen Drives, Plotters, Scanners etc.

(b) Study of Various interfacing standards:

- EIDE/ATA, SCSI, USB, Fire wire, Parallel Port i/f, ECP/EPP, PCMCIA, Fibre Channel i/f, Serial ATA etc.

(c) Programming of Device Controllers like FDC, Printer Controller, KBD Controller, CRT Controller etc.

**Unit 2:** (a) Study of modern motherboard: Different types of motherboard and core logic chipsets, different components of motherboard.

(b) Bus Standards: Different Type of buses – FSB, BSB,I/O Buses – ISA, EISA,PCI etc.

**Unit 3:** (a) Power Supply- SMPS and its features.

(b) Various Power Conditioning Devices – Voltage Stabilizers / AVRs, Line Conditioners, Spike/Surge Suppressors, Line filters etc.

(c) UPS – different types of UPS; different types of batteries for UPS

(d) Calculation of power ratings for stabilizers, UPS etc. for a given max. Load; To determine the battery requirements – no . AH rating etc. for UPS for given backup time.

**Unit 4:** (a) Study of System BIOS and its features.

(b) System configuration/ configuration of various parameters as per user requirements.

**Unit 5:** Preparation of System specification according to given requirements. Overview of troubleshooting procedures and troubleshooting devices.

### **Books Recommended:**

#### **Text books:**

1. Winn L. Rosch, ” Hardware Bible”, Techmedia.
2. Govindrajalu, “IBM PC & Clones, Hardware, Troubleshooting & Maintenance”,TMH, 2<sup>nd</sup> Edition.

#### **Reference Books:**

1. Peter Norton, “Peter Norton’s New Inside the PC”, Macmillan Computer Pub.8<sup>th</sup> Edition
2. The Good Hardware Guide, Richard Jones.
3. PC Peripheral Devices, Daniel M Smith.

# MCA II YEAR - SEMESTER I

## CT 2013: OPERATING SYSTEMS

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2013	Operating Systems	4	-	2	4	2	70	30	20	30	150

**Unit 1:** Introduction to Operating Systems: Functions, Desirable Features, Structure of an O/S, Evolution, Different Types, Booting process of a system. Operating System Services: Different types of O/S services, Methods of providing these services – System programs, System Calls; Importance of System Calls.

**Unit 2:** Operating System as Resource Manager:

- A. File Systems : File concept, User's and System programmer's view of File System; Disk organization; Disk space management, Disk space Allocation Methods, File System Creation; Directory structures; Partitioning of Hard disk, Concept of high level and low level formatting; Packing/Unpacking of blocks; File Sharing; Different layers of a File System; System Calls for File System Management.
- B. Process Management: Process Concept, Process representation – PCB; Scheduling Concepts, Types of Schedulers, Process State Diagram, CPU Scheduling – Scheduling criteria, Scheduling Algorithms, Algorithm Evaluation; System Calls for Process Management; Threads. Concurrent Processes: Real and Virtual concurrency; Mutual exclusion, Synchronization, Critical section, Inter Process Communication, Classical problems of IPC, Solutions to Critical section and Synchronization problems: Semaphores, WAIT/SIGNAL operations and their implementation, Monitors, Hardware lock/unlock instructions.
- C. Memory Management : Logical v/s Physical Address Space, Different Techniques for Memory Management Partitioning, Paging, Segmentation, Paged Segmentation; Comparison of these techniques; Overlays, Dynamic linking and loading; Virtual Memory – Concept, Implementation by Demand Paging etc.

**Unit 3:** The I/O System: I/O Devices – Block and Character Devices, Different I/O techniques; I/O Software Goals, I/O Software structure (layers of I/O system) – Interrupt Handler, Device Driver, Device independent I/O software, User-space I/O software; Terminal Drivers and Disk Drivers; Disk Scheduling Algorithms.

**Unit 4:** Deadlocks: Deadlock Problem, Characterization, Prevention, Avoidance, Recovery. Security and Protection: Security and Protection requirements, User-oriented and Data oriented Access Control, Password Protection, Access Control Lists, Capability Lists; Viruses and related threats.

**Unit 5:** Introduction to Network, Distributed, Real Time and Multiprocessor Operating Systems, Case studies: Unix/Linux, Windows-NT, DOS and other contemporary Operating Systems.

### **Books Recommended :**

#### **Text books:**

1. Silberschatz and Galvin, “*Operating System Concepts*”, John-Wiley & Sons, 2002.
2. William Stallings, “*Operating System*”, Pearson Education.

#### **Reference Books:**

1. Milan Melancholic, “*Operating System Concepts and Design*”, TMH, 2001.
2. Maurice J. Bach, “*The Design of Unix Operating System*”, Pearson Education .
3. Bill Ball, David Pitts, “*Red Hat Linux 7*”, Techmedia, 2001.
4. David Solomon, “*Inside Windows NT*”, Microsoft Press, 2/e, 1998.

## MB 2014: ORGANIZATIONAL BEHAVIOUR & HRD

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	MB 2014	Organizational Behavior & HRD	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Understanding Organization Behavior, O B model, Hawthorne studies, Foundations of Individual & Group behavior.

**Unit 2:** Theories of Motivation and Leadership: Types of Teams, Team V/s Groups, Group processes, Interpersonal needs & relations, Group dynamics, Stress management.

**Unit 3:** Organizational Change: Forces & Resistance to change, Lewin's Three Step models, Organizational Climate Culture (OC).

**Unit 4:** Acquisition of Human Resource: Job analysis, Job description, Job specification, Manpower planning, Recruitment, Selection, Placement, Induction and Job separation.

**Unit 5:** Introduction to HRD: Importance & Need of HRD, HRD processes & mechanisms, Planning & organizing HRD, OCTAPAC, KAIZEN, HRIS.

**Unit 6:** Job evaluation, Satisfaction, Compensation, Training & Development, Job enrichment, Quality of working life, Career planning, Employee welfare, Performance appraisal, TQM.

**Unit 7:** Personnel management, Organization & Function, Grievance & Conflict management, Laws & Rules governing employee benefits, Trade unions, Collective Bargaining.

**Unit 8:** Case studies.

### **Books Recommended:**

1. Robbins, "*Organization Behavior*", Pearson Education, 12th Edition.
2. Edwin Flippo, "*Personnel Management*", McGraw Hill.
3. A. M. Sheikh, "*HRD & Management*", S. Chand.

## CT \_\_\_\_\_ : DESIGN AND ANALYSIS OF ALGORITHMS

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT ____	Design & Analysis of Algorithms	4	1	-	5	-	70	30	-	-	100

**Unit 1:** Review of Elementary Data Structures: Stacks, Queues, Lists, Trees, Hash, Graph. Internal representation of Data Structures, Introduction to Algorithms, Algorithm Specifications.

**Unit 2:** Performance Analysis of Algorithms: Time and Space Complexity; Time space tradeoff, Various bounds on complexity, Asymptotic notations: O-notation,  $\Omega$ -notation,  $\Theta$ -notation, Recurrences and Recurrences solving techniques: Recursion-tree method, Master method, Substitution method, Average time analysis methods: Probabilistic methods.

**Unit 3:** Divide and Conquer Method: Structure of Divide and Conquer Algorithms, Binary Search, Quick Sort, Strassen Matrix Multiplication etc; Greedy Method: Overview of Greedy Method, Example Problems like: Minimum Cost Spanning Tree, Knapsack Problem etc.

**Unit 4:** Dynamic Programming: Overview, Matrix Multiplication, Travelling Salesman Problem, All Pairs Shortest Path and other problems; Backtracking: Overview, 8-Queens Problem, Knapsack Problem etc. Branch and Bound: The Method, Example Problems.

**Unit 5:** NP-hard and NP-complete problems: Definition, Properties and Examples; Introduction to Parallel Algorithms and Randomized Algorithms.

### **Books Recommended:**

#### Text Books:

1. Cormen, Leiserson, Rivest, Stein, *“Introduction to Algorithms”*, Second Edition, Prentice Hall of India, 2001.
2. Horowitz E. and Sahani, *“Fundamentals of Computer Algorithms”*, Galgotia Publications, 1984.
3. Aho A.V., Hopcroft J.E., J. Ullman, *“Design and Analysis of Computer Algorithms”*, Addison Wesley, 1998.

#### Reference Books:

1. Knuth D., *“Fundamental algorithms: The Art of Computer programming”*, Volume-I, Third Edition, Pearson Education 1998.
2. Knuth D., *“Semi numerical Algorithms: The Art of Computer programming”*, Volume-II, Third Edition, Pearson Education 1998.
3. Knuth D., *“Sorting and Searching: The Art of Computer programming”*, Volume-III, Second Edition Pearson Education 1998.
4. John Kleinberg, Trades E., *“Algorithm Design”*, Pearson Education 2002.
5. A. Papoulis, S.U. Pillai, *“Probability, Random Variables and Stochastic Processes”*, McGraw Hill, Fourth Edition 2006.

## CT 2016: OBJECT ORIENTED PROGRAMMING

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2016	Object Oriented Programming	4	-	3	4	3	70	30	40	60	200

**Unit 1:** Introduction: Inherent Complexity of Software, Attributes of Complex Systems, Elements of the Object Model: Minor and Major elements.

**Unit 2:** Object Oriented Concepts: Problem Solving using Object Oriented approach, Objects and classes, attributes and methods, constructors, data abstraction and encapsulation, data hiding.

**Unit 3:** Introduction to Object Oriented Fundamentals: Basic language elements, Primitive and Non primitive data types, Unicode Character set, Variables: default and initial value of variables, Operators And Assignments, Access Modifiers, Methods: declaration, calling.

**Unit 4:** Object Oriented Programming : Arrays, control structures, String handling, Conversions, packages and interfaces, class inheritance , polymorphism :Compile time and Run time, wrapper class, error handling with exceptions, multithreaded programming, I/O and advanced features of object oriented programming.

**Unit 5:** Introduction to Object Oriented Analysis and Design: Design concept, Use Cases, Class diagrams, State Transition diagrams, Object diagrams.

### **Books Recommended :**

#### **Text books:**

1. Grady Booch, “*Object Oriented Analysis and Design with Applications*”, Pearson, 2/e, 2001.
2. H. Schildt, “*Java The Complete Reference*”, TMH, 2001.
3. Khalid A Mughal “*A Programmer’s Guide to Java SCJP Certification*”.

## MB 2044: COMMUNICATION SKILLS

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	MB 2044	Communication Skills	-	-	2	0	2	-	-	50	-	50

**Unit 1:** Meaning and Process of Communication, Importance of Effective Communication, Communication situation and Communication skills. Barriers to Communication, Objectives of Communication. Types of Communication, Principles of Communication, Guidelines of Effective Communication.

**Unit 2:** Media of Communication, Written, Verbal & Non-Verbal, Face to face, Visual, Merits and Demerits of Written and Oral Communication.

**Unit 3:** Developing Communication Skills, Interview, Seminar, Groups discussion, Empathetic Listening, Communication skills in E-commerce.

### **Books Recommended:**

1. "Business Communication, Strategy & Skills", Prentice Hall, New Jersey, 1987.
2. U.S.Rai & S.M.Rai, "Business Communication", Himalaya Publishing House, M.
3. Rajendra Pal, "Essentials of Business Communication".
4. Virendra Kumar & Bodh Raj, "Business Communication", Kalyani Publication.

**MCA II year - Semester II**  
**CT 2061: COMPUTER NETWORKS**

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2061	Computer Networks	4	-	2	4	2	70	30	20	30	150

**Unit 1:** Introduction: Use of Computer Networks, Types of Networks, Intranet, Different LAN & WAN topologies, Networking hardware & software: Hardware Components – Transmission media, Access Devices – NIC, Routers; Repeaters. Software Components – Protocols, Device Drivers, Communication S/W. Layered Network Architecture, Reference Models - ISO-OSI, TCP/IP.

**Unit 2:** Physical Layer : Basics of Data Communication, Guided Transmission media – Twisted Pair Wire, Coaxial Cables, Fibre-optic Links; Wireless Transmission – Radio, Microwave, Lightwave Transmission; Communication Satellites, PSTN.  
Introduction to Switching: Circuit Switching , Packet Switching, Message Switching.  
Physical Layer N/W Devices – Hubs, Repeaters, Transceivers, Connectors, N/W Adapters, Bridges.

**Unit 3:** Data Link Layer: Framing, Error control, Flow control.  
Elementary Data Link Protocols: Stop and Wait Protocols; Sliding Window Protocols.  
Example Data Link Protocols - HDLC, SLIP, PPP.  
Medium Access Sub-layer: Channel allocation - Static, Dynamic.  
Multiple Access Protocols: Pure ALOHA, slotted ALOHA, CSMA/CD, CDMA, CSMA/CA.  
Collision Free Protocols; Limited Contention Protocols.  
Local Area Networks: LAN types, IEEE 802.X standards – Ethernet, Fast Ethernet, Gigabit Ethernet; Token Ring Protocols, FDDI Protocol.

**Unit 4:** Network layer: Design issues - Implementation of Connectionless and connection oriented services; Virtual circuits Vs Data-gram subnets.  
Routing algorithms: Shortest path, Flooding, Flow based, Distance Vector, Link state, Hierarchical, Broadcast, Multicast Routing. Flow & Congestion Control.  
Internetworking : IP overview, IP packet structure; IP addressing, subnetting, supernetting, CIDR, Fragmentation & Reassembly; Inter-network routing protocols – OSPF, RIP, BGP, EGP; ICMP; ARP, RARP; DHCP; Introduction to Tunneling, Mobile IP, IPv6.

**Unit 5:** Transport Layer: Connection Establishment & Termination; Error Control, Flow Control & Buffering, Multiplexing, Crash recovery; RPCs.  
The Internet Transport Protocols – UDP and TCP. Gateways.  
Application Layer: Introduction to Client-Server Applications, Domain Name Services, Email, File Transfer protocols. Remote Access Applications and protocols like Telnet; WWW, HTTP.  
Introduction to Network Programming; Network Management.

**Books Recommended :**

**Text books:**

1. Forozan B.A., "Data communications and networking", Tata mcGraw Hill ,4/e.
2. Tanenbaum, A. S., "Computer Networks", Pearson Education.

**Reference Books:**

1. Comer, Douglas E., "Internetworking with TCP/IP, Vol. I", Pearson Education.
2. Larry Peterson, Bruce Davie, "Computer Networks: A System Approach", Morgan Kaufman.
3. William Stallings, "Data & Computer Communication", Pearson Education.



## CT 2062: DATABASE MANAGEMENT SYSTEMS

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2062	Data Base Management Systems	4	-	3	4	3	70	30	40	60	200

**Unit 1:** Introduction : Basic concepts – View of Data – Data Abstraction, Instances and Schemas, Data independence;; Database Languages; Database Administrator; Overall system structure; Database system Architecture; Comparison with conventional methods of data processing. Various Data Models: E-R model - Basic Concepts, design issues, E-R Diagram, Relational model - Structure of Relational Databases, Relational Algebra and Calculus.

**Unit 2:** Database Languages: SQL, DDL, DML, PL/SQL.

**Unit 3:** Integrity Constraints – Domain constraints, Assertions, Triggers, Functional Dependencies. Relational Database Design – Decomposition, Normalization Techniques. Indexing and Hashing – Basic Concepts, B-Tree, B<sup>+</sup> Tree, Static and Dynamic Hashing.

**Unit 4:** Query Processing – Selection, Sorting, Join and other Operations; Transaction Processing; Concurrency Control; Data Recovery Techniques. SQL Programming, Introduction to embedded SQL & QBE, Case study on a RDBMS.

**Unit 5:** Advanced Data Models and Emerging Trends: Introduction to Object Oriented, Parallel, Distributed and Multimedia Databases. Introduction to Data Mining and Data Warehousing.

### **Books Recommended:**

#### **Text books:**

1. H. F. Korth and A. Silberschatz, “*Database System Concepts*”, 6/e, TataMcGraw-Hill.
2. R. Elimasri and S. Navathe, “*Fundamentals of Database Systems*”, 5/e, Pearson Education, 2006.

#### **Reference Books:**

1. C. J. Date, “*An Introduction to Database Systems, vol-I*”, Addison Wesley, 1994.
2. J. D. Ullman, “*Principles of Database Systems*”, Galgotia, 1994.
3. Rob & Coronel, “*Database Systems: Design, Implementation & Management*”, Thomson Learning.
4. Patrick O’Neil & Elizabeth O’Neil, “*Database Principles, Programming and Performance*”, Harcourt India.

## CT 2063: SOFTWARE ENGINEERING – I

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2063	Software Engineering – I	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Introduction: System Development Life Cycle; Software Process Models, System Engineering. Software Process and Project Metrics: Measures, Metrics and Indicators.

**Unit 2:** Software Project Planning: Planning Objectives, Project Estimation, Decomposition Techniques, Empirical Estimation Models – the COCOMO Model. Risk Analysis and Management: Software Risks, Risk identification and Projection, Risk Mitigation, Monitoring and Management. Project Scheduling and Tracking: Basic Concepts; Defining the Task Set for the S/W Project; Scheduling; Error Tracking.

**Unit 3:** System Analysis:

- Requirement Analysis, Use-Cases, Analysis Principles, Software Prototyping, Requirement Specifications.
- Analysis Modeling: Data Modeling – Entity Relationship Diagrams; Functional Modeling – Data Flow Diagrams; Behavioral Modeling; Data Dictionary.

**Unit 4:** System Design:

- The Design Process, Design Principles, Design Concepts, Effective Modular Design, Design Documentation.
- Architectural Design: Data Design
- User Interface Design, Component Level Design.

**Unit 5:** Software Testing: Testing Fundamentals, Test Case Design, White-Box Testing, Black-Box Testing; Verification and Validation, System Testing. Technical Metrics for Software: Metrics for the Analysis Model, Design Model; Metrics for Testing, Maintenance. Software Quality Assurance & Reliability:

- Quality Control, Quality Assurance, Software Reviews, Statistical Software Quality Assurance.
  - Introduction to ISO Quality Standards
  - Software Reliability: Measures of Reliability.
- Software Configuration Management: Version Control, Change Control.

### **Books Recommended:**

#### **Text Books:**

1. R. S. Pressman, “*Software Engineering - A practitioner’s approach*”, 5<sup>th</sup> Edition, McGraw-Hill 2001.
2. Pankaj Jalote, “*An Integrated Approach to Software Engg.*”, 2<sup>nd</sup> Edition, Narorsa.

#### **References Books:**

1. Richard Fairley, “Software Engineering Concepts”, McGraw-Hill.
2. Ian Sommerville, “Software Engineering”, 6th Edition Pearson Education.
3. G. L. Myers, “Software Reliability”, Wiley Inter Science.
4. M. L. Shooman, “Software Engineering”, McGraw-Hill.

## CT 2081: ADVANCED OPERATING SYSTEMS

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2081	Elective – I	4	1	-	5	0	70	30	-	-	100

**Unit 1:** Review of fundamental concepts of Operating System. Evolving trends in traditional O/S: related to security & Protection, Multithreading, Design and implementation issues of operating System: current trends, Introduction to Advanced Operating System, Different types of Advanced Operating Systems, Comparison of Advanced Operating System with traditional Operating System.

**Unit 2:** Network & Distributed Operating Systems: Fundamentals, Message Passing: features, issues, buffering, process addressing, group communication, RPC: RPC model, implementation, stub generation, RPC messages, server management, client server binding, Distributed Shared Memory: architecture, design & implementation issues, advantages of DSM, Synchronization: clock synchronization, event ordering, election algorithm.

**Unit 3:** Process Management: process migration, threads, Resource Management: features, Distributed file systems: features, file models, file accessing models, file replication, design principles, Security & protection in Distributed Operating System: cryptography, authentication, access control, digital signature.

**Unit 4:** Multiprocessor Operating System: Types of Multiprocessor Operating Systems, functions & requirements, Processor management & Scheduling.

**Unit 5:** Real Time Operating System: Introduction, applications and essential features; Real Time scheduling, tasks & task states; memory management, semaphores and shared data; Embedded System design using a Real Time Operating System. Introduction to Database O/S, Multimedia O/S, Case studies of Operating System like windows 2000, Linux, RT-Linux, VxWorks etc.

### **Books Recommended:**

#### **Text Books:**

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts & Design", PHI, 2002.
2. Milan Milenkovic, "Operating Systems: Concepts & Design", TMH, 2nd Ed.

#### **References Books:**

1. Mukesh Singhal Niranjana G. Shrivaratri, "Advanced Concepts in Operating Systems", TMH, 2001.
2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts & Design", Pearson Education, 4<sup>th</sup> Ed.
3. David E. Simon, "An Embedded Software Primer" Addison Wesley.
4. Silberschatz and Galvin, "Operating Systems Concepts", John Wiley & Sons, 6 Ed.

## CT 2082: COMPILER DESIGN

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2082	Elective – I	4	1	-	5	0	70	30	-	-	100

**Unit 1:** Introduction to Compiler: Overview of the Translation Process, Analysis of Source Program, Phases of a compiler.

Grammars: Tokens and Alphabets, Strings, Classes of Grammars, Sentinel forms, Derivation and Reduction Trees, Ambiguity.

Lexical Analysis & Finite Automata: Transformation of NDFSM to DFSM, Regular Grammars and FSMs, FSM representations, Lexical Analyzer – Delimiter and Reserved Words, Literals, Strings, Identifiers, Keywords, Special Tokens, LEX.

**Unit 2:** Syntax Analysis: Basic Parsing Techniques – Top-down, Bottom up, Operator Precedence, Automatic Construction of Efficient Parsers: LR, SLR, LALR, LL(O), LL(I), LL(K) etc, YACC.

**Unit 3:** Semantic Analysis: Computation of Expression, Control Structures – Loops, Procedure Calls etc., Conditional Statements, Various Intermediate Code Forms, Syntax Directed Translation.

Memory Allocation & Symbol Table Organizations: Static & Dynamic Allocation, Array Allocation, String Allocation, Structure Allocation, Symbol Table Contents, etc.

Error Detection Indication & Recovery: Routines for Printing, Various Lexical, Syntax and Semantic Errors.

**Unit 4:** Code Optimization: Optimization Issues, Loop Optimization, Local & Global Optimization, Program Flow Analysis.

**Unit 5:** Incremental Compilers & Interpreters: Structure of Target Program, Error Handling, Conversational Debugging, Structure of an Incremental Compiler.

### **Books Recommended:**

#### **Text Books:**

1. Aho, Sethi and Ullman, “*Compilers: Principles, Techniques and Tools*”, Pearson Education.
2. D. M. Dhamdhere, “*Compiler Construction-Principles and Practices*”, McMillan Publication.

#### **Reference Books:**

1. J. P. Trembley and P. G. Sorrenson, “*The Theory and Practice of Compiler Writing*”, McGraw-Hill.
2. Allen I. Holub, “*Compiler Design in C*”, Prentice Hall of India, 2003.
3. J.P. Bennet, “*Introduction to Compiler Techniques*”, Second Edition, Tata McGraw-Hill, 2003.
4. Henk Alblas and Albert Nymeyer, “*Practice and Principles of Compiler Building with C*”, PHI, 2001.
5. Kenneth C. Loudon, “*Compiler Construction: Principles and Practice*”, Thompson Learning, 2003.

## CT 2083: INTELLIGENT SYSTEMS

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2083	Elective – I	4	1	-	5	0	70	30	-	-	100

**Unit 1:** Artificial intelligence: Definition, Scope of AI, AI techniques, Problem Solving, Use of Heuristics, Game Playing.

**Unit 2:** Knowledge Representation: Symbolic logic, Predicate logic, Deduction, Abduction and Induction, Conceptual dependency, Semantics nets, frames and scripts, Design of knowledge bases, inference engine, deductive databases, OO databases, implementation in PROLOG/ LISP like languages.

**Unit 3:** Handling Uncertainty – Use of certainty Factors, Fuzzy Logic. Learning: Learning using neural nets, Explanation based learning, Learning by example. Planning: Representations for planning, Knowledge engineering for planning, Conditional planning.

**Unit 4:** Expert Systems: Knowledge elicitation, acquisition, processing, Knowledge Engineering Tools. Intelligent interfaces, Prototyping.

**Unit 5:** Advanced issues in AI: Natural language processing, Speech Recognition, Computer Vision, Perception, CASE based and modal based reasoning.

### **Books Recommended:**

#### **Text Books:**

1. Rich and Knight, “*Artificial Intelligence*”, Tata Mcgraw Hill, 2<sup>nd</sup> Edition.
2. Patterson, “*Introduction to AI and Expert systems*”, Pearson Education.

#### **Reference books:**

1. J. D. Ullman, “*Principles of databases and knowledge based systems*”, MD.
2. Addis, “*Designing Knowledge Based systems*”, Prentice Hall.
3. Stuart Russell, Peter Norwig, “*Artificial Intelligence A modern Approach*”, Pearson Ed., 2002.

## MB 2084: ENTERPRISE RESOURCE PLANNING

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	MB2084	Elective – I	4	1	-	5	0	70	30	-	-	100

**Unit 1:** Evolution of Enterprise Resource Planning & Need for ERP: Accommodating variety, seamless integration, integrated data model, strategic and operational issues in ERP.

**Unit 2:** Business Re-Engineering: Significance and functions of business re-engineering BPR, ERP and information technology.

**Unit 3:** MRP and JIT Systems: Business Modelling for ERP, Building the business model, ERP and MRP - II. Blueprint of ERP business model.

**Unit 4:** ERP Implementation: Role of Consultants vendors and users, customisation, methodology and guidelines for ERP implementation.

**Unit 5:** ERP and Competitive Advantage. Marketing of ERP.

**Unit 6:** ERP Domain: An overview MFG / PROIFS / AVALON - Industrial and Financial systems, Baan - IV, SAP 81, SAP R/3 applications.

**Unit 7:** Purchase Management: Purchasing Organization, Purchase Procedures. Purchase Principles, Purchasing for Mass Production. Purchase contract. Make or Buy Decision, Material Import.

**Unit 8:** Inventory Management: Inventory Models. Quantity Discounts, Shortages, Fixed Time Models. Buffer Stock. Models with price Breaks, Selective Inventory Control, Multi-period Models, Stochastic Inventory Models. Inventory Planning to meet resource constraints.

**Unit 9:** Case Studies.

### **Books Recommended :**

1. Garg V. K., N. K. Venkitakrishnan, “*Enterprise Resource Planning, Concept and Practice*”, PHI, 1998.
2. Jayaraman, “*Business Process Re-Engineering*”, TMH.
3. “*SAP R/3 Manual*”, PHI.
4. Dobbler-Lee, “*Purchasing and Materials Management*”,
5. Alexis Leon, “*Enterprise Resource Planning*”.
6. Arnold, “*Introduction to material management*”, Pearson Education

## MB 2085: MANAGEMENT SUPPORT SYSTEM

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	MB2085	Elective – I	4	1	-	5	0	70	30	-	-	100

- Unit 1:** Introduction: Objective and cost benefits of Management Information systems (MIS), Decision and MIS, A decision Environment Model, Decision Strategies.
- Unit 2:** Information: Characteristics of Information, Measurement and amount of Information, Information Search, Storage and Retrieval, Information Feed back system.
- Unit 3:** Planning of MIS: Planning Techniques, Project Proposals, Reporting and Controlling.
- Unit 4:** Design Implementation and Evaluation of M.I.S. : Determination of Information needs and sources, Development of Conceptual Design, Development of Detailed Design, Selection of Final Design, Design Report, Organization for implementation training of operational Personnel. Forms and Files for Data Collection. Evaluation, Control & Maintenance of Information systems.
- Unit 5:** Management concept and C.B.I.S. : Role of C.B.I.S. in Management, M.I.S. and C.B.I.S. family, M.I.S. in total C.B.I.S. Environment. An M.I.S. Model and Dimensions of M.I.S. Model, Types of C.B.I.S.
- Unit 6:** Transaction Processing: An overview of Tele-processing Systems (T.P.S.) Techniques of T.P.S., Processing Models – M.I.S. and T.P.S.
- Unit 7:** Decision Support System: Definition, Characteristics of D.S.S., Difference in D.S.S. and M.I.S. Development of D.S.S. and its application.
- Unit 8:** Functional Application of M.I.S. : The production sub-system. Marketing sub-system, Finance sub-system and Personal Sub-system.
- Unit 9:** Office Automation system: Definition, Importance, Planning and Implementation of Automated Computer Based Office Communication system.

### **Books Recommended :**

1. Kanter, , “*Management Information System*”.
2. Murdick & Ross, “*Management Information System*”.
3. Alan Simpson, “*Dbase - III*”.

## MB 2086: OPTIMIZATION TECHNIQUES

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	MB2086	Elective – I	4	1	-	5	0	70	30	-	-	100

**Unit 1:** Introduction: History and development of O.R., present trend.

**Unit 2:** Linear Programming: Model Formulation, Graphical and Simplex Method, Big- M & Two-Phase Simplex, Duality in L.P., Revised Simplex Method.

**Unit 3:** Allocation:

A: Transportation Models, Optimality Test, Degeneracy, Unbalanced Problems.

B: Assignment Models.

**Unit 4:** Waiting Line Models: Introduction to arrival and service process and effect of variability on queue system, Classification, States in Queue, Probability distribution of arrivals and service times, Single server model (M/M/1), Multi server model (M/M/S).

**Unit 5:** Simulation: Definition and Need, Monte-Carlo simulation, Random numbers and Mapping to probability Distributions (standard and user defined), Changes in states due to multipoint variability, steps for simulation, Simulation softwares.

**Unit 6:** Game Theory: Two persons zero-sum game, Maxmin and Minimax Principles, Saddle point, Dominance, Graphical and Algebraic methods of solution, Solution by transforming into Linear Programming Problem.

**Unit 7:** Network Techniques: Introduction to Project Networks, Work Break Down and Manageable activities, PERT Variability in activity times and Probability of Competition, CPM - Critical path and activity floats.

**Unit 8:** Computer Applications in O.R.: Introduction to Softwares such as LINDO, LINGO.

### **Books Recommended:**

1. H.Taha, "*Operations Research*", Pearson Education.
2. Philips-Ravindran, "*Operations Research*", John Wiley.
3. Heera-Gupta, "*Operations Research*", S. Chand.
4. B. Banerjee, "*Operations Research*".
5. S.D.Sharma, "*Operations Research*".
6. N.D.Vora, "*Operations Research*", TMH.



## CT 2087: ENTERPRISE COMPUTING

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2087	Elective – I	4	1	-	5	0	70	30	-	-	100

**Unit 1:** Introduction: An Introduction to Enterprise Information Systems in Organizations, Organizing Data and Information, Enterprise Architectures, MVC Architecture.

**Unit 2:** Design Patterns: Concept, Benefits, Categories of patterns and their applications.

**Unit 3:** Server-side programming : Introduction to Server Side Programming, JSP and Servlets: Architecture, Life Cycle and methods, Remote Method Invocation, Introduction to Java Beans and its types, Enterprise Java Beans, JDBC, Struts

**Unit 4:** Client-Side Scripting: HTML, Core JavaScript, Client side validation using JavaScript.

**Unit 5:** Enterprise Security: Transactions and Security: Web security and Application security, Authentication and Authorization, security for active contents, Security Administration & Management.

### **Books Recommended:**

#### **Text Books:**

1. Jim Keogh, "*J2EE: The Complete Reference*", Tata McGraw Hill, 2006, ISBN: 0-07-052912-4.
2. Erich Gamma, Richard Helm, Ralph Johnson & John Vlissides, "*Design Patterns: Elements of Reusable Object Oriented Software*", Addison Wesley Publication..
3. Ralph Stair & George Reynolds, "*Principles of Information Systems*", Thompson, ISBN: 1-4239-0115-0.
4. Danny Goodman, "*JavaScript & DHTML Cook Book*", O'Reilly Media Publication, Second Edition.

#### **References Books:**

1. David Flanagan, Jim Farley & William Crawford, "*Java Enterprise in a Nutshell*", Second Edition, O'Reilly Publisher.
2. Deitel & Santry, "*Advanced Java 2 Platform – How to Program*", 2002, Prentice-Hall, ISBN: 0-13-089560-1.
3. D. Xlur, J. Gupi & D. Malks, "*Core J2EE Patterns: Best Practices & Design Strategies*" Pearson Education, 2006.
4. James Holmes, "*Struts: The complete reference*", Tata McGraw Hill, Second Edition, 2007.
5. James Elliott, Timothy M. O'Brien, Ryan Fowler, "*Harnessing Hibernate*", O'Reilly Publication 2008.
6. Neil Daswani, Christoph Kern, Anita Kesavan, "*Foundation of Security*", Apress Publication, 2007.

## CT 2095: SYSTEM ADMINISTRATION LAB

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2095	System Administration Lab.	-	-	2	0	2	-	-	20	30	50

**Unit 1:** Introduction to System Administration tasks.

**Unit 2:** Setting up a Lab : O/S installation and configuration, Remote installation of O/S, booting process of various O/S, Remote booting of O/S, partitioning of disk, Network configuration, rapid deployment techniques, S/W packages – installation, configuration, de-installation.

**Unit 3:** Managing users and groups : Managing user accounts, administering user passwords, user authentication.

**Unit 4:** File System and Disks : Managing file systems, Sharing file systems, Protection of files, Role based access control.

**Unit 5:** Back-up & Restore : Back-up media, backing-up files and file-systems, restoring files from back-ups, Network back-up systems.

**Unit 6:** Managing System Resources : System configuration, System performance and tuning, monitoring and controlling processes, monitoring and managing disk space usage, network performance, troubleshooting, system accounting, management of print jobs.

**Unit 7:** Automating Administrative Tasks : Creating effective shell scripts and using various tools to automate different administrative tasks.

**Unit 8:** Case studies : Case studies of contemporary operating systems like Linux/Unix, Windows 2000 etc.

### **Books Recommended :**

1. Eleen Frisch, “*Essential System Administration*”, O’reilly, 3<sup>rd</sup> Edition.
2. D.Haralson, S.Sjouwerman, B.Shilmover, J.Michael, “*Windows 2000 Server & Professional System Administrators Black Book*”, John Wiley, 2<sup>nd</sup> Ed.
3. Christopher, “*Red Hat Linux 10 Bible*”, John Wiley.

## CT 2096: OPERATING SYSTEM INTERNALS

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 2096	Operating System Internals	-	-	2	0	2	-	-	20	30	50

**Unit 1:** Overview of UNIX/Linux, Windows operating system, Layered architecture, The Kernel and kernel data Structures.

**Unit 2:** Internal representation of files in UNIX/Linux: the inode, conversion of pathname to inode, superblock, Windows NTFS Layout & metadata, system calls for file management in UNIX/Linux and Windows.

**Unit 3:** Concepts of process: PID, process state and transition, context of a process, manipulation of process address space, system calls for process management in UNIX/Linux and Windows using Win32 API.

**Unit 4:** Development of small utilities in UNIX and Windows using system calls.

**Unit 5:** Developing a shell with certain minimal features for UNIX/Linux.

### **Books Recommended:**

#### **Text Books:**

1. Maurice.J.Bach, "Design of UNIX Operating System", PHI.
2. Levine, "Windows XP: The complete reference", Tata McGraw Hill.
3. Beck, "Linux Kernel", Pearson Education.

#### **References Books:**

1. Sumitabha Das, "UNIX Concepts & Applications", "Tata McGraw Hill.
2. Honeycutt, "Introducing Windows 2000 Profesional", Microsoft Press.
3. Peterson, "UNIX": The complete reference". 5/e, Tata McGraw Hill.

**MCA III YEAR**  
**CT 3011: INTERNET & WEB TECHNOLOGY**

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 3011	Internet & Web Technology	4	-	2	4	2	70	30	20	30	150

**Unit 1:** Introduction to Internet: Evolution of Internet & WWW, Internet Working concept, Review of TCP/IP, Architecture, Basic Tools of Internet Access, Browsing and Search Technologies. DNS, Internet Service Providers, Internet Connectivity: Wired – Dial up, Leased Lines, ISDN Lines, and Wireless – Radio Link, VSAT.

**Unit 2:** Web Site Planning & Designing: Introduction to HTML, Java Script, Introduction to server side programming language like php, orientation towards php, Basic rules of php programs, functions, storing information with database. Web Management: Fault Management, Configuration and Performance Management, Web Sites Maintenance

**Unit 3:** Web Site Hosting: WWW Servers, Multiple Sites on a single Server, HTTP, URLs, How to register a Web Site on Search Engine, Mail Hosting facilities. Web Browsers: Principle, Types, Examples  
Web Searching: Principle of working of Search Engines, Types of Search Engines, Example Search Engines, Searching Mechanisms.

**Unit 4:** Important Web Protocols:

File Transfer Protocol: Types of FTP Servers, including anonymous; TFTP, SMTP.

Telnet: Telnet Protocol, Server Domain, Telnet Client, Terminal Emulation; Usenet and Internet relay chat, Web Applications: E-mail: E-mail Networks, E-mail Protocols (X-400, SMTP, and UUCP).

**Unit 5:** Format of an E-mail message, E-mail headers, E-mail contents and encoding, E-mail routing, E-mail client, POP-3, IMAP-4. Introduction to SOA, Web services & their architecture, service registry/brokers, WSDL interfaces, Introduction to semantic Web.

**Books Recommended:**

**Text Books:**

1. Young, “*Internet : The Complete Reference*”, Tata McgrawHill.
2. Zacker, “*Networking :The Complete Reference*”, Tata McgrawHill.
3. Tannenbaum, A.S, “*Computer Networks*”, Pearson Edu.
4. David Sklar, “*Learning PHP 5*”, O’Reilly.

**Reference Books:**

1. Douglas Comer, “*The Internet Book*”, Pearson Education.
2. T.A.Powell, “*The Complete Reference – HTML*”, Tata McgrawHill
3. Joe Sklar, “*Principles of Web Design*”, Vikas Pub.

## CT 3012: SOFTWARE ENGINEERING – II

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 3012	Software Engineering – II	4	-	2	4	2	70	30	20	30	150

**Unit 1:** Review of Software Engineering Concepts and Fundamentals.

(a) Component Based Software Engineering: The CBSE Process, Domain Engineering, Component Based Development.

(b) Computer Aided Software Engineering.

(c) Software Re-Engineering: Business Process Re-engineering, Reverse Engineering, Forward Engineering.

**Unit 2:** Object Oriented Concepts and Principles: The Object Oriented Paradigm, Basic Concepts, Elements of an object model, OO Project Metrics and Estimation.

**Unit 3:** Object Oriented Analysis: Conventional v/s OO Approach, Unified Modeling Language (UML); Domain Analysis; The OO Process, Use – Cases; Object-Relationship Model, Object-Behavior Model.

**Unit 4:** Object Oriented Design: Design issues, OO Design using UML; The System Design Process, Object Design Process, Design Patterns.

**Unit 5:** Object Oriented Testing: Correctness and Consistency of OOA and OOD Models; Test Cases for OO Software. Technical Metrics for Object-Oriented Systems.

### **Books Recommended:**

#### **Text Books:**

1. R.S.Pressman, “*Software Engineering*”, McGrawHill, International, 5<sup>th</sup> Edition.
2. Ivon Jacobson, “*Object Oriented Software Engineering*”, Addison Wesley.
3. Booch G., “*The Unified Modelling User Guide*”, Addison Wesley, 1999.

#### **Reference Books:**

1. Gamma G.Helm, Johnson, “*Design Patterns, Elements of Reusable Object Oriented Software*”, Addison Wesley.
2. Shaw M., “*Software Architecture*”, PHI.

## CT 3021: DATA WAREHOUSING AND DATA MINING

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 3021	Elective – II	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Introduction: Basic data mining tasks, Data Mining V/s knowledge discovery in databases. Data mining issues. Data Mining from a Data Base perspective, Fuzzy sets and fuzzy logic, Information retrieval, DSS, Dimensional Model, Web search engines.

**Unit 2:** Data Mining Techniques: A statistical perspective on data Mining, Similarity measures, Decision trees, Data Mining using Neural Networks and genetic algorithms.

**Unit 3:** Basic data mining Techniques : Classification: Statistical-based algorithms, Distance-based algorithms, Decision tree-based algorithms, Neural network-based algorithms, Rule-based algorithms, Combining Techniques. Clustering : Hierarchical algorithms, Partitional algorithms, Clustering large databases – BIRCH, DBSCAN, CURE algorithms. Association rules : Parallel and distributed algorithms, Basic algorithms.

**Unit 4:** Data Warehousing: Introduction, Delivery Process, Data warehouse Architecture, Data Preprocessing: Data cleaning, Data Integration and transformation, Data reduction. Data warehouse Design: Database schema, Partitioning strategy Data warehouse Implementation, Data Marting, Meta Data, A Multidimensional Data model.

**Unit 5:** OLAP Systems: Basic concepts, OLAP queries, Types of OLAP servers, OLAP operations etc. Data Warehouse Hardware and Operational Design: Security, Backup And Recovery, Applications of Data mining and Data warehousing.

### **Books Recommended:**

#### **Text Books:**

1. Pang – ning Tan, “*Introduction to Data Mining*”, Pearson Edu, 2007.
2. Jaiwei Han, Micheline Kamber, “*Data Mining : Concepts and Techniques*”, Morgan Kaufmann Publishers.

#### **Reference Books:**

1. Margaret H. Dunham, “*Data Mining : Introductory and Advanced topics*”, Pearson Edu., 2003.
2. Anahory & Murray, “*Data Warehousing in the Real World*”, Pearson Edu., 2003.

## CT 3022: DISTRIBUTED COMPUTING

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 3022	Elective – II	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Introduction : Introduction to Distributed Systems and Distributed Computing, Distributed systems Vs Computer Networks, Goals and objectives of distributed Systems, Distributed Computing models & architectures : Client/Server Architecture- Two tier and Multi tier architecture; other models. Processes in Distributed Systems: Threads, concurrent Process, clients, servers, code migration, software agents.

**Unit 2:** Communication & Synchronization: Interprocess communication, message passing & RPC, Remote Method Invocation, Clock synchronization, Logical & Physical clock, distributed programming, Election Algorithms, Mutual exclusion, Distributed transaction processing.

**Unit 3:** Distributed Shared Memory: Introduction, Architecture of DSM, design & implementation issues, consistency models & protocols. Distributed File System Introduction File Models, File Sharing semantics, File caching & File replication, Atomic transactions.

**Unit 4:** Fault Tolerance: Basic concepts, failure models, reliable client server communication, Distributed commit, Recovery methods.

**Unit 5:** Security: Security threats, Authentication , Cryptography, Access Control- Firewalls.  
Case Study: CORBA,D-COM,GLOBE, .NET etc.

### **Books Recommended:**

#### **Text Books:**

1. Andrew S. Tanenbaum, Maarten Van Steen “*Distributed Systems: Principles and Paradigms*”, Pearson Education, 3<sup>rd</sup> Ed.
2. Pradeep K. Sinha, “*Distributed Operating System: Concepts & Design*”, PHI,2003.

#### **Reference Books:**

1. Randy Chow, and Theodore Johnson, “*Distributed Operating Systems and Algorithms*”, Addison-Wesley.
2. Singhal Mukesh, Shivaratri N.G., “*Advanced Concepts in Operating Systems, Distributed, Database, and Multiprocessor Operating Systems*”, McGraw Hill.
3. George Caulouris, Jean Dollimore, Tim Kindberg, “*Distributed Systems : Concepts and Design*”Addison Wesley, 3<sup>rd</sup> Ed.
4. Andrew S. Tanenbaum ,” *Distributed Operating System*”, Pearson Education

## CT 3023: MOBILE COMPUTING & COMMUNICATION

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 3023	Elective – II	4	-	-	4	0	70	30	-	-	100

### Unit 1: Introduction:

Overview of Mobile and Wireless Technology, Evolution of Mobile communication, Examples of Wireless communication systems, Applications of Mobile and Wireless Technology. Cellular Systems: Introduction, Cell Area, Capacity of Cells, Channel allocation, Frequency reuse, Cochannel Interference, Cell Splitting, Cell Sectoring

### Unit 2: Wireless transmission:

Signals and Noise, Antennas. Multiplexing – SDM, FDM, TDM, CDM. Modulation – ASK, FSK, PSK, AFSK, APSK, Multicarrier modulation. Spread Spectrum – DHSS, FHSS. Wireless Medium Access Control: SDMA, FDMA, TDMA, Spread Spectrum Multiple Access – FHMA, CDMA, Hybrid spread spectrum techniques, GPRS, SMS. Packet Radio – Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CA, Reservation ALOHA, PRMA. Multi-hop Wireless.

### Unit 3: Wireless Networking:

Ad-hoc Networks, Wireless LANs and PANs – IEEE 802.11, HiperLAN, Bluetooth. Mobile Network Layer – Mobile IP, Routing in mobile networks. Mobile Transport Layer – Indirect TCP, Snooping TCP, Mobile TCP. Mobile Agent – Model, Architecture, Mobile DataBase, Mobile DataBase Management.

### Unit 4: Wireless Systems & Standards:

Telecommunication Systems – AMPS, GSM, DECT, TETRA, UMTS, IMT-2000. Satellite Systems – Types - GEO, LEO, MEO, GPS. WLL, MMDS, LMDS, WAP, WML.

### Unit 5: Wireless Security Issues:

Security threats to wireless networks, Open system authentication, Shared key authentication – WEP, Encryption Issues in Mobile Commerce.

### **Books Recommended:**

#### Text Books:

1. Schiller J., “*Mobile Communications*”, AW Publications, 2001.
2. Rapport T., “*Wireless Communications – Principles and Practice*”, Pearson, 2/e, 2003.

#### Reference Books:

1. Agrawal D. & Zeng Q., “*Introduction to Wireless and Mobile Systems*”, Vikas Publishing House, 2003.
2. Blake R., “*Wireless Communication Technology*”, Thomson Asia, 2001.



## CT 3024: BIOINFORMATICS

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 3024	Elective – II	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Fundamentals of Bioinformatics : Introduction, Importance of Bioinformatics, The Biological Sequence, Sequence Analysis, Experimental sources of Biological Data, Homology and Analogy, Fundamentals of Molecular Biology, Pattern Recognition, Publicly available Databases/Biology Networks.

**Unit 2:** Biological Databases, DNA Sequence Databases, DNA Sequence Analysis.

**Unit 3:** Bioinformatics Tools : Visualisation of Sequence Data, Sequence Alignment, Homology Searching, Gene Expression Informatics; Advanced Algorithms for Sequence Analysis; Text Mining, Supercomputing and ‘Grid’ facilities; Analysis Packages.

**Unit 4:** Applications and Commercial Aspects of Bioinformatics : Visualisation of Sequence Data, Drug Discovery, Genetic Basis of Disease, Personalised Medicine and Gene-based Diagnostics, Legal, Ethical and Commercial Ramifications of Bioinformatics.

**Unit 5:** Use of IT Tools for Bioinformatics: Use of JAVA and XML, PERL; Databases.

### **Books Recommended:**

#### **Text Books:**

1. T.K. Attwood & D.J.Parry Smith, “*Introduction to Bioinformatics*”, Pearson Education, Asia.
2. Bal Harshwardhan, “*Bioinformatics:Principles &Applications*”,TMH.

#### **Reference Books:**

1. Bal Harshwardhan, “*Perl Programming for Bioinformatics*”, TMH.
2. J. Seckbach, Eitan Rubin, ”**The New Avenues in Bioinformatics** “, Springer.

## MB 3026: ENTREPRENEURSHIP AND IT LAWS

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				Total
								Theory	CW	SW	Pr.	
1.	MB3026	Elective – II	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Industrial Science and General Environment: National and International Economics & Trades, Balance of payment, deficit financing, inflation, unemployment and their impacts on SSI. Importance of entrepreneurship, Government policies and incentives related to SSI, Administration of SSI and industrial culture, impact of productivity and modernisation, Function and roles of support institutions like SFC's, Banks, SISI, DIC, LUN, AVN, AKVN, NSIC, SAIL, MMTC etc.

**Unit 2:** Entrepreneurial Behavior: Personality of an entrepreneur, Transactional analysis, Priorities and management of time, self image, skills and creativity achievement motivation, Entrepreneurial communication, role playing exercises, Analysing situations and opportunities, receiving feedback, observation, memory, visualisation, spread and depth of thoughts.

**Unit 3:** Selections, Testing & Purchases for Materials, Processes, Equipments & Services: Different standards and testing procedures, inspection fixtures, gauges and test rigs design, commercial materials and their rates, detailed estimation and costing of products and services, purchasing procedures, manpower selections and controls, Evaluating new products, various selections criteria for materials, processes, machinery and equipments.

**Unit 4:** Taxation and Legal Aspects: Factory and labour laws, safety and ecological considerations, sales tax, income tax, customs duties, excise duties, ESI, PF, bonus and incentives, ownership constitutions, contracting.

**Unit 5:** Some Special Aspects: Competitor studies, cost reduction techniques and value Engg. in SSI, Low cost tooling and automation, site selections, layout and plant design aspects, Various forms and procedures in SSI, products specifications practices, Planning of a new enterprise, Designing aspects for services like transportation, hospitals, hotels, software facilities, civil constructions etc.

**Unit 6:** Project Report Preparation: Product identification, Market survey, Detailed project report preparations, market research, advertisements, feasibility reports.

**Unit 7:** Intellectual Property Rights, Patents and Software Piracy. Role of WTO in protection of Intellectual Property, Regulatory Issues.

### **Books Recommended :**

1. Jain R. K., "Guide to Industries Policies & Procedures", All Indian investments Pub.
2. Ruddar Datt, "Indian Economy", S. Chand & Co. Ltd.
3. Anderson., Dunkelnberg J. S., "Entrepreneurship: Starting a new Business", Harper & Row, NY.
4. Saravanavel P., "Entrepreneurial Development", Ess Pee Kay Pub. House.
5. A Hand Book for New Entrepreneur, EDII Ahemdabad.

## CT3027: CLOUD COMPUTING

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT3027	Elective – II	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Introduction to Cloud Computing: Cloud Computing Technology, Hardware & Software Infrastructure, Different Clouds, Risks, Cloud Services, Applications, Regulatory Issues, and Limitations.

**Unit 2:** Cloud Computing Architecture: Requirements, Introduction to Cloud Computing Architecture, Various kinds of Cloud Computing Architecture, Grid Computing, Transactional Computing, On demand Computing, Distributed Computing.

**Unit 3:** Virtualization & Scalability: Virtualization at the Infrastructure level, CPU virtualization, Storage Virtualization, Network Virtualization, A discussion on Hypervisors, SAN, ISCSI, VLAN, Scaling a cloud Infrastructure.

**Unit 4:** Cloud security fundamentals, vulnerability assessment tool for cloud, Privacy and Security in cloud: Cloud Computing security architecture, General Issues, Security Challenges: Virtualization security management-virtual threats, VM Security Recommendations, VM-Specific security techniques, Secure execution environments and Communications in cloud .

**Unit 5:** Disaster Management: Disaster Recovery Planning: Recovery Point Objectives, Recovery time Objectives, Disaster management in Cloud: Backup Management, Geographic Redundancy, Disaster Management: Monitoring, Load Balancing, Database Recovery.

### **Books Recommended:**

1. Michael Miller, “*Cloud Computing: Web- Based Applications That change the Way You Work and Collaborate Online*”, Pearson.
2. George Reese, “*Cloud Application Architectures*”, Publication O’ Reilly.
3. Anthony T. Velte, Tobe J. Velte, Robert Elsenpeter, “*Cloud Computing: A Practical Approach*”, Pearson Education.

## CT 3045: E-COMMERCE & INFORMATION SECURITY

S. No.	Code No.	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
								Theory	CW	SW	Pr.	Total
1.	CT 3045	E-Commerce & Information Security	4	-	-	4	0	70	30	-	-	100

**Unit 1:** Introduction to E-Commerce: Definition, E-Commerce v/s E-Business, Components of E-Commerce System, Scope & Benefits of E-Commerce, Impact of E-Commerce on Business Models.

**Unit 2:** Electronic Data Interchange (EDI) Systems: Traditional EDI systems, Value Added Networks (VANs), Fully Integrated EDI Systems; Data Transfer and Standards, EDI Systems and the Internet, Internet Trading Relationships like Consumer to Business, Business to Business etc.

**Unit 3:** E-Commerce Payment Systems: Payment Gateway, Certificate Issuance; Magnetic strip Cards, Smart Cards, E-Checks, E-Cash, Risks in Electronic Payment Systems, Introduction to Intelligent Agents: Definition, Capabilities of Intelligent Agents, Intelligent Agents & E-Commerce, Legal and Control Issues in E-Commerce.

**Unit 4:** Information Security: Principles of Information Security, Security Threats - Vulnerabilities and Attacks, Risks, Security Needs, Security Services, Network Security - Proxy Server and Firewalls, E-mail Security – PGP S/MIME, Web Security - Requirements, Security Protocols like SSL, TLS, SET.

**Unit 5:** Cryptography: Classical Cryptography, Symmetric Key: DES, Triple DES, Public Key: RSA, DSA, Hash Functions and Message Authentication: MD5, Digital Signatures, Digital Certificates, X.509 Standard.

### **Books Recommended:**

#### **Text Books:**

1. Greenstein M. and Feinman T.M., “Electronic Commerce : Security, Risk Management and Control”, Tata McgrawHill, 2000.
2. William Stallings, “Network Security Essentials”, Pearson Edu. Asia, 2001.

#### **Reference Books:**

1. David Travis , “E-Commerce Usability”.
2. Jason Bentrup and James Whatley , “Building E-Commerce”.
3. Efraim turban , “Electronic Commerce” Pearson Education.
4. Ravi Kalakota and Andrew B. Whinston, “Frontier of Electronic Commerce”, Addison Wesley, 2001.