

# Jiwaji University Gwalior -- MCA -- session 2008-2011

## SCHEME OF MCA COURSE

### MCA FIRST SEMESTER :

Course No.	Course Name	L	T	P	Theory Marks	Sessional Marks	Practical Marks	Total Marks
101MCA	Introduction to Information Technology	3	1	-	100	50	-	150
102MCA	Mathematical Foundations of Computer Science	3	1	-	100	50	-	150
103MCA	Programming and Problem Solving in 'C'	3	1	-	100	50	-	150
104MCA	Computer Organisation and Assembly Language Programming	3	1	4	100	50	50	200
105MCA	Oral and Written Communication	3	1	-	100	50	-	150
106MCA	Programming Laboratory in 'C'	-	-	6	-	100	100	200
	TOTAL	15	05	10	500	350	150	1000

### MCA SECOND SEMESTER :

Course No.	Course Name	L	T	P	Theory Marks	Sessional Marks	Practical Marks	Total Marks
201MCA	Operating Systems	3	1	-	100	50	-	150
202MCA	Database Management Systems	3	1	-	100	50	-	150
203MCA	Data Structures Using 'C' language	3	1	4	100	50	50	200
204MCA	Probability and Combinatorics	3	1	-	100	50	-	150
205MCA	Software Engineering	3	1	-	100	50	-	150
206MCA	Programming Laboratory in RDBMS (SQL & PLSQL)	-	-	6	-	100	100	200
	TOTAL	15	05	10	500	350	150	1000

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### MCA THIRD SEMESTER :

Course No.	Course Name	L	T	P	Theory Marks	Sessional Marks	Practical Marks	Total Marks
301MCA	Computer Networks	3	1	-	100	50	-	150
302MCA	Object Oriented Programming using C++	3	1	4	100	50		150
303MCA	UNIX & Shell Scripting	3	1	-	100	50	50	200
304MCA	Computer based Numerical and Statistical Techniques	3	1	-	100	50	-	150
305MCA	Organisational Behaviour	3	1	-	100	50	-	150
306MCA	Project in C++	-	-	6	-	100	100	200
	TOTAL	15	05	10	500	350	150	1000

### MCA FOURTH SEMESTER :

Course No.	Course Name	L	T	P	Theory Marks	Sessional Marks	Practical Marks	Total Marks
401MCA	Analysis and Design of Algorithms	3	1	-	100	50	-	150
402MCA	System Software	3	1	-	100	50	-	150
403MCA	Java Programming	3	1	-	100	50	-	150
404MCA	Optimization Techniques	3	1	4	100	50	50	200
405MCA	Accounting & Management Control	3	1	-	100	50	-	150
406MCA	Project in (VB /D2K)	-	-	6	-	100	100	200
	TOTAL	15	05	10	500	350	150	1000

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### MCA FIFTH SEMESTER :

Course No.	Course Name	L	T	P	Theory Marks	Sessional Marks	Practical Marks	Total Marks
501MCA	Artificial Intelligence and Expert Systems	3	1	4	100	50	-	150
502MCA	Computer Graphics and Multimedia	3	1	-	100	50	50	200
503MCA	Simulation and Modeling	3	1	-	100	50	-	150
504MCA	E1 / E2 / E3	3	1	-	100	50	-	150
505MCA	E4 / E5	3	1	-	100	50	-	150
506MCA	Project in JAVA/ASP	-	-	6	-	100	100	200
	TOTAL	15	05	10	500	350	150	1000

E1: Theory of computation

E2: ERP & BPR Allied Concepts

E3: Managerial Economics

E4: Dataware housing and data mining

E5: Internet and its applications

### MCA SIXTH SEMESTER :

Course No.	Course Name	L	T	P	Theory Marks	Sessional Marks	Practical Marks	Total Marks
601MCA	System Development Project (Here student is required to undertake six months system development project in the Industry or in a Computer Organization and submit a detailed project report )	-	-	-	-	300	200	500
	TOTAL	-	-	-	-	300	200	500

**101MCA: INTRODUCTION TO INFORMATION TECHNOLOGY**

**UNIT 1**-Introduction: Basic concepts of information technology, concepts of data and information data processing, history of computers, organization of computers, input and output devices, storage devices and file organization.

**UNIT 2**-Software concepts: System software, application software, utility packages, compilers, interpreters, operating systems, Elementary commands of DOS, Windows and Unix operating system ( file handling, directory management and general purpose user interfacing commands )

**UNIT 3**-Computer languages : machine language, assembly languages, high level languages, fourth generation languages, General concepts of OOPS (Object oriented programming ) and SQL(Structured Query Languages ).

**UNIT 4**-Communication and Network Technology : Communication system elements, Communication modes (analog and digital, synchronous and asynchronous, simplex, half duplex and full duplex, circuit switching and packet switching ), Communication media: (speed and capacity, twisted pair, coaxial fiber optics, wireless), common network components, hosts and servers, work-stations, network topologies and network ( ISO/OSI Ref Model and TCP/IP).

**UNIT 5**-State of the art application of IT: Application of IT in business, education, industry, home and training , entertainment, science and engineering and medicine, multimedia data types(graphics, images, audio, video), virtual reality applications, internet, World Wide Web(WWW), Domain names, e-mail, teleconferencing, e-commerce, hypermedia, data warehousing.

**References :**

1. Rajaraman V. "Fundamental of Computers" (2nd edition). Prentice Hall of India, New Delhi 1996.
- 2 .Sanders. D.H. " Computers Today" McGraw Hill, 1988.
3. S. Jaiswal, "Information Technology Today",Galgotia Pub., New Delhi, 1999..

**102MCA : MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

**UNIT 1**-Sets Relations and Functions :Sets, Subsets, Power-Sets, Complement, Union and intersection. Demorgan's law Cardinality, relations: Cartesian Products, relations relational Matrices, properties of relations, equivalence\*relation Functions: Injection, Surjection, Bijection Composition of Functions, Permutations. Cardinality, the characteristic functions Recursive definitions, finite induction. Lattices & Boolean Algebra:

**UNIT 2**-Axiomatic definition of Boolean algebra as algebraic structures with two operations. Proposition & Prepositional functions, Logical connections Truth values and Truth Table the algebra of prepositional functions-the algebra of truth values-Applications (switching circuits, Basic Computer Components).

**Groups and Fields:**

**UNIT 3**- Groups: Group axioms-permutation groups; Subgroups, Co-sets, Normal Subgroups, Free semi groups; Modular arithmetic grammars, language.

**UNIT 4**-Fields : Definition; structure; minimal polynomials; irreducible polynomials; primitive Elements., polynomial roots; Applications (Error Correcting Codes Sequence generation).

**UNIT 5**-Graphs: Finite graphs; incidence and degree, isomorphism, sub graphs and union of graphs ; Connectedness ; walks paths and circuits Eulerian graphs. Trees properties of trees; pendant vertices in a tree, Center of tree Spanning trees and Cut vertices; Binary tree Matrix representation of a graph, Incidence, Adjacency matrices and their properties. Applications of graphs in Computer Science.

**REFERENCES:**

1. "Discrete Mathematical Structure with applications to Computer Science "by J.P. Trembley & R.P. Manohar.
2. "Discrete Mathematics " by K.A. Ross and C.R.B. Writh
3. "Discrete Mathematical Structures for Computer Science" by Bernard Kolman & Robert C. Busby

**103MCA : PROGRAMMING AND PROBLEM SOLVING IN 'C'**

**UNIT 1**-An Overview : Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithm & flowcharts; Characteristics of a good program - accuracy simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/conventions of coding, documentation, naming variables; Top down design ; Bottom up design.

**UNIT 2**-Fundamentals of C Programming : History of C; structure of a C program, Data types, Constants & Variables Operators & expressions; Control Constructs - if-else, for, while, do-while; Case statement; Arrays; Formatted and unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

**UNIT 3**-Modular Programming: functions; Arguments; Return value; Parameter passing -call by value, call by reference; Return statement; Scope visibility and life-time rules for various types of variable, static variable; Calling a function ; Recursion - basics, comparison with iteration, tail recursion, when to avoid recursion examples.

**UNIT 4**-Advanced Programming techniques : Special constructs- break, continue, exit , goto & level; pointers- & and \* operator , pointer expression , pointer arithmetic, dynamic memory management functions like malloc(), calloc() , free() ;string() ; pointer v/s array ; pointer to pointer , array of pointer and its limitations ; function returning pointer , pointer to function , function as parameter ; structure-basic, declaration, membership operator ,pointer to structure , referential operator, self referential structure , structure within structure , array in structure, array of structure; Union -basic, declaration, enumerated data type; Typedef; command line arguments

**UNIT 5**-Miscellaneous Features : File handling and related functions , printf and scanf family C preprocessor- basics, #include, #define, #undef. Conditional compilation directive like #if, #else, #elif, #endif,#ifdef; and #ifndef; variable argument list functions.

**References :**

1. The C Programming Language - B.W. Kernighan & D.M. Ritchie
2. The Sprit of C - Cooper, Mullish
3. Kanetkar Y : Let us C
4. Kanetkar Y : Pointers in C

**104MCA:COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING**

**UNIT 1**-Representation of Information: number system, integer and floating point representation, character codes(ASCII,EBCDIC) , error detection and correction codes .

**UNIT 2**-Basic Building Blocks: Boolean algebra, combinational blocks: gates, multiplexers , decoders etc. Sequential building blocks: flip flops, registers, counters, ALU, Random Access Memory etc.

**UNIT 3**-Register Transfer Language and micro operations: concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/to memory, arithmetic and logical operations along with register transfer ,timing in register transfer.

**UNIT 4**-Architecture of a simple processor : A simple computer organization and instruction set, instruction format, addressing modes, instruction execution, in terms of micro instructions, concept of interrupt and simple I/O organization, implementation of processor using the building blocks.

**UNIT 5**-Assembly Language Programming: detailed study of 8086/8088 assembly language instruction set, loops and comparisons, condition and procedure, arithmetic operator assembly language, illustrations using typical programs like : table search, subroutines, symbolic and numerical manipulations and I/O.

Memory Organization: basic cell of static and dynamic RAM, building large memories using chips, associative memory, cache memory organizations, virtual memory organization.

**References :**

1. M. Morris Mano, "Computer System and Architecture", (3rd edition) Prentice Hall of India, New Delhi, 1994.
2. Liu and Gibson, "8086/8088 Microprocessor Assembly Language.
3. Bartee, " Digital computer Fundamentals".
4. Malvino, "Digital computer Electronics".

**105MCA : ORAL AND WRITTEN COMMUNICATION**

**UNIT 1**-Meaning and process of communication, importance of effective communication, Communications situation and communication skills, barriers to communications.

**UNIT 2**-Objectives of communication, types of communication, principal of communication, essential of effective communication.

**UNIT 3**-Media of communication: written, oral, face to face, visual, audio visual, merits and demerits of written and oral communication, preparing for oral presentation, conducting presentations.

**UNIT 4**-Developing communication skills, interview how to face and how to conduct. Preparing of bio-data, seminar, paper, bibliography, group discussion, official correspondence.

**UNIT 5**-Mechanics of writing paragraphing, precise, report writing, technical reports, length of written reports, organizing reports, writing technical reports.

**References :**

1. Essential of Business Communication by Rajendra Paul and J. S. Korlahali, Sultan Chand & Sons Publishers, New Delhi.
2. Business Communication BY U. S. Rai & S. M. Rai, Himalaya Publishing House.
3. Writing a technical paper by Menzal and D. H. Jones, McGraw Hill, 1961.
4. Business communication: Strategy and Skill

**Note :** Rehersal / Practice : Group Discussions, Interview, seminars will be arranged.



**201MCA : OPERATING SYSTEMS**

**UNIT 1**-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, operating system services for process management. Scheduling algorithms. Performance evaluation.

**UNIT 2**-Memory Management : Memory management without swapping or paging, swapping, virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging systems, segmentation.

Inter-process Communication and Synchronization : The need for inter-process 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 : Deadlock Prevention ,deadlock avoidance.

**UNIT 3**-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.

**UNIT 4**-Disks : Disk hardware, scheduling algorithms, Error handling, track-at-a-time caching, RAM Disks.

Clocks : Clock 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.

**UNIT 5**-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.

**References :**

1. Deitel, H.M. " An Introduction to Operating Systems". Addison Wesley Publishing Company 1984.
2. Milenkovic M., "Operating Systems - concepts and Design". McGraw Hill International Edition-Computer Science series 1992.
3. Peterson J.L. Abraham Silberschatz. "Operating System Concepts". Addison Wesley Publishing Company, 1989.
4. Tanenbaum, A.S." Modern Operating Systems", Prentice Hall of India Pvt. Ltd. 1995.

**202MCA : DATA BASE MANAGEMENT SYSTEMS**

**UNIT 1**-Introduction : advantages of DBMS approach; various views of data ,data independence, schema & sub-schema ; primary concept of data models ; database Languages; transaction management; database administrator & user ; data dictionary; overall system architecture. ER model: basic concepts ; design issues; mapping constraints; keys; ER diagram; weak & strong entity- set; specialization & generalization, aggregation, inheritance; design of ER schema; reduction of ER schema to tables. Domains, relation & keys: domains; relations; kind of relations;relational databases;various types of keys ; candidate, primary, alternate & foreign keys.

**UNIT 2**-Relation algebra & SQL: The structure; relational algebra with extended operation; modification of database; idea of relational calculus; basic structure of SQL; set operations; aggregate functions; null values; nested sub queries; derived relations; views; modification of database; join relations; DDL in SQL.Database Integrity : General idea; Integrity rules ; domain rules; Attribute rules; Relation rules; Database rules; assertions; triggers; integrity & SQL.

**UNIT 3**-Functional dependencies & normalization: basic definitions; Trivial & nontrivial dependencies; closure set of dependences & of attributes; Irreducible set of dependencies; Introductions to normalization; Nonloss decomposition; FD diagram; First, Second and Third normal forms; Dependency preservation; BCNF; multivalued dependencies and fourth normal form; Join dependencies and fifth normal form.

Transaction, concurrency & Recovery : Basic Concept; ACID Properties; Transaction State; Implementation of Atomicity and Durability; Concurrent executions; Basic Idea of Serializability ; Basic Idea of Concurrency Control; Basic Idea of Deadlock; Failure Classification; Storage Structure- types, Stable storage Implementation, Data Access; Recovery & Atomicity- Log Based Recovery, Deferred Database Modification, Immediate Database Modification, Checkpoints.

**UNIT 4**-Distributed Databases: Basic Idea; distributed Data Storage; Data Replication; Data Fragmentation- Horizontal, Vertical & Mixed Fragmentation.

Emerging Fields in DBMS: Object Oriented Databases- Basic Idea & the Model, Object Structure, Object Class, Inheritance, Multiple Inheritance, Object Identity; Data Ware Housing- Terminology, Definitions, Characteristics; Data Mining & its Overview; Databases On WWW; Multimedia databases-difference with conventional DBMS, Issues, Similarity based Retrieval, Continuous Media Data, Multimedia Data Formats, Video Servers.

**UNIT 5**-Storage Structure & File Organization : Overview of Physical Storage Media; Magnetic Disk Performance and Optimization; Basic Idea of RAID; File Organization; Organization of Records in Files; Basic Concepts of Indexing; Ordered Indices; Basic Idea of B-Tree & B<sup>+</sup> Tree Organization.

Network&Hierarchical Model:Basic Idea;DataStructureDiagram;DBTG Model; Implementation; Tree Structure Diagram; Implementation Techniques; Comparison of the Three Models.

**References :**

1. Date. C. J. "An Introduction to Database Systems" Narosa Publishing House, New Delhi
2. Desai B.C. "An Introduction to Database Concepts" Galgotia Publications New Delhi
3. Elmsari and Navathe. "Fundamentals of Database System" Addison Wesley, New York.
4. Pullman J.D. "Principles of Database System" Galgotia Publications, New Delhi.
5. Data Base System Concepts:A.Silberschatz, H.F. Korth, S. Sudarshan(3<sup>rd</sup>Ed.)(McGraw Hill Pub)

**203MCA : DATA STRUCTURE USING 'C' LANGUAGE**

**UNIT 1**-Prerequisite: Array; Structure; Pointers; Pointer to Structures; Functions ; Parameter Passing; Recursion.Stack & Queue: Contiguous Implementation of Stack; Various Operation on Stack; Various Polish Notations-Prefix, Postfix, infix; Conversion From one to Another- Using Stack; Evaluation of Post & Prefix Expressions. Contiguous Implementation of Queue; Linear Queue, Its Drawback; Circular Queue; Various Operation on Queue; Linked Implementation of Stack & Queue- Operations.General List : List & its Contiguous Implementation, its Drawback; Singly Linked List- Operation on it; Doubly Linked List- Operation on it; Circular Linked List; Linked List Using Arrays.

**UNIT 2**-Trees: Definitions- Height, Depth, Order, Degree, Parent & Children Relationship etc.; Binary Trees- Various Theorem , Complete Binary Tree, Almost Complete Binary Tree; Tree Traversals-Pre, In & Post Order Traversals, Their Recursive And Non Recursive Implementations; Expression Tree-evaluation; Linked representation of Binary Tree- Operations. Threaded Binary Trees, Forest, Conversion of Forest into Tree. Heap-Definition.

**UNIT 3**-Searching, Hashing & Sorting: Requirement of Search Algorithm; Sequential search, Binary Search, Index Sequential Search, Interpolation Search; Hashing - Basics, Methods, Collisions, Resolution of Collisions, Chaining; Internal Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort on linked and Contiguous List. Shell Sort, Heap Sort.

**UNIT 4**-Graphs: Related Definitions; Graph Representation- Adjacency Matrix, Adjacency List, Adjacency Multi List; Traversal Schemes- Depth First Search, Breadth First Search; Minimum Spanning Tree; Shortest Path Algorithm; Kruskal & Dijkstra Algorithms.

**UNIT 5**-Miscellaneous Features: Basic Idea of AVL Tree- Definition, Insertion, Deletion Operations; Basic Idea of B Tree- definition, Order, Degree, Insertion & Deletion Operations; B<sup>+</sup> Tree- Definition, Comparison with B Tree; Basic Idea of String Processing.

**References :**

1. "Data structure and Program Design In C" Robert L. Kruse.
- 2."Introduction to Data Structures " J.P. Trembley & Sorenson"
3. Algorithms + data Structures = Programs" N. writh
4. "Fundamentals of Data Structures "E. Horwitz & S.Sahni
5. "Data Structure Using C & C++" Tennenbaum A.M. & Others: PHI

**204MCA : PROBABILITY AND COMBINATORICS**

**UNIT 1**-Probability : Sample space, Events. Axioms. Conditional probability. Bays rule Random variables: Discrete and continuous.

**UNIT 2**-Distribution and density functions. Marginal and conditional distributions. Stochastic independence.

Expectation : Expectation of a function, Conditional expectation and variance.

**UNIT 3**-Moment generating function. Cumulate generating functions. Characteristic functions. Distributions: Discrete and continuous distributions.

**UNIT 4**-Permutations and combinations : Distinct and non-distinct objects. Generating functions for combinations.

**UNIT 5**-Recurrence relations: Linear and with two indices. Principles of inclusion and exclusion. Formula derangement . Restrictions on relative positions.

**References:**

1. Liu. C.L. "Introduction to Combinatorial mathematics" McGraw Hill. 1996.
2. Ross. S."A.First Course in Probability" Collier Macmillan New York . 1976.

## **205MCA : Software Engineering**

**UNIT 1**-Overview of System Analysis & Design : System Definition & Concepts: Characteristics and Type of Systems, System Environment & Boundaries, Real-Time & Distributed Systems, Role & Need of System Analyst, Qualifications and Responsibilities.

System Development Life Cycle: Introduction to Various phases of system development of life cycle, data & fact gathering techniques (interviews, group communication, presentation and site visits), Feasibility Study and its Importance, Type of Feasibility reports, prototyping, cost-benefit analysis.

### **UNIT -2**

Software engineering fundamentals : Definition of software engineering, difference with conventional method of software development, phases of software development life cycle, software project teams, software development process models: waterfall, prototype, spiral.

Software Requirement Analysis : Role of software requirement specification, Characteristics and components of software requirement specification, Specification languages, structure of SRS.

### **UNIT-3**

Software design & testing: Fundamental of design concept; abstraction. modularity; types of module. Coupling and cohesion: content, common, control, stamp, data coupling. Cohesion; coincidental, logical, temporal, procedural, communicational, sequential, functional. Design methodology- Object oriented approach, function approach Vs Object oriented approach, Software metrics; size oriented, function oriented, object oriented metrics.

Verification & validation: types of testing (black box and white box testing), unit testing, integration testing, system testing, acceptance testing.

### **UNIT-3**

Software estimation and reliability: Issue in software cost estimation, standard component, function point method, COCOMO.

Concept of software reliability, software errors, faults. Reliability metrics.

### **UNIT -5**

SCM & Software maintenance : Fundamental of software configuration management & software maintenance, major elements of SCM, types of software maintenance.

CASE Tools & Environment : Concept, Scope of CASE, Classification of CASE Tools, categories of CASE environments.

### **Books:**

1. Software Engineering : A Practitioners Approach, Pressman Roger, Tata McGraw Hill.
2. An Integrated Approach to software Engineering, Pankaj Jalote, Narosa Pub.
3. Software Engineering : A Practitioners Approach, Pressman Roger, Tata McGraw Hill.
4. An Integrated Approach to software Engineering, Pankaj Jalote, Narosa Pub.

**301MCA : COMPUTER NETWORKS**

**UNIT 1**-Introduction : Goals & Applications, Reference Models OSI and TCP/IP, Comparison, Network Hardware: LAN,MAN,WAN and Internet, Wireless networks, Inter Networks, Network Software: Protocol Hierarchies, Design Issues, Interfaces and Services, Connection Oriented And Connection less Services, Service Primitives.

**UNIT 2**-Physical Layer: Concept of Data Transmission, Transmission Media, Switching techniques, Wireless Transmission, ISDN and ATM.

**UNIT 3**-Data Link Layer: Framing, Error Control, DLC Protocols: Simplex, Stop-and-Wait, Shielding Window, HDLC. Medium Access Sub Layer: Channel Allocation- Static & Dynamic, Multiple access protocols, IEEE Standards for LAN, FDDI, Fast Ethernet.

**UNIT 4**-Network Layer: Organization, Virtual Circuits v/s Datagram Services, Routing Algorithms, Congestion Control, Network Layer in Internet.

**UNIT 5**-Transport Layer: Services & Protocols ( TCP and UDP ), ATM ALL Protocol, Socket Programming.

Application Layer: Network Security, DNS, SNMP, E-mail, WWW, Network Multimedia Applications.

**References :**

Computer Networks, A.S. Tannenbaum, 3<sup>rd</sup> Edition, PHI.  
Data networks, Dimitri Bertsekas & Robert Gallager, PHI.  
Data Networks: Concepts, Theory & Practices, Black, PHI.  
Computer Networks & Distributed Processing, Martin J., PHI.

### **302 MCA: OBJECT ORIENTED PROGRAMMING USING C++**

**UNIT 1-Basic of OOP:** Basic Concept of Object Oriented Programming and its advantages/characteristics- Object, Classes, Inheritance, Reusability, Polymorphism & Overloading; A Comparative Study of C & C++; Programming Concepts errors- Compilation error, Linker Error, run-time Error, Conceptual errors; Debugging.

**UNIT 2-Basic of C++:** Variable & Constants; Data Types; Expression & Statements; cin & cout; Qualifier & Manipulators; Operators- their priority & associativity; Type Conversion; Casting; Loops & Decisions; Structures; Functions-inline Functions, Parameter Passing.

**UNIT 3-OO Programming in C++: Details of-**Objects and Classes; Constructor, Destructor, Function overloading, this pointer, Operator overloading, Inheritance,types of inheritance, Virtual Base Class.

**UNIT 4-Miscellaneous Features:** Friend Function, Friend Classes;Nested Classes, Static Members.

**Arrays in C++:** arrays as data members, arrays of objects ; Dynamic Memory Allocation Operators: new and delete.

**UNIT 5- Pointers in C++:** pointer to objects, array of pointers to objects, pointers to derived classes, pointers to class members,Virtual Function, Pure Virtual Function, File & Stream Classes, Command Line Arguments; Templates.

#### **References :**

1. " Object Oriented Programming in C++" By Lafore.
2. " Programming with C++" By John Hubbard
3. " The C++ Programming Language" By Stroustrup
4. " C++ Inside Outside" Byeckel

### **303 MCA: UNIX & Shell Scripting**

#### **UNIT 1 : Overview UNIX & LINUX**

Structure of UNIX , evolution of UNIX ,Kernel and shell , features of UNIX ,UNIX: Installation and booting.

#### **UNIT 2 : File System**

Unix file system ,types of Unix files ,Login Directory, Inode-User Identification. file system hierarchy , working directories & pathnames ,pwd. Basic command for file manipulation like :ls, cat , cp, rm, mv, ln ,touch , cd,mkdir,rmdir,file access permission , types of permissions , determining & changing permission , Umask, chown,chgrp,newgroup, changing your password :passwd.

#### **UNIT 3 : Advanced features**

**Multi user communication &Scheduling:**who,write,mesg,wall,mail,at,lp,lpstat,pr,news,motd, Multiple commands on command line , redirecting : standard output to a file , standard input from a file and both , pipelines and filter:herad,tail,paste,sort,uniq,grep,egrep,fgrep,awk,nl, The Process:running a process in the background , process status , terminating a process , delay process. General purpose utilities:more,file,wc,od,cal,banner,cmp,tty,sty,date etc.

**System Calls for the System:**File Related system calls, process related system call,Mounting and Unmounting File System,Link Unlink.

#### **UNIT 4 : Introduction To Shell Script:**

Unix editors:vi,ex.Bourn Shell,C Shell, advance features of shell. Shell variable – system shell variables , local & global variables . Shell meta characters and environment ,if and case statements, for ,while and until loops. Shell Programming.

**UNIT 5: : Introduction to Linux:** History and features of Linux, Linux structure, Various flavors of Linux,Installing Linux .

**System Administration:** Understanding System Administration,startup & shutting down ,Managing user accounts,backing up data,system security.

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#### **Reference:**

1. UNIX System – Rebecca Thomas (McGraw- Hill)
2. Advanced UNIX – Stephen Prata (BPB Publication)
3. UNIX System –Sumitabha Das
4. Operating System by PHI- Milan koewick



**304MCA:COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES**

**UNIT 1**-Errors in numerical approximation: Sources of errors, machine error, Relative error, Percentage error, round off in different number system, Interpolation : Gauss Backward, Gauss Forward, Lagranges interpolation, Newton divided Difference , Inverse interpolation.

**UNIT 2**-Iterative methods: Zeros of a single transcendental equation and zeros of polynomial using bisections, false position Newton-Raphson etc. convergence of solutions.

**UNIT 3**-Simultaneous linear equations: Solutions of simultaneous linear equations gauss elimination method and pivoting, ill-conditioned equations and refinement of solutions, Gauss Sidle iterative methods.

Numerical Differentiation & Integration: Solutions of differential equation, Runge- Kutta methods, predictor- corrector methods.

**STATISTICAL ANALYSIS:**

**UNIT 4**-Regression Analysis: Least Square fitting: Polynomial and curve fitting. Linear and nonlinear regression. Correlation- Pearsons coefficient of correlation

**UNIT 5-**

Probability Theory: Sample Space events; sampling theory, conditional probability Bayes formulas, Additive law of probability, Compound events, Use of Binomial Theorem.

**REFERENCES :**

- 1.“Basic Statistical Computing” by D. Cook A. H. Lee & T.S. Lee
- 2.“Statistical Computer Method Basic “ by J. D. Lee & T.D. Lee
- 3.“Statistical Analysis a Computer Oriented Approach” by A Affi
- 4.“Probability & Statistics with reliability queuing & Computer Science Applications” by K. S. Trivedi
- 5.“System Simulation” by Geoffrey Gordon
6. "Computer Based numerical Algorithms" by E.V.Krishnamurthy & S.K. Sen
7. "Computer Oriented numerical Methods" by v. Rajaraman
8. " Linear Algebra “ by G. Hadlley.

### **305MCA : ORGANIZATIONAL BEHAVIOUR**

**UNIT 1**-Introduction to Organizations and Individuals. What is an organization. Components of organization, nature and variety of organizations (in terms of objectives. Structure etc. ) models of analyzing organizational phenomena.

**UNIT 2**-Organizational and business variables, Organizations in the Indian context, Institutions and structures. Basic roles in an organization, etc . perception attitudes. Motives (achievement, power and affiliation).

**UNIT 3**-Commitment : Value creativity and other personality factors. Profile of a manager and an entrepreneur.

Interpersonal and Group Processes- Interpersonal trust, understanding the other person from his/her point of view. Interpersonal communication. Listening, feedback, counseling. Transactional analysis. Self-functioning. Team decision-making team conflict resolution. Team problem solving.

**UNIT 4**-Organizational Structure and Integrating Interpersonal and Group Dynamics-elements of structure. Functions of structure . determinants of structure, disfunctionalities of structures. Structure -technology. Environment- people relationships.

**UNIT 5**-Principles Underlying design of organization; organizational change. Integrating cases (s). Case method and lectures should be supplemented with a variety of other methodologies such as feedback on questionnaires and tests, role plays and behaviour simulation exercise.

#### **References :**

1. A.J. Robertson. Lvan T. and Cooper . Cary. L. "Work Psychology: Understanding Human Behaviour in the Workplace" Macmillan India Ltd. Delhi. 1996.
2. Dwivedi R.S. "Human Relations and Organisational Behaviour: A Global perspective" Macmillan India Ltd. Delhi. 1995.
3. Arnold.J.Robertson.Lavern T.and CooperCary.L."Work Psychology: Understanding Human Behaviour in the Workplace" Macmillan Indian Ltd.Delhi.1996.
4. French & Bell (4<sup>th</sup>ed.). "Organization Development: Behavioral science Interventions for Organization Improvement" Prentice Hall of India Pvt.Ltd.New Delhi 1996.
5. P.Kesho."Organisational Development for Excellence" MacMillan India ,1996
6. Robbins (4<sup>th</sup> ed.). "Essentials of Organizational Behaviour" Prentice Hall of India
7. Schermerhorn, Hunt and Osborn "Managing Organizational Behaviour" John Wiley & Sons. USA.1982.
8. Weston.Mergers. "Restructuring and Corporate Control" Prentice Hall Of India Pvt.Ltd. New Delhi.1995.

**401MCA : ANALYSIS AND DESIGN OF ALGORITHMS**

**UNIT 1**-Basic of Algorithm Analysis : Analyzing algorithms, Worst-case and average case analysis, asymptotic notations (Omega, Theta, Big "oh", Little "oh", Little Omega) recurrences : substitution method, master method.

**UNIT 2**-Advanced Data Structures : Hash tables, Binary trees, Binary Search trees, Binary search, Binary heaps, Heap sort and B-trees.

**UNIT 3**-Basic Design & Analysis Techniques : Graph algorithms like Depth First Search, Breadth First Search, and Sorting :radix sort, Quick sort, Merge sort, Finding maximum and minimum .

**Advanced Design & Analysis techniques :**

**UNIT 4**- Greedy method :Knapsack Problem, Job Sequencing with Deadline ,Single Source Shortest Path, Minimum Cost Spanning Tree algorithms

Dynamic programming: 0/1 Knapsack, Multistage Graphs, Optimal Binary Search Tree

**UNIT 5**- Backtracking: 8 Queens Problem, Graph Coloring

Branch and bound : 4-Queens Problem, Travelling Salesperson.

NP - Completeness : NP- completeness and NP complete problems

**References:**

1. " Fundamentals of Computer Algorithms" by Horowitz & Sahani
2. " Introduction to Algorithms" by Cormen, Leiserson & rivest
- 3 " Fundamentals of Algorithms" by Knuth.

**402MCA : Systems Software**

**UNIT 1-INTROUCTION:** Components of System Programming, Assemblers, Loaders, Macros, Linkers, Compilers, Operating system.

**UNIT 2-ASSEMBLER:** design of assembler ,statement of problem, data structure, format of databases, algorithms, look for modularity, review of searching and sorting techniques.

**UNIT 3-MACRO:** Macro Instruction, features of Macro facility, Design of Microprocessor, Design of one and two pass Microprocessor and their relationship with an assembler.

**UNIT 4-LOADERS & LINKERS :** Loading schemes : Compile and go, General loader scheme, absolute, Subroutine relocating direct linking loader, other loader schemes, binders linking overlays, Dynamic binders, Design of absolute loader, Design of direct linking loader.

**UNIT 5-COMPILERS & INTERPRETERS:** Overview of compilation process, basic compiler functions, grammar, lexical analysis, syntactic analysis etc.

**References :**

1. Introduction to System Software : D.M. Dhamdhare
2. System Programming - J.J. Donovan
3. System Software- Bech

## **403MCA JAVA PROGRAMMING**

### **UNIT 1-Overview of JAVA Programming :**

History of JAVA , features of java , how it is differ from C & C++ , java program structure , java Statements , JVM, command line arguments

### **Expression & Operator :**

Data types , literals , variables , declaring a variable , dynamic initialization . Arrays, Operators - relational , Arithmetic, logical , assignment , increment & decrement , conditional operator , Bitwise operator , special operator, arithmetic expression , evaluation of expression .

### **Decision making & Branching :**

Control Statements--IF , Switch ,Loops , Break , Continue , Return.

### **UNIT 2-Basic concept of OOPS :**

Classes , methods , creating instance & class variable , accessing class member , Constructor , Methods overloading , Method overriding , Static member , final classes , finalizer method, Abstract method & classes , visibility control , Interfaces :Defining interfaces , extending interfaces , implementing interfaces , accessing interfaces ,Variables , Package - system package , using system package , creating package , accessing a package, adding a class to a package , Hiding classes .

### **UNIT 3-Exception Handling & Multithreaded Programming:**

**Exception Handling-** Fundamental, types, uncaught exception, using try and catch, multiple catch, nested try, throw, throws,finally,**Java thread model**, creating threads, extending thread class, stopping & blocking a thread, Life cycle of thread, thread exception, thread priority, synchronization- implementing and runnable interface, inter thread communication, multithreading.

### **UNIT 4-Developing web-based program :-**

What is an applet, applet architecture, applet life cycle, a simple applet program, AWT-Working with Graphics; line, rectangles, ellipses, circles, arcs, polygons Working with colors; Working with fonts. Stream and Files.

### **UNIT 5 Advance Java**

JDBC: JDBC architecture, JDBC Basics, establishing a connection, JDBC Statements.Designing a User Interface with swing - Benefits Of swing , application framework , adding components to a swing , frame working with swing.

### **Reference:**

1. **Programming with java . A preimer by “ E. Balaguruswamy “.**
2. **“Advence programming in Java by V.K.Jain & Hemlata**
3. **JAVA 2 platform in 21 DAYS by “Lemay and Cadenhead” by Techmedia pub.**
4. **The complete reference JAVA 2 by “ Patrick Naughton & Herbert Schidt” .**

### **404MCA: Optimization Techniques**

**UNIT 1**-Overview of Operation Research:Problem formulation; Model Construction; O.R. Techniques.Introduction to Linear Programming:Construction of the L. P. Model; graphical L. P. solution, simplex method, Big m method; Primal and Dual Problems,

**UNIT 2**-Replacement Problems: Capital equipment; Discounted Cost ; replacement in anticipation of failure; Age replacement. Transportation and Assignment Problems.

**UNIT 3**-Queuing Models; Description of Queues; Arrival and Service Times; Birth & Death queuing system; M/M/1 model.

**UNIT 4**-Game Theory: Pure and Mixed strategy; two person zero sum game ; game with and without saddle points; rule of dominance.Project Management Techniques;Network representation; CPM and PERT;; optimization of project time and cost; crash cost and crash time .

**UNIT 5**-Dynamic Programming:Deterministic and probabilistic dynamic programming, Bellman's Principle. Integer Programming Problem.Branch and Bound techniques;

### **REFERENCES :**

- 1." Introduction to Operation Research " by F. S Hiter & Liberman
- 2."Opration Research" by H.A. Tara
- 3."Operation Research" by S.D. Sharma

**405MCA: ACCOUNTING AND MANAGEMENT CONTROL**

**UNIT 1**-Meaning & Objects of Accounting Concepts & Conventions, Accounting Equation, Rules Of Journalizing.Cash Book, Ledger Posting , Preparation Of Trial Balance

**UNIT 2**-Trading And P/L Account,Balance Sheet With Adjustments Relating to Closing Stock, Out Standing Expenses, Prepaid Expenses, Accrued Income, Depreciation, Bad Debt, Provision For Bad Debt, Provision for Discount on Debtors & Creditors, Provision for Tax

**UNIT 3**- Inventory Pricing, FIFO & LIFO Methods.Simple Problem of Fund Flow Statements, Cost-Volume Profit Analysis

**UNIT 4**- Standard Costing, Computation of Material & Labor Variances, Budgetary Control, Preparation of Cash Budget & Flexible Budget.

**UNIT 5**-Management Control & its Characteristics, Goals and its Strategies, Structure and control. Responsibility Centres & Control Centres; Concept of Responsibility Centres, Revenue Center, Profit Center and Investment Center, Transfer Pricing & Responsibility Reporting.

**References :**

1. Bhattacharya S.K. And Dearden. John, Accounting for Management” Prentice Hall of India, New Delhi.
- 2.Chadwick.“The Essence of Financial Accounting” Prentice Hall of India Pvt. New Delhi.
3. Chandwick “The Essence of Management Accounting” Prentice Hall of India Pvt. Ltd. New Delhi.
4. Horngren. Sundem and Selto (9<sup>th</sup> ed.). “Introduction to Management Accounting “ Prentice Hall of India Pvt. Ltd.
- 5.Welch. Hilton and Gordon (5<sup>th</sup> ed.); “Budgeting; Profit Planning and Control” Prentice Hall of India Pvt. Ltd. New Delhi.
6. “Introduction to Book Keeping” Grewal.

## **501MCA : Artificial Intelligence & Expert Systems**

**UNIT 1- An Overview of AI:** Definitions, Foundations of AI: Philosophy, Mathematics, Psychology, Computer Engineering, linguistics, History of AI, Applications of AI.

### **UNIT 2 -AI Production Systems, Search and Control Strategies:**

AI Production systems and control strategies; Exploring alternatives: Finding a path: Depth first search, hill climbing, breadth first search, beam search, best first search; Finding the best Path: The British Museum search, Branch and Bound Search, A\* Search, AO\* Search; Game Playing: Minmax search, Alpha-beta pruning, Progressive deepning, Heuristic Pruning..

### **UNIT 3-Knowledge Representations:**

First order predicate calculus, Clause form representation of WFFs, resolution principle & unification, inference mechanism, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

### **UNIT 4-Natural Language Processing:**

Overview of linguistics, grammars and languages, Parsing techniques: Chart Parsers, transition nets, augmented transition nets, WASP Parser.

### **UNIT 5-Expert systems:**

Introduction and applications of exert systems, Rule-based System Architecture, Non-production system architecture, Expert system shells, dealing with uncertainty: Baysian reasoning and fuzzy reasoning. Introduction to Some of the AI Techniques like neural networks, genetic algorithms, machine learning, pattern recognition, Robotics etc.

Books:

1. Introduction to AI and Expert Systems: D.W. Patterson PHI.
2. Artificial Intelligence: P.H. Winston, Addison Wesley.
3. Principles of AI: N.J. Nilsson, Springer-Verlag
4. Artificial Intelligence: A Modern Approach: Stuart Russell and Peter Norvig, Pearson Education



## **502MCA : Computer Graphics & Multimedia**

**UNIT 1- Introduction:** Computer graphics, definition, classification & applications, development of hardware & Software for computer graphics, Refresh Cathode ray tubes, Random and raster scan devices, DVST, plasma panel display, LED and LCD monitors, laser devices, printers, plotters, display processors, raster and random scan system.

**Output primitives:** DDA along with, Bresenhan's line drawing algorithm, antialiasing, circle generation: Midpoint algorithms, ellipse, other curves, character generation, area filling scan line algorithm, boundary fill flood fill algorithm, attributes of output primitives line attributes, area fill attributes, character attributes.

**UNIT 2-Two-dimensional Transformations and Clipping:** Translation scaling rotation reflection sheer, matrix representation and homogeneous coordinates composite transformation commands. Viewing coordinates window, view port, window to view transformation line clipping Cohan Sutherland algorithm polygon clipping: Sutherland-hodgeman algorithm.

**UNIT 3-Three-dimensional concepts:** Three dimensional viewing, three dimensional object presentation : polygons, curved line & surfaces quadrate (sphere, ellipsoid), surfaces, design of curves & surfaces, bezier's methods, Bspline methods; three dimensional transformation: Translation, scaling composite transformation, rotation, about arbitrary axis, projection: parallel, perspective.

**UNIT 4-Visible surface detection:** Classification of visible-surface, detection algorithms, back face detection, depth buffer methods, A- buffer method, scan line method, depth sorting method.

**Illumination and shading:** Light sources, diffuse reflection, specular reflection, reflected light, texture, shadows, light intensity intensity levels. Surface shading, constant intensity, gouraud shading, phong shading.

**UNIT 5-Introduction To Multimedia:** Review of Multimedia, Multimedia Applications, Multimedia systems architecture, Multimedia Hardware, Multimedia Software, Representation and operations on various multimedia data types: text, images, graphics, video and audio, Introduction to multimedia authoring.

### **Books:**

1. D.Heam and M.P. Baker Computer Graphics (2<sup>nd</sup> ed), PHI.
2. S. Harrington – Computer Graphics – a Programming approach (2<sup>nd</sup> ed) McGrawhill.
3. Multimedia Systems Design: Prabhat K. Andleigh and Kiran Thakrar, PHI.
4. Roger S. David Procedural Elements for Computer, McGraw Hill.
5. Roger S. David Mathematical Elements for Computer Graphic, Mc Graw Hill.
6. Foley & Vandan : Computer Graphics : Principles & Practice in "C" Addison Wesley.

### **503MCA SIMULATION AND MODELLING**

**UNIT 1**-Definition of simulation: Type of simulation,(continuous & discrete) Definition of models, Types of models, Comparing model data with real system data. Why to use simulation? Simulation is used for solving real life problem.

**UNIT 2**-Limitation of simulation technique, Phases of simulation model, Data generation, Book keeping, Events Type simulation(numerical problems), Generation of random numbers, Monte Carlo simulation(Numerical problem).

**UNIT 3**- Continuous system simulation: Continuous system models, Differential equation, Hybrid computer, continuous system simulation languages(CSSLS), simulation of an autopilot, real time simulation.

Probability concept in simulation: numerical evaluation of continuous probability Function, continuous uniformly distributed random numbers, non uniform continuous distributed random numbers, the Rejection method, discrete simulation language, simulation of telephone system,.

**UNIT 4**-Simulation: Application to Inventory Control, Queuing problem, Capital budgeting, Financial Planning ,Advantages and disadvantages of simulation, scope of simulation techniques.

**UNIT-5**-Introduction to SIMSCRIPT: SIMSCRIPT programs, SIMSCRIPT system concept, organization of SIMSCRIPT programs, Names and labels, SIMSCRIPT statement, defining the telephone system model, referencing variables, the MAIN routine, the Arrival events, the Timing routine ,the closing event, Disconnect event.

#### **References:**

1. System Simulation, G. Gordon, PHI
2. Introduction to simulation, T.A. Payer, Mcgraw Hill
3. Computer Aided Modelling and Simulation, W.A Spriet, Academic press
4. Operation research by Heera and Gupta
5. Operation research by S.D. Sharma, Keolar nath publications.

### **504-E1MCA Theory of computation**

**Unit 1: Mathematical preliminaries:** set, relations and functions, graphs and trees, string, alphabet and language, principle of induction, predicate and propositional calculus.

Theory of automation: definition and description, DFA, NFA, transition system, 2DFA, equivalence of DFA, NDFA, regular expression, regular grammar, FSM with output. Minimization of finite automata.

**Unit 2: Formal languages :** definition and description, phrase structured grammar and their classification, Chomsky classification of languages, closure properties of families of languages, regular grammar, regular set & their closure properties, finite automata, equivalence of FA, and regular expression, equivalence of two way finite automata, equivalence of regular expression.

**Unit 3: context free grammar and PDA:** properties unrestricted grammar & their equivalence, derivation tree simplifying CFG, unambiguity CFG, normal form for CFG, push down automata, 2 way PDA, relation of PDA with CFG, Determinism and non determinism in PDA, and related theorems, parsing & pushdown. Automata.

**Unit4: Turning Machine:** model, design, representation of TM, language accepted by TM, universal TM, deterministic and non-deterministic, TM as acceptor/ generator, algorithms, multidimensional, multitracks, multitape, halt problems in TM.

**Unit 5: Computability:** Concepts, introduction of complexity theory, introduction to undecidability, recursively enumerable sets, recursive set, partial recursive set, concept of linear bounded automata, context sensitive grammars and their equivalence.

#### References:

- 1) Marvin L. Minsky "Computation: Finite and Infinite machine", PHI.
- 2) Hopcroft and Ullman "Introduction to automata theory, languages & computation", Narash PH
- 3) Lewis "Theory of computation", PHI
- 4) Mishra and Chander shekhar "Theory of computer science"(A L &C), PHI

### **504-E2MCA ERP AND BPR ALLIED CONCEPTS**

UNIT 1-Introduction to ERP :- Evolution of ERP, Growth of ERP Market , advantages of ERP, ERP & Related technologies : BPR ,MIS , DSS,EIS, Data Warehousing & Data Mining , OLAP, Supply Chain Management.

UNIT 2-Business Functions, Processes, & Data Requirements: - Functional Areas of operation: Marketing & sales, Production & Materials Management, Accounting & Finance , Human Resources.

Marketing Information System & Sales Order Process: - Sales Quotations & Orders, Order Filling, Accounting & Invoicing, Payment & Returns,Sales & Distribution in ERP: Pre-sales activities, sales order processing, Inventory Sourcing, Delivery, Billing, Payment, CRM (Customer Relationship Management).

UNIT 3-Production & Materials Management Information System: - Materials Requirement Planning (MRP), Manufacturing Resource Planning (MRP-II), Bill of Materials (BOM), JIT & Kanban, CAD/CAM, Product Data Management, Make-to-Order (MTO), Make-to-Stock (MTS), Assemble-to-Order (ATO), Engineer-to-Order (ETO), Configure-to-Order (CTO).

Accounting & Finance: - Accounting & finance activities: creating financial statements, Operational Decision Making Problem: Credit Management, Product Profitability Analysis, ERP & Inventory Cost Accounting Activity, Activity based costing & ERP.

UNIT 4-ERP Implementation Life Cycle: - Pre-evaluation screening, Package evaluation, Project Planning phase, Gap Analysis, Reengineering, Configuration, Implementation team training, Testing, Going live, End user training. Post- implementation, Role of vendors & consultants.

UNIT 5-Business Process Reengineering (BPR) & its Implementation:BPR, five step methodology to implement BPR, Development process vision & determining process objectives, defining the processes to be reengineered, understanding & measuring the existing processes, identifying the IT levels, designing the prototype & implementing it.

#### **BOOKS :**

1. Concepts in Enterprise Resource Planning : Bready, Monk ,Wagner
2. Buisness Process Reengineering : Jayaraman Natarajan & Rangramanujan
3. ERP Concepts & Practice V.K Garg & Venkitakrishan.
4. Enterprise Resource Planning : Alexis Leon

**504-E3MCA MANAGERIAL ECONOMICS**

**UNIT 1**-Nature and scope of managerial economics. Objectives of the firm. Managerial and behavioral theories of the firm.

**UNIT 2**-Concepts of opportunity cost, incremental, time perspective. Principles of discounting and equimargins. Demand analysis - purposes and concepts. Elasticity of demand. Methods of demand forecasting.

**UNIT 3**-Product and cost analysis : short run and long run average cost curves. Law of supply. Economies and diseconomies of scale. Law of variable proportions.

**UNIT 4**-Production function - single output isoquants. Pricing prescriptive approach, Price determination under perfect competition. Monopoly, oligopoly and monopolistic competition. Full cost pricing, product line pricing. Pricing strategies.

**UNIT 5**-Profits: Nature and measurement policy. Break-even analysis. Case study.

**References:**

1. Dean.J., "Management Economics". Prentice Hall of India, New Delhi. 1982.
2. Mote, V.L., et. al. " Managerial Economics: concepts and Cases", Tata McGraw Hill. New Delhi. 1980.

### **505-E4MCA –Data warehousing and data mining**

**UNIT 1- Introduction to Data Mining** :Data Mining , features, business context, technical context, approaches to data mining. Types of Data Mining : Direct & Undirected, Virtuous Cycle.

**UNIT 2- Data Mining Process & Technique** : Data Mining Techniques: automatic, cluster detection, Decision trees, Neural Networks, Data Mining Methodologies: Conventional System Development :waterfall process,Rapid Prototyping.

**UNIT 3-Introduction to Datawarehouse** : Data warehousing concepts, Goals & objectives, Issues involved in Data Warehousing, The three C's of Data Warehousing : Commitment,Completeness & Connectivity, OLAP,Types of Data Warehouse.

#### **Constructing a Data Warehouse System:**

**UNIT 4- Stages of the project** : Planning stage : Justifying the datawarehouse, obtaining user buy-in, overcoming Resistance to the Data Warehouse, Developing a project plan; Data Warehouse Design approaches. Architectural stage : Process architecture, Introduction, Load manager, Query manager, Detailed Information, Summary Information, Metadata, Data Marting.

**UNIT 5- Testing the Data Warehouse**: Introduction ,developing the test plan, testing backup recovery, testing the operational environment, testing the database, testing the application, Logistics of the test, Security : Requirements, performance, impact of security, security impact on design.

#### **References:**

1. "Data Warehousing" by Amitesh Sinha.
2. "Data Warehousing in the real world " by Sam Anahory & Dennis Murray.
3. " Decision Support System & Data Warehouse Systems " by Efram G. Mallach.

## **505-E5MCA Internet and its application**

### **unit 1 Introduction of Networking**

TCP/IP internet, internet services, protocol, standardization, Ethernet, FDDI, LAN, WAN, MAN, ATM, HTTP . Properties of internet, internet architecture, Internet addresses, routers, bridges.

### **Unit 2 Introduction of Browser and WebPage**

Browser, Features of browser, types of browser, use of browser .

About IE and its versions, Mozilla, AOL .

What is webpage and it uses, structure of webpage.

### **Unit 3 HTML**

What is HTML and it use, HTML TAGS , URL ,head, body, anchor link, tables, frameset, span, div , image, audio, buttons, submit, reset, cancel, lists, font, .

### **Unit 4 HTML FORMS**

What is Forms. Use of forms, method, action, POST , GET etc. Events mouse over, click, mouse down . Form Designing. Introduction of DHTML

### **Unit 5:**

Good web design, the process of web publishing, document overview, header elements, website hosting, HTTP & URL, search engines, FTP , downloading ad uploading FTP, site promotions. .

#### References:

- 1) Thomas A .powell "The complete reference HTML", TMH.
- 2) Douglas Corner "The Internet Book " pearson Education, Asia.
- 3) Jeol sklar "Principles of Web design" , Vikash publication
- 4) K.Kalata "Internet programming Thomson learning" .