SCHEME OF MCA COURSE

MCA FIRST SEMESTER :

Paper Code	Comp/ optional	Paper name	Credit	Theory		Sessional		Practical		Total
				MAX	Min	Max	Min	max	Min	
101MCA	C	Introduction to Information Technology	3	60	21	40	14			100
102MCA	C	Mathematical Foundations of Computer Science	3	60	21	40	14			100
103MCA	C	Programming and Problem Solving in 'C'	3	60	21	40	14			100
104MCA	C	Computer Organization and Assembly Language Programming	3	60	21	40	14			100
105MCA	C	Oral and Written Communication	3	60	21	40	14			100
106MCA	C	Programming Laboratory in 'C'	3			40	14	60	21	100
107MCA	AE &SD	Seminar	1			100	35			100
108MCA	SE &SD	Assignment(Language/Yoga/ Social work/Environment science/ Physical education)	1			100	35			100
109MCA	C	Comprehensive Viva –voce	4					100	35	100

Total Credit : #20+4 (Virtual Crédit)

MCA SECOND SEMESTER :

Paper Code	Comp/ optional	Paper name	Credit	Theory		Sessional		Practical		Total
				MAX	Min	Max	Min	max	Min	
201MCA	C	Operating Systems	3	60	21	40	14			100
202MCA	C	Database Management Systems	3	60	21	40	14			100
203MCA	C	Data Structures Using 'C' language	3	60	21	40	14			100
204MCA	C	Probability and Combinatorics	3	60	21	40	14			100
205MCA	C	Software Engineering	3	60	21	40	14			100
206MCA	C	Programming Laboratory in RDBMS (SQL & PLSQL)	3			40	14	60	21	100
207MCA	AE & SD	Seminar	1			100	35			100
208MCA	AE & SD	Assignment(Language/Yoga/ Social work/Environment science/ Physical education)	1			100	35			100
209MCA	C	Comprehensive Viva –voce	4					100	35	100

Total Credit : #20+4 (Virtual Crédit)

MCA THIRD SEMESTER :

Paper Code	Comp/ optional	Paper name	Credit	Theory		Sessional		Practical		Total
				MAX	Min	Max	Min	max	Min	
301MCA	C	Computer Networks	3	60	21	40	14			100
302MCA	C	Object Oriented Programming using C++	3	60	21	40	14			100
303MCA	O	E1: Unix & shell scripting	3	60	21	40	14			100
	O	E2: ERP & BPR Allied Concepts								
304MCA	C	Computer based Numerical and Statistical Techniques	3	60	21	40	14			100
305MCA	C	Organisational Behaviour	3	60	21	40	14			100
306MCA	C	Project in C++	3			40	14	60	21	100
307MCA	AE & SD	Seminar	1			100	35			100
308MCA	AE & SD	Assignment(Language/Yoga/ Social work/Environment science/ Physical education)	1			100	35			100
309MCA	C	Comprehensive Viva –voce	4					100	35	100

Total Credit : #20+4 (Virtual Crédit)

MCA FOURTH SEMESTER :

Paper Code	Comp/ optional	Paper name	Credit	Theory		Sessional		Practical		Total
				MAX	Min	Max	Min	max	Min	
401MCA	C	Analysis and Design of Algorithms	3	60	21	40	14			100
402MCA	C	E3: Theory of computation	3	60	21	40	14			100
	O	E4: Distributed System								
403MCA	O	Java Programming	3	60	21	40	14			100
404MCA	C	Optimization Techniques	3	60	21	40	14			100
405MCA	C	Accounting & Management Control	3	60	21	40	14			100
406MCA	C	Project in Java	3			40	14	60	21	100
407MCA	AE & SD	Seminar	1			100	35			100
408MCA	AE & SD	Assignment(Language/Yoga/ Social work/Environment science/ Physical education)	1			100	35			100
409MCA	C	Comprehensive Viva –voce	4					100	35	100

Total Credit : #20+4 (Virtual Crédit)

MCA FIFTH SEMESTER :

Paper Code	Comp/ optional	Paper name	Credit	Theory		Sessional		Practical		Total
				MAX	Min	Max	Min	max	Min	
501MCA	C	Artificial Intelligence and Expert Systems	3	60	21	40	14			100
502MCA	C	Computer Graphics and Multimedia	3	60	21	40	14			100
503MCA	C	Simulation and Modeling	3	60	21	40	14			100
504MCA	C	Dataware housing and data mining	3	60	21	40	14			100
505MCA	O	E5: Cloud Computing	3	60	21	40	14			100
	O	E6: .Net Technology								
	O	E7: Internet of things								
506MCA	C	Project in .Net Technology	3			40	14	60	21	100
507MCA	AE & SD	Seminar	1			100	35			100
508MCA	AE & SD	Assignment(Language/Yoga/ Social work/Environment science/ Physical education)	1			100	35			100
509MCA	C	Comprehensive Viva –voce	4					100	35	100

Total Credit : #20+4 (Virtual Crédit)

MCA SIXTH SEMESTER :

Paper Code	Comp/ optional	Paper name	Credit	Theory		Sessional		Practical		Total
				MAX	Min	Max	Min	max	Min	
601MCA	C	System Development Project Report	9			40	14	60	21	100
602MCA	C	System Development Project work Demonstration	9			40	14	60	21	100
603MCA	AE & SD	Seminar	1			100	35			100
604MCA	AE & SD	Assignment(Language/Yoga/ Social work/Environment science/ Physical education)	1			100	35			100
605MCA	C	Comprehensive Viva –voce	4					100	35	100

Total Credit : # 20 +4 (Virtual Crédit)

PROGRAMME SPECIFIC OUTCOME

Aim of MCA programme is to impart comprehensive knowledge and practical skills covering all aspects of computer uses in business, industries and service sectors. Students will get expertise to perform as application system designer, implementers, developers and managers in foremost areas of computer applications.

101MCA: INTRODUCTION TO INFORMATION TECHNOLOGY

COURSE OUTCOME: On completion of the course, students will be able to demonstrate a basic understanding of the field of IT , define the term "Information Technology" and recognize the disciplines that have contributed to the emergence of IT, namely Computer Science, Information Systems, and Computer Engineering; Students will get general idea of Linker, assembler and compiler

UNIT 1-Basic concepts of IT, concepts of Data & Info, data processing, history of computers (generation, type of languages), organization of computers, I/O devices, storage devices, system software, application software, utility packages, numerical based on storage devices. Concept of communication and network technology, Applications of IT.

UNIT 2-Assembler : Elements of assembly language programming, a simple assembly scheme, pass structure of assembler, design of two pass assemblers, a single pass assemblers. Macros & Macro Processors : Macro definition & Call, Macro expansion Nested macro calls, advanced macro facilities, design of macro processors

UNIT 3-Compilers & Interpreters : aspects of compilation, memory allocation, compilation of expression compilation of control structures, code optimization, interpreters. Software Tools : Software tools for program development, editors, debug monitors, programming environment, user interfaces.).

UNIT 4-Linker & Loaders : Relocation & linking concepts, design of linkers, self relocating programs, a linker for MS DOS, linking for overlays, loaders : A two pass loader scheme, Relocating loaders, subroutine linkage, Direct linkage loader, Binders overlays.

UNIT 5-Sequential file organisation, random file organisation, index structure, indexed file organisation, alternate key indexed sequential files, multi key organisation, multi key access, multi list file organisation, inverted files & their definition , insertion, deletion, operations with optimum utilization of memory, comparison of various type of file organization

References :

1. D.M. Dhamdhere " System Programming & O.S." Second Ed.
2. J.Donovan"SystemProgramming"THM.
3. Rajaraman V. "Fundamental of Computers" (4nd edition.) Prentice Hall of India, New Delhi 2004
4. SardesD.H."Computer'stoday"McGrawHill1988.
5. S.Jaiswal,"FundamentalofComputer&IT",WileydreamtechIndia.

102MCA : MATHMATICAL FOUNDATIONS OF COMPUTER SCIENCE

COURSE OUTCOME: After successful completion of this course, student will be able to understand discrete mathematical preliminaries, apply discrete mathematics in formal representation of various computing constructs, recognize the importance of analytical problem solving approach in engineering problems

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'

COURSE OUTCOME: Upon successful completion of this course, students will be able to understand the basic concept of C programming, and its different modules that includes decision and loop control structures , acquire knowledge about the basic concept of writing a program, role of constants, variables, identifiers, operators, type conversion and other building blocks and advanced programming techniques

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
5. An introduction to C programming – Amit Saxena, Anamaya Publishers, New Delhi

104MCA:COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

COURSE OUTCOME: At the end of this course students will be able to understand assembly language , perform simple optimizations by hand, trace and debug at the assembly level. Understand and extend simple cpu implementations, understand basic interrupt/exception handling, make simple performance estimates for assembly code, ability to design the datapath and control unit of a simple cpu.

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

COURSE OUTCOME: On successful completion of the learning sessions of the course, the learners will be able to mastering the art of a professional business presentation, distinguishing different communication processes and their practical applications, more effective written communication strategies.

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. Buisiness 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. Buisness communication: Strategy and Skill

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

201MCA : OPERATING SYSTEMS

COURSE OUTCOME: On successful completion of the learning sessions of the course, the learners will be able to analyze the structure and basic architectural components involved in OS, demonstrate competence in recognizing and using operating system features, understand and analyze theory and implementation of different operating system aspect, Apply knowledge of different operating system algorithms.

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 sport 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

COURSE OUTCOME: Upon successful completion of this course, students will be able to analyze database design methodology, acquire knowledge in fundamentals of database management system, be able to analyze the difference between traditional file system and DBMS, able to handle with different database languages, draw various data models for database and write queries mathematically. The brief introduction of Distributed database is also given to the students.

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 dependences; 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 a 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, Continues 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^+ 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. ullman J.D. "Principles of Database System" Galgotia Publications, New Delhi.
5. Data Base System Concepts:A.Silberschatz, H.F. Korth, S. Sudarshan(3rd Ed.)(McGraw Hill Pub)

203MCA : DATA STRUCTURE USING 'C' LANGUAGE

COURSE OUTCOME: Upon successful completion of this course, students will be able use different kinds of data structures which are suited to different kinds of applications, and some are highly specialized to specific tasks, Manage large amounts of data efficiently, such as large databases and internet indexing services, Use efficient data structures which are a key to designing efficient algorithms, Use some formal design methods and programming languages which emphasize on data structures, rather than algorithms, as the key organizing factor in software design, Store and retrieve data stored in both main memory and in secondary memory.

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.

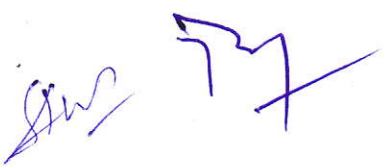
UNIT 3-Searching, Hashing & Sorting: Requirement of Search Algorithm; Sequential search, Binary Search, Index Sequential Search, Interpolation Search; Hashing - Basics, Methods, Collisions, Resolution of Collisions, Chaining; Internal Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge 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^+ 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

COURSE OUTCOME: on successful completion of the learning sessions of the course, the learner will be able understand probability and random variables, understand generating function to solve the engineering problems, understand the permutations and combinations to solve various problems, examine the nature of system using the recurrence relations

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

COURSE OUTCOME: on successful completion of the learning sessions of the course, the learner will be able to do analysis and design of complex systems and meet ethical standards, legal responsibilities, ability to apply software engineering principles, techniques and develop, maintain, evaluate large scale software systems, to produce efficient, reliable, robust and cost-effective software solutions and perform independent research and analysis, ability to work as an effective member or leader of software engineering teams and manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals

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

301MCA : COMPUTER NETWORKS

COURSE OUTCOME: - Student will be able conceptualize all the OSI Layers, use appropriate network tools to build network topologies and familiarize with the basic taxonomy and terminology of computer networking area. Student will also be aware with Protocol Hierarchies, Design Issues, Interfaces and Services, Connection Oriented and Connection less Services. Student will be able to understand the terminology of LAN,MAN,WAN and Internet, IEEE Standards for LAN, FDDI, Fast Ethernet, Network Security, DNS, SNMP, E-mail, WWW, Network Multimedia Applications and Socket Programming.

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 Data gram 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, 3rd 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++

COURSE OUTCOME: - Students will gain knowledge about Object Oriented Programming through C++. They can make their own Applications/Projects using C++ and can be deputed as a C++ programmer in IT companies. Students can be understand the basic concept of Object Oriented Programming like Object, Classes, Inheritance, Reusability, Polymorphism & Overloading. Apart from this Students can able to understand Constructor, Destructor, Function overloading, this pointer, Operator overloading. Students will gain knowledge about UML concepts, object-oriented paradigm and visual modeling, UML diagrams, UML specifications, object model, object oriented design, identifying classes and object, object diagrams.

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.
Introduction to UML: UML concepts, object-oriented paradigm and visual modeling, UML diagrams, UML specifications, object model, object oriented design, identifying classes and object, object diagrams.

References :

1. " Object Oriented Programming in C++" By Lafore.
2. " Programming with C++" By John Hubbard
3. " The C++ Programming Language" By Strouststrap
4. " C++ Inside Outside" Byeckel
5. Lee UML & C++ a practical guide to Object Oriented Development 2 ed, Pearson.
6. Hans Erit Eriksson UML 2 toolkit Wiley
7. Boggs Mastering UML BPB Publications.

303 MCA E1: UNIX & Shell Scripting

COURSE OUTCOME: Students will gain knowledge about Structure of UNIX like Kernel and shell, features of UNIX,. Unix file system, Login Directory, file system hierarchy and basic command for file manipulation like :ls, cat , cp, rm, mv. Students will also aware with multi user communication & Scheduling, multiple commands on command line and various System Calls for the System. Students can understand Shell Programming like Bourn Shell, C Shell, advance features of shell. Shell variable, local & global variables. Apart from that students will gain knowledge about Linux structure, Various flavors of Linux, Installing Linux .

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.

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

303 MCA E2: ERP AND BPR ALLIED CONCEPTS

COURSE OUTCOME: Student will be able to Understand various BPR methodologies and their applications, the critical success factors for implementing, appreciate various alternative techniques of BPR – TQM, Work Study, Benchmarking and their applications, analyze and integrate issues and challenges of applying tools/techniques of Information Technology for BPR and learn to apply them in the industry

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

304MCA:COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

COURSE OUTCOME: Student will be able to errors in numerical approximation, Interpolation, Iterative methods and simultaneous linear equations. Apart form that Regression Analysis, Correlation and probability theory. Student will be able to demonstrate understanding of common numerical methods like Arithmetic, Floating point number operations, Normalization and their consequences

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, Runga- 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

COURSE OUTCOME: Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization and analyze the complexities associated with management of the group behavior in the organization. Student can understand Components of organization, nature and variety of organizations, Organizations in the Indian context, Basic roles in an organization and Organizational Structure and Integrating Interpersonal and Group Dynamics-elements of structure.

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, poser 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. Listerang, 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. Amold.J.Robertson.Lavern T.and CooperCary.L."Work Psychology: Understanding Human Behaviour in the Workplace" Macmillan Indian Ltd.Delhi.1996.
4. French & Bell (4th 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
Robbins (4th ed.). "Essentials of Organizational Behaviour" Prentice Hall of India
6. Schermerhorn, Hunt and Osbora "Managing Organizaiton Behaviour" John Willey & Sons. USA.1982.
7.Weston.Mergers. "Restructuring and Corporate Control" Prentice Hall Of India Pvt.Ltd. New Dellhi.1995.

401MCA : ANALYSIS AND DESIGN OF ALGORITHMS

COURSE OUTCOME: On successful completion of the learning sessions of the course, the learner will be able to choose appropriate advanced data structure for given problem, Students will be able to calculate complexity. Students will be able to select appropriate design techniques to solve real world problems. Students will able to apply the dynamic programming technique to solve the problems. Students will be able to apply the greedy programming technique to solve the problems. Students will be able to understand backtracking and graph colouring problems

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 E3 : Theory Of Computation

COURSE OUTCOME: upon completion of this course, students will be able to, understand basics of languages, grammars and finite automata, learn regular expression, regular grammar, context free languages, pushdown automata and turing recognizable languages, be exposed to a broad overview of the theoretical foundation of computer science with analytical thinking for problem-solving in related areas.

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, Chomskey 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.

UNIT 4-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 undecidaibility, recursively enumrables sets, recursive set, partial recursive set , concept of linear bounded automata, context sensitive grammars and their equivalence.

References :

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

402-MCA E4: Distributed System

COURSE OUTCOME: On successful completion of the learning sessions of the course students will be able to identify the advantages and challenges in designing distributed algorithms for different primitives like mutual exclusion, deadlock detection, agreement, etc., differentiate between different types of faults and fault handling techniques in order to implement fault tolerant systems, analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance constraints.

UNIT 1-Introduction to Distributed Systems : Goals of Distributed Systems, Hardware and Software concepts, the client server model, Remote procedure call, remote object invocation, message and stream oriented communications.

UNIT 2-Process and synchronization in Distributed Systems: Threads, clients, servers, code migration, clock synchronization, mutual exclusion, Bully and Ring Algorithm, Distributed transactions.

UNIT 3-Consistency, Replication, fault tolerance and security : Object replication, Data centric consistency model, client-centric consistency models, Introduction to fault tolerence, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.

UNIT 4-Distributed Object Based and File Systems : CORBA, Distributed COM, Goals and Design Issues of Distributed file system, types of distributed file system, sun network file system,.

UNIT 5-Distributed shared memory, DSM servers, shared memory consistency model, distributed document based systems: the world wide web, distributed co-ordination based systems: JINI.

References:

1 Andrew S. Tanenbaum, Maarten Van Steen "Distributed Systems Principles and Paradigms" Pearson Education Inc. 2002.
2. Lui "Distributed Computing Principles and Applications".
3. Harry Singh "Progressing to Distributed Multiprocessing" Prentice-Hall Inc.
4. B.W. Lampson "Distributed Systems Architecture Design & Implementation", 1985 Springer Varlag.
5. Parker Y. Verjies J. P. "Distributed computing Systems, Synchronization, control & Communications" PHI.
6. Robert J. & Thieranf "Distributed Processing Systems" 1978, Prentice Hall.
7. George Coulios, "Distribute System: Design and Concepts", Pearson Education

403MCA JAVA PROGRAMMING

COURSE OUTCOME: On successful completion of the learning sessions of the course students will be able to Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc like types of java, feature of java, JAVA environment, JAVA virtual machine. and also understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, Constructor , Methods overloading , Method overriding.

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

COURSE OUTCOME: On successful completion of the learning sessions of the course students will be able to understand the theory of optimization methods and algorithms developed for solving various types of optimization problems, to develop and promote research interest in applying optimization techniques in problems of Engineering and Technology, to apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

UNIT 1-Overview of Operation Research: Problem formulation; Model Construction; O.R. Techniques. Introduction to Liner 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

COURSE OUTCOME: upon successful completion of this course, the students will be able to understand the role of accounting and its limitations, prepare financial statements in accordance with generally accepted accounting principles, demonstrate knowledge of each step in the accounting cycle, support at a basic level the recording and reporting of financial information for business, demonstrate an understanding the tally in accounts

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 (9th ed.). "Introduction to Management Accounting " Prentice Hall of India Pvt. Ltd.
5.Welch. Hilton and Gordon (5th 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

COURSE OUTCOME: upon successful completion of this course, students will be able to understand basic concepts of artificial intelligence, early developments in this field, basic knowledge representation, problem solving, and learning methods of artificial intelligence , understand the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular problems, game playing as problem solving, representation of a game as a state space, state space search, heuristic search, blind and informed search, understand natural language processing, expert system, modern developments in the field of ai , soft computing, fuszzy systems, robotics etc.

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

COURSE OUTCOME: upon successful completion of this course, students will be able to understand contemporary graphics hardware. Display mechanism, input output mechanism, able to do scan-conversion and display objects on screen, fill regions, draw curves , able to transform objects in 2d and 3d, clip object in 2d using different mechanisms, detect visible surfaces using algorithms, get working knowledge of 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, antialiasion, 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, cured line & surfaces quadrate (sphere, ellipsoid), surfaces, design of curves & surfaces, bezier's methods, Bspling 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 Hradware, 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 (2nd ed), PHI.
2. S. Harrington – Computer Graphics – a Programming approach (2nd 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" Addision Wesly.

503MCA SIMULATION AND MODELLING

COURSE OUTCOME: After completion of this course student will be able to understand different methods for random number generation, having a clear understanding of the need for the development process to initiate the real problem, understanding of principle and techniques of simulation methods informed by research direction, cognitive skills (thinking and analysis). Students will be able to describe the components of continuous and discrete systems and simulate them, to model any system from different fields.

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. Gorden, 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 MCA –Data warehousing and data mining

COURSE OUTCOME: After completion of this course student will be able to Understand the functionality of the various data mining and data warehousing component knowledge, understand appreciate the strengths and limitations of various data mining and data warehousing models apply, create explain the analyzing techniques of various data analyze describe different methodologies used in data mining and data ware housing. Analyze compare different approaches of data ware housing and data mining with various technologies.

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

UNIT 2- *Data Mining Process & Technique* : Data Mining Techniques: automatic, cluster detaction, Decision trees, Neural Networks, Data Mining Methadologies: 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 Warehous.

Contructing 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 text, Security : Requirements, performance, impact of security, security impact on design.

References:

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

505 MCA-E5 :Cloud Computing

COURSE OUTCOME: After completion of this course student will be able to the course on cloud architecture & security introduces the basic concepts of security systems and cryptographic protocols, which are widely used in the design of cloud security. The issues related multi tenancy operation, virtualized infrastructure security and methods to improve virtualization security are also dealt with in this course

Unit 1: Historical development ,Vision of Cloud Computing, Characteristics of cloud computing as per NIST, Cloud computing reference model ,Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis ,Satellite Image Processing ,CRM and ERP, Social networking

Unit 2: Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance, Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management. Cloud Offerings: Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure

Unit 3: Cloud Management & Virtualization Technology: Resiliency, Provisioning, Asset management, Concepts of Map reduce , Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute ,storage, networking, desktop and application virtualization .Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements , Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits ..

Unit4: Cloud Security: Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture .

Unit 5: Market Based Management of Clouds , Federated Clouds/Inter Cloud: Characterization & Definition ,Cloud Federation Stack , Third Party Cloud Services . Case study : Google App Engine, Microsoft Azure , Hadoop , Amazon , Aneka.

References:

1. Buyya, Selvi , Mastering Cloud Computing ,TMH Pub
2. umar Saurabh, Cloud Computing , "Wiley Pub"
3. Krutz , Vnes, Cloud Security , Wiley Pub
4. Velte, Cloud Comput ing A Practical Approach ,TMH Pub
5. Sosinsky, Cloud Computing , Wiley Pub

505 MCA-E6 : .Net Technology

COURSE OUTCOME: On completion of this course, student should be able to • Create database driven applications and web services. • Implement client/server model for any application. • Develop Console application, windows application, ASP.NET Web application and Services.

unit I Introduction to .NET Technology, Introduction to VB.NET, Software development and Visual Basic .NET, Visual Basic .NET and .NET frame.

Unit 2 Visual Basic fundamentals: The Visual Basic .NET Development Environment, The element of VB.NET, VB.NET operators, Software design, Conditional structure and control flow, Methods.

Unit 3 Classes and Objects: Types, Structure and Enumeration, Classes, Interfaces, Exception handling and Classes, Collections, Arrays and other Data Structure.

Unit 4 Advance design concepts, Patterns, Roles and Relationships, Advanced Interface Patterns: Adapters and Delegates and Events Data Processing and I/O.

Unit 5:
Writing Software with Visual Basic.NET, Interfacing with the End User, Introduction to ASP.NET and C#.NET and their features.

References:

1. Jeffrey R. Shapiro "The Complete Reference Visual Basic .NET" Tata Mcgraw Hill (2002 Edition).
2 Rox "Beginner and Professional Edition VB.NET" Tata Mcgraw Hill.
3. Steven Holzner "Visual Basic .NET Black Book" Wiley Dreamtech Publication.
4. Alex Homer, Dave Sussman "Professional ASP.NET1.1" Wiley Dreamtech
5. Bill Evzen,Bill Hollis "Professional VB.NET 2003" Wiley Dreamtech
6. Tony Gaddis "Starting Out VB.NET PROG.2nd Edition" Wiley Dreamtech

505MCA E7: **Internet of things**

COURSE OUTCOME: Students will able to, Apply the concepts of IOT,. Identify the different technology, Apply IOT to different applications, Analysis and evaluate protocols used in IOT, Design and develop-MCAp smart city in IOT, Analysis and evaluate the data received through sensors in IOT.

Unit I: Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.

Unit II Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Unit III M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Unit IV Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Unit V: IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming & IOT Devices.

TEXT BOOKS: Vijay Madisetti, Arshdeep Bahga," Internet of Things A Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS: 1. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN: 978-1-118-43062-0 2. Daniel Kellmereit, "The

601MCA: System Development Project Report

COURSE OUTCOME: Students will have hands of experience of real life system development life cycle, the students will learn to apply the technologies learnt during the course in real life projects, students will learn to work in real life project development environments involving deadlines and teamwork, students will learn to pick up and apply upcoming technologies in project development not covered during the course

System Development Project (Here student is required to undertake a six months system development project in the Industry/Institute or in a software/computer Organization and submit a detailed project report as per prescribed format latest on the date announced by the department and then evaluated by the examiner.

602MCA: System Development Project work Demonstration

COURSE OUTCOME: Students will get the skill of presentation of their work and be able to focus on parts which need critical power of computation.

Students of final semester join a Software/computer organization/industry/institute ro work on real life value project, and will make a sincere effort to develop an information system/ some other type of system using latest Software tools. This work will be demonstrated by students in the accepted norms on date and time announced by the department and evaluated by the examiner.