SHIVAJI UNIVERSITY KOLHAPUR

B

Accredited By NAAC

M.C.A.(Master of Computer Application)

Credit System.

MCA (Science) Syllabus (updated) 2010

MCA-Semester-I

Sr. No.	Course	Credits	Letter Grade	Marks Obtain.	Grade Value	Credit value	Grade Points
1	Fundamentals of Computers	4	B-	45	4	4*4	16
2	Art of Programming	4	A	85	8	4*8	32
3	Discrete Mathematics	4	B+	70	6	4*6	16
4	Digital Electronics and Microprocessor	4	B	56	5	4*5	20
5	Introduction to Management Techniques	4	C+	32	3	4*3	12
6	Practical – I	4	B-	48	4	4*4	16
7	Project & Viva	4	B	59	5	4*5	20
	Total	28				Total	132

MCA-Semester-II

Sr. No.	Course	Credits	Letter Grade	Marks Obtain.	Grade Value	Credit value	Grade Points
1	Software Engineering	4	A-	77	7	4*7	28
2	Data & File Structure	4	B-	45	4	4*4	16
3	Statistical Computing	4	B	53	5	4*5	20
4	Linux Operating System	4	C+	40	3	4*3	12
5	Accounting & Management Control	4	C-	19	1	4*1	04
6	Practical – II	4	C+	33	3	4*3	12
7	Project & Viva	4	B-	50	4	4*4	16
	Total	28				Total	108

MCA-Semester-III

Sr. No.	Course	Credits	Letter Grade	Marks Obtain.	Grade Value	Credit value	Grade Points
1	Computer Communication Network	4	B-	44	4	4*4	16
2	Object Oriented technologies	4	A	81	8	4*8	32
3	Computer Oriented Numerical Methods & Optimization Techniques	4	C	27	2	4*2	08
4	Advanced Computer Architecture	4	A+	93	9	4*9	36
5	Advanced Topics in Database Theory & Applications	4	B	57	5	4*5	20
6	Practical – III	4	B-	47	4	4*4	16
7	Project & Viva	4	C+	33	3	4*3	12
	Total	28				Total	140

MCA-Semester-IV

Sr. No.	Course	Credits	Letter Grade	Marks Obtain.	Grade Value	Credit value	Grade Points
1	Distributed Operating System	4	B-	46	4	4*4	16
2	Visual Programming	4	C+	39	3	4*3	12
3	Java Programming	4	A-	75	7	4*7	28
4	Theory of Computation	4	A+	90	9	4*9	36
5	Data Warehousing & Data Mining	4	B+	65	6	4*6	24
6	Practical – IV	4	B	55	5	4*5	20
7	Project & Viva	4	C	27	2	4*2	08
	Total	28				Total	144

MCA-Semester-V

Sr. No.	Course	Credits	Letter Grade	Marks Obtain.	Grade Value	Credit value	Grade Points
1	Artificial Intelligence	4	C+	35	3	4*3	12
2	Parallel Computing	4	A-	77	7	4*7	28
3	Principles of Compiler construction	4	A+	94	9	4*9	36
4	Elective-I	4	B+	68	6	4*6	24
5	Elective-II	4	B-	46	4	4*4	16
6	Practical – V	4	B	55	5	4*5	20
7	Project & Viva	4	B-	42	4	4*4	16
	Total	28				Total	152

MCA-Semester-VI
   Total marks 250
   Total credits - 10
   (internal mark + external examiner mark)
   = (50 + 200)

Credit System Syllabus
Master of Computer Application
Semester -I

Paper-I- (MCA-101) : Fundamentals Of Computers And Its Environment

Unit 1   **(15 lectures)**
   a) **Data representation :** Number system -- Decimal, Binary, Octal and Hexadecimal, Conversion from one system to another, Binary arithmetic, Signed numbers, Fixed and Floating pointing arithmetic, Characteristics, Generation and Classification of computers, Study of HYPCOMP.

Unit 2   **(15 lectures)**
   a) **Operating system** -- Concept, Functions, Booting. Types of operating system, Batch processing, Multiprogramming, Multitasking, Multi processing, Time Sharing, **b) Basic computer organization and Design :** Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory-reference instructions, input-output and interrupt, complete computer description, design of basic computer, design of accumulator logic.

Unit-3   **(15 lectures)**
   a) **Computer Networks**, Topology – Bus, Star, Ring, Tree, Mesh and combined, OSI Model and its layers, Error detection and correction – Types of errors, Parity check, LRC, CRC and checksum methods
   b) **Software engineering** – Definition, System development life cycle,
      Software engineering paradigms

Unit-4   **(15 lectures)**
   Computer Graphics – Construction and working of CRT, random scan and raster scan displays, colour CRT's, line, circle and ellipse generation algorithms, Basic 2D and 3-Dimensional transformations.

References:
1) Enhanced Guide to Managing and Maintaining your PC --- Jean Andrews
                  (Thomson publication)
2) Computer Fundamentals -- P K Sinha (BPB publications)
3) Fundamentals of computers -- V.Rajaraman (PHI-97).
4) Operating Systems --- Achut Godbole
5) Peter Norton's DOS guide, Updated to cover 6.2, (PHI-96)
6) Introduction to Computer – Peter Norton
7) Data Communications and Computer Networks -- Brijendra Singh (PHI)
8) Computer System Architecture – M Morris Mano (Person Education)
9) Computer Graphics – Hearn and Baker
10) Computer Graphics – A P Godse
11) Computer Graphics – Kelly Plastock

Credit System Syllabus
Master of Computer Application
Semester -I
Paper-II- (MCA-102) : Art Of Programming

Unit-I : (15)
The Problem Solving Aspect : Problem definition, Getting started on problem, Use of specific examples, Similarities among the problems, Working backwards from the solution, General problem solving strategies, Top Down Design - Breaking problem into sub problem, Choice of suitable data structure, Loops – Construction, Initial condition, Iterative construct, termination.
Algorithm : Definition, Features, Use of procedures to emphasize modularity, Choice of variable names, documentation, debugging, Program testing, Efficiency of Algorithms : Redundant computations, Referencing array elements, Inefficiency due to late termination, Trading storage for efficiency gain, Analysis of algorithms : Priori and posteriori analysis, Asymptotic Notations: The Big-**O** Notation. Flow Charts : Notations, Examples

Unit-II: (15)
Introduction to C : History, Structure of a C program, Keywords, Identifiers - Variables, Constants, Symbolic constants, Escape sequences, Data types – built-in and user defined Operators and Expressions : Operator types (arithmetic, relational, logical, assignment, bitwise, conditional, other operators), precedence and associativity rules. Formatted input and output, **Control Structures :** Decision making structures : if, if-else, switch, Loops: while, do-while, for, break and continue, Labels and goto

Unit-III : (15)
Functions in C : Introduction, Advantages, Standard library functions, User defined functions : Declaration, definition, function call, parameter passing (by value), return keyword, void, Scope of variables, storage classes, Recursion, **Arrays :** Declaration, initialization, Types – one, two and multidimensional, Passing arrays to functions, **Pointers :** Declaration, initialization, Arrays and pointers, Pointer arithmetic, Pointer to pointer, Functions and pointers, Dynamic memory allocation : malloc and free

Unit-IV : (15)
Strings : Declaration and initialization, Standard library functions, Strings and pointers, Array of strings, **Structures and Unions :** Creating structures, Accessing structure members (dot Operator), Array of structures, Pointers and structures, **Unions,** Difference between structures and unions, **C Preprocessor :** Format of Preprocessor directive, File Inclusion directive, Macro, **Command Line Arguments :**Accessing command line arguments, **File Handling :** Types of Files, Operations on files, Random access to files

References:
1. Dromey : How to Solve it by Computers
2. Ellis Horowitz, Sartaj Sahni : Fundamentals of Computer Algorithms (Galgotia)
3. Kernighan and Ritchie : The C Programming language
4. Herbert Schildt : Complete C Reference

Credit System Syllabus
Master of Computer Application
Semester -I
Paper-III- (MCA-103) : Discrete Mathematics

Unit 1:   **(15)**
(a) Combinatorics: Permutations and combination and combination of distinct
and non-distinct objects, Binomial coefficient and its applications. Pigeonhole principle, Generating
functions for combinations, Enumerators for permutations, Distribution of distinct objects.
(b) Recurrence Relations and Solutions: Linear relations with two indices, Principles of inclusions &
exclusions, Formula derangement, Restrictions on relative positions.

Unit 2:   **(15)**
Relations and Functions : Elementary set theory, product sets, Relations,
Properties and related algorithm, closures, Computer representation of sets,
relations and digraph, manipulation.

Unit 3:   **(15)**
(a) Functions: Types of function, functions for computer science, permutation
functions and their manipulations.
(b) Order relations and structures : Partially ordered sets, Externals element of
posets, Lattices and their properties, Finite Boolean algebras, Function on Boolean algebras.

Unit 4:   **(15)**
(a) Mathematical Logic: Statements and notations, Connectives, Normal forms,
Theory of inference for
Statement calculus, Predicate calculus, Inference theory of the predicate calculus.
(b) The application of residue arithmetic computers. Group codes, Definition and examples of algebraic.
Structures, their applications to computer science.

Reference:

1. A.Doerr, Discrete Mathematics for Computer Science,(Galgotia-86).
2. Kolman B. Busby, Ross S.C.:Discrete Mathematical Structures for Computer Science, (Prentice Hall).
3.Olympia Nicodimi : Discrete Mathematics, (CBS publications and distributors)
4. Joshi K.D., Discrete Mathematics, (Wiely Eastern).
5. Liu C.L: Elements of Discrete Mathematics,(TMH).
6. S. Sahni, Concepts in Discrete Mathematics,(Camclot Publisher,USA).
7. Tremblay J.P. and Manohar, R:Discrete Mathematical Structures with applications to Computer
Science.(McGraw-Hill book company)
8. Schaums series: Discrete Mathematics.

Master of Computer Application
Semester -I
Paper-IV- (MCA-104) : Digital Electronics and Microprocessor

1. Digital Logic Circuits **(15)**
Binary systems, Boolean algebra ,K-map Multiplexers, Logic Gates, Combinational Logic –   Adder, Sub tractors, Encoder, Decoders, multiplexers, Demultiplexers. sequential logic - Flip-flops. Registers, Shift Registers, Ripple Counters, Synchronous counters, Asynchronous counters, Analog to Digital Conversion (ADC) and DAC , Memories

2. Control logic and computer design. **(15)**
Control Organization – one F/F per state method, Sequence register and decoder method, PLA Control. Microprogram Control and it's organization, Control of processing unit, Computer Instructions and it's Execution, Arithmetic and Logic instructions, Jump, Shift, Rotate instructions. POP & PUSH instructions. Microprocessor organization, addressing modes, Memory Organization, DMA, stack & subroutines and interrupt

3. Introduction to microprocessors and their architecture: **(15)**
Architecture of 8086 – pin descriptions, operating modes, registers, Bus cycle, 8088 architecture, bit, 16 bit, 32 bit & 64 bit microprocessors(8085,8086,80x86), Memory and I/O Interfacing of Peripherals, Interrupts of 8085, Timing diagrams for I/O and memory transfer.

4. Assembly Language Programming – Introduction to Assembly Language   **(15)**
Programming Evolution, Application, Block transfer, Keyboard/Display interface. math coprocessor and I/O processor, 80486 Assembly Language Programming for Hex arithmetic and memory segmentation using debug program, BIOS and DOS interrupts,

References:
1. Douglas Hall, Microprocessors and interfacing(McGraw Hill-86).
2.   Malvino and Leach ,Digital principles and applications (TMH)
3. Gaonkar, Microprocessor Architecture, Programming & Application 085/8080 (Wieley Eastern).
4 .Novel M. Morris, An introduction to 8086/8088 Assembly Language Programming for beginners,
5. Peter Abel, Assembly Language Programming(PHI-97).
6. Refiquazamman, Computer Architecture.
7. Venugopal, Microprocessor X86 programming, (BPB-95).
8. Wyatt, Using Assembly Language.
9.Liu Gibson , " Microprocessor system : The 8086/8088 family Architecture Programming design
10. James L. Antonakers , "An Introduction to the Intel family of microprocessor"(Addison Wesley)

Master of Computer Application
Semester -I
Paper-V- (MCA-105) : Introduction to Management Techniques

Unit-1. Basic of management and Marketing   **(15)**

Management-- General principles of Management, HRD selection, Appraisal
Training and Information Systems.
Marketing: Understand the concept of marketing MIS, Marketing MIS consists of
product policy and design, pricing, choice of marketing to intermediaries, methods of physical distributions, Use of Personal selling, Advertising and sales promotion, Marketing research and marketing organization.

Unit-2 Finance: **(15)**

Finance function-concept, scope and its relationship with other functions, Tools of financial analysis, Funds and Cash Flow analysis, Ratio analysis, Risk-return trade off, Financial forecasting-Performa of income statement and balance sheet, cash forecasting under uncertainties, Financial Planning, Estimation and management of working capital, operating cycle concept, Inventory, Accounts receivables, cash & accounts payables, Working capital requirements.

Unit-3 Manufacturing: **(15)**

Operations planning and control-aggregate planning, multiple Product batch, production cycles, short term scheduling of job shops, setting production rates in continuous production systems activity, scheduling in projects, Introductions to project time calculations through PERT & CPM, management of supply chain, materials management-introduction to materials management, systems and projects for inventory management, planning and procurement of materials, quality management- quality concept and planning, standardization, quality circles.

Unit-4 Strategy: **(15)**

Firm and its environment, Strategies and resources, Industry Structure and analysis, Evaluation of corporate strategy, Strategies for growth and diversification, process of strategies planning, Emphasis should be given on Computer Applications in Functional areas of Management.

References:

1. Agarwal R.D., Organization and Management,(Tata McGraw Hill-86).
2. Azami, Business Policy.
3. Dale S. Beach, Personnel-Management of people.
4. Edwin B. Flippo, Personnel Management.
5. Everett E. Adam and Jr. Ronald J. Abert, Production and Management Concepts, Model And Behavior(PHI-95).
6. Jain, Industrial Management.
7. Massic, Essentials of Management, (PHI).
8. Prasanna Chandran, Finance Sense.
9. Prasanna Chandran, Finance for Nonfinance Executives.
10. Robert C. Appleby, Modern Businesses Administration.
11. Tom Cannon, Basic Marketing.
12. T.M.Pandye, Financial Management,(Vikas Pub.79).
13. Uday Pareek and T.V.S. Rao HRD.

Master of Computer Application
Semester -II
Paper-VI (MCA-201) : Software Engineering

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Unit-I : Introduction to software engineering **(15)**

Computer based business systems, importance of software and software engineering, software engineering paradigms, role of user and analyst. Requirement analysis :Fact finding and interviews, review and assignment, feasibility study, data modeling and process modeling, tools of modeling, DFD, ERD, prototyping and 4GL, RAD, classical as well as computer aided techniques

Unit-II : Software Project Planning **(15)**

Observations on estimating, project planning objectives, software scope, resources, software project estimation, decomposition techniques, empirical estimation models, the Make/buy decision, automated estimation tools. Software Design: Input, output and process design, Design and controlling the screens, formatting the reports, File design, Data storage methods, Human computer interface design, software design, program definition and module design, Guidelines for designing, design walk through and design review.

Unit-III: Software coding standards **(15)**

Top-down & Bottom-up approaches, structured programming, documentation and other good programming practices, code verification and validation. Software testing and training : a strategic approach to software testing, strategic issues, unit testing, integration testing, validation testing, system testing, the art of debugging, Training management, users and operations staff.

Unit-IV : Software quality assurance **(15)**

Software metrics, bench marking, quality assurance and conversion, maintaining and managing the system, the ISO 9000 quality standards.

Reference Books:
1) E Awad   System Analysis and Design
2) Fairly   Software engineering concepts
3) Krishna Moorthy   Handbook of Software engineering
4) Perry Edwards   System Analysis and Design
5) Pankaj Jalote   Integrated approaches to Software engineering
6) R S Pressman   Software engineering -- Practitioners approach

Master of Computer Application
Semester -II
Paper-VII- (MCA-202) : Data and File Structures

UNIT-I.   **(15)**
Fundamental notions : Primitives and composite data types , complexity of an
algorithms, various sort, search algorithms and their complexities.
Arrays : Representation, Multidimensional Arrays, sparse matrices, sparse matrix
representation.
Linked List : Processing linked list, Circularly linked list, Doubly linked list,
Multilinked lists. .

UNIT-II   **(15)**
Queues : Processing the queues, Linked list implementation, Deques, Priority queues and
their applications.
Stacks   : Processing the stacks, Linked list implementation, Application of Stacks for
expression solving, Non recursive implementation of recursive algorithm.

UNIT-III   **(15)**
Trees   : Representation of hierarchical relationships, General Trees, Binary trees,
Binary search trees, linked list implementation, traversal algorithms, Threaded binary trees, height balanced
trees, Heap tree.
Graph: Graph representations, Breadth first and Depth first search, Topological sort,
 Shortest path, Minimum Spanning tree, applications of graph.

UNIT-IV   **(15)**
Design and analysis of algorithm: Greedy methods, Dynamic programming,
Backtracking, Branch and bound
File Structures   **:** Sequential, Indexed sequential organization, Binary tree indexing,
B-tree indexing, Tire indexing, Hashed indexing.
Advanced Concepts: Garbage collection techniques, Memory Management techniques
and effective use of data structures, introduction to Euler's graph, seven bridge problem.

Reference :
1.   Aho, Hop craft and Ulman, Data structures and algorithms   (Addision - Wesley)
2.   Bhagat Sing and Nap, Introduction to data structures (TMH-85).
3.   Data Structures using Cand C++ - Tanenbaum
4.   Classic data structures- D. Samantha- PHI
5.   Karnighan B. and Ritchi D., The C Programming Language (PHI-88)
6.   R.L.Kruse, Data Structures and Program design (PHI-96)
7.   Trembley and Sorenson, Introduction to Data Structures with application (TMC-84).
8.   Weiderberg : Data and file structures

Credit System Syllabus
Master of Computer Application
Semester -II
Paper-VIII (MCA-203): Statistical Computing

Unit -1 Data analysis: (15)
 a) Population sample parameters, Variables, Various types of data , Frequency distribution, Tabulation, Graphical Representation of data .
 b) Descriptive measures: Measures of central tendency, dispersion, skewness and kurtosis.
 c) Correction and regression:- Interprelution of correlation, correlation coefficient and its properties, regression, coefficients of regression, liner of regression and properties coefficient of data mination.

Unit – 2 (15)
 a) Probability:-Sample Space , equally likely outcomes, exclusive, exhaustive events. Definition of probability, examples of probability of various events. Addition theorem on probability. Conditional probability, multiplication theorems on probability, indendence of events. Bayes theorem and its applications. Arcioms of probability.
 b) Random variable and probability distribution :- Random variable, vector probability marginal and distribution of a v. u. Expectation and variance of a v.u. Marginal and conditional distribution of a discrete bivariate random vector. Marginal expectation, variance, covariance, and correlation coefficient.

Unit-3 (15)
 a) Standard discrete probability distributions : Bernoulli, Binomial, Poisson, Geometric, Hyper Geometric, Negative Binomial Distributions, Computation of mean and variance of these distributions.
 b) Continuous Probability Distributions : Probability density function (pdf), distribution function (c.d.f.) expectation and variance, Uniform, exponential normal distributions computations of mean and variance, their properties, computation of probabilities of various events.
 c) Testing of hypothesis : Statistics, sampling distribution, standard error, types of hypothesis, types of errors, critical region, level of significance, p-value, large sample test for mean, equality of means, proportions and equality of proportions, t-test for mean and equality of means, Chi-square test for population variance and goodness of fit.

Unit-4 (15)
 a) Simulation techniques : Random Number generation techniques, generation of uniform (0,1) observations, generation of non-uniform random observations, inverse c.d.f. transformation method, rejection method. Generation of random observations from standard distributions Bernoulli, Binomial, Poisson, Geometric, Negative Binomial, exponential, beta, normal
 b) Test for randomness : Digit frequency test of serial correlation, Kolmogorov Smirnov test, Chi-square test of goodness of fit, Poker test. Emphasis be given for sampling the graphs of p. m. f. , p. d. f. use of packages for the graphical representation, Developing algorithms for computation and their implementation.

References :
1. Bhat B.R., Srivenkatramana T. & Madhava, Rao K.S., Statistics (vol.1,2),

(Newage international publiacation -96).
2. Chou Cy A Lin, Statistical analysis for Business and Economic,
    (Eleservier ,1989).
3. J.Medhi, Introduction to statistical methods.
4. Levin R.I. Statistics for management (Printice Hall, 1980).
5. S. Ross, A First course in probability.
6. Trivedi : Probabilty and Statistics with Computer Applications
7. Freund J E : Modern Elementary Statistics
8. Gupta S C : Fundamentals of Mathematical Statistics
9. Mood & Graybill : Introduction to probability and Statistics
10. Goon, Gupta Dasgupta : Fundamentals of Statistics – Vol I
11. Devroye : Non-Uniform random variate generation
12. Narsingh Deo : System Simulation with digital computer

Credit System Syllabus
Master of Computer Application
Semester – II
(MCA-204): Paper-IX Linux Operating System

Unit 1:   **(15)**
Introduction to Unix, Linux & GNU, Introduction to shell and kernel, Unix Commands , General Purpose Utilities, File System Navigation, File Handling ,Shell Environment, File Attributes, Simple Filter, Grep Family, Process, Communication Commands.

Unit 2:   **(15)**
Advanced Filters Sed & Awk, vi Editor ,Advanced vi Editor, Linux File Structure, EMACS Editor of Linux , Shell Programming of Linux, Advanced Shell Programming, System Administration, Introduction to Development Tools of Linux,

Unit 3:   **(15)**
 Dbm Database of Linux, My SQL installation, My SQL administration, Introduction to Accessing MySQL Data from C.

Unit 4:   **(15)**
 Socket, Socket connections, Network information, Multiple
 Clients, Datagrams.

References :
1. Beginning Linux Programming: Neil Mathrew Richard Steve Wrox publication.
2. Unix Concepts and Applications : Sumitbha Das
3. Graham Glass , King AblesUnix for programmers and users
4. Andleigh P.K., UNIX system architecture
5. Achut Godbole, Operating systems with case studies in UNIX Netware, Windows NT
6. Banerjee R. Architecture and conceptual design of the UNIX system
7. Bach, UNIX operating system
8. Gandhi, Shetty and Shah, Vijay Mukhi's C Odyssey UNIX
9. Kaare Chiristian, The UNIX operating system.
10. Kanetkar Y., UNIX Shell Programming
11. Kernighan and Pike, The UNIX Programming Environment
12. Maurice Bach, Design of UNIX Operationg System (PHI - 94).
13. Morgan and Mcbiton, Introduction to UNIX system (McGrawHill - 87).
14. Narayanswamy Kutty, C and UNIX Programming
15. Rebecca Thomas, Rogers and Yates, Advanced Programmer's Guide to UNIX
16. C.Schirmer, Programming in C for UNIX

Master of Computer Application
Semester -II
Paper-X- (MCA-205): Accounting and Management Control

Unit-1 **(15)**
Basic Accounting and Conventions, understanding preparation of Financial Statements (balance sheet, highlighting accounting equation, profit and loss statement, accounting processes, basic accounts, trial balance and financial statements, issues such as provisions for bad debts tax, dividends losses such as bad debts missing information classification effect, cost of assets rentals etc.). Income Measurement (revenue, recognition and matching costs and revenues, inventory valuation) Depreciation Accounting , Intangible Assets Accounting , Understanding Published annual accounts including funds flow statement.

Unit-2 **(15)**
Basic Cost Concepts Introduction, Cost classification, allocation, appointment and absorption, cost centers, Cost Analysis for Management Decisions(direct costing, break-even analysis, relevant costs, pricing ,pricing joint costs, make or buy, relevant fixed costs and sunk sunk costs). Cost analysis for control (Standard Costing, variances, material, labour, overhead, sales and profit). Standard Cost Accounting (budgeting and control, elements of budgeting control of manufacturing and manufacturing expences, performance appraisal, evaluation of cost control systems).

Unit-3 **(15)**
Introduction to Management Control Systems ,Goals ,Strategies and Key Variables, Performances Measures, Responsibility Centers and Transfer Price, Investment Center, Reporting System. Management by bjectives, Budgeting and Control, Organizational Relation- ships in Control, Control Dynamics, Top Management and Control, strategies and Long range Planning, Control of Services Organization, Controls of Projects, Control of Non Profit Organizations, Control of Multinational Companies.

Unit-4 **(15)**
Exhaustive study of Accounting and Taxation Packages. (e.g. TALLY, Ex Etc.).

References :

1. Jain Navarang , Cost Accounting (Sultanchand and Sons, New Delhi - 86).
2. Javaharlal, Cost Accounting.
3. NIC Publications, Management Systems and control.
4. Paul Vol I & II , Advanced Accounting.
5. R.L. Gupta, Advanced Accounting.
6. Maheshwari S.N. , Introduction to Accounting (Vikas Publ-86).

Master of Computer Application
Semester -III
Paper-XI- (MCA-301): Computer Communication Networks

Unit 1 (15)
Introduction to computer network: Fundamentals of telecommunication theory,
modems, synchronous and asynchronous transmission. OSI Architecture, Protocols and Interfacing : TCP/IP model, Time Division Multiple Access, Time Division Multiplexing, FDM .
Local Area Network : Ethernet , Token Bus, Token Ring , LLC and MAC Protocols, ANSI Fiber Distributed Data Interface, Carriers Sense System (with Collisiouz and without collision)

Unit 2 (15)
Circuit switching, Packet Switching , Message Switching , Datagram and virtual circuit.
Concepts of Routing , routing algorithm (shortest path, flooding, distance vector, link state routing, hierarchical) Congestion control algorithms (Leaking bucket, Token Bucket)
Network Security: Traditional Cryptography-Substitution Ciphers, Transposition Ciphers,
One Time Pads, Fundamental Cryptographic Principles, Digital signature(Symmetric key, public key , message digest)

Unit 3 (15)
Wireless LAN IEEE 802.11 – architecture, physical layer, MAC layers, Bluetooth- architecture, layers-Bluetooth, radio, Base band, other upper layers.
X.25 Network and Supporting Protocols - Features, Layers, Channel Options, Flow Control
Principle, Logical Channel Status, Packet Formats, Frame Relay Architecture
TCP/IP - Internetworking , IP address structure , IP datagram, Process-to Process Delivery , UDP, TCP services and features , TCP segment .

Unit 4. (15)
UNIX Networking Concepts and socket programming -
Berkeley socket overview, UNIX domain protocols, socket addresses,
Socket system calls, reserved ports, passing file descriptors, I/O asynchronous and multiplexing socket implementation WINSOCK programming
 Application - **-**Concept of well known ports, DNS, OSI application – VTAM, FTAM, Client server application – network file server,Time and date routine, ping, FTP, remote logging , E-mail architecture etc.

References :
1. Black C. -"Computer Networks Protocols ,Standards and Interface"
2. Stalling A.S. -"Computer Networks" (PHI-93 4th ed.)
3. Tannenbaum A.S. -"Computer Networks" (PHI-81)
4. Data Communications and Networking – Behorouz A. Forouzan.
5. Comer - "Internetworking with TCP/IP:Principles ,Protocols and Architecture" (PHI)
6. Devis R.- "Windows Network Programming" (Addison Wiesley readings A-93)
7. Steven W.R. - "UNIX Network Programming" (PHI-94)
8. Steven W.R - "Advanced Programming in UNIX Environmental"

Master of Computer Application
Semester -III
Paper-XII- (MCA-302): Object Oriented Technologies

Unit-I **(15)**

Introduction to Object Oriented Paradigms: Basic terminology and features. Skeleton of an Object Oriented Program - Creating and Using Classes and members, constructors, member initialization list, member wise assignment, efficiency considerations. Copy constructor and destructors. Constant objects and member functions, Static data members and functions, Friend Function, friend class , non member functions, this pointer, Dynamic memory allocation, Nested classes, Composition, introduction to Namespace.

Unit-II **(15)**

Operator overloading and user defined conversions – operator overloading fundamentals, Restrictions., overloading urinary & binary operators, overloading stream ($<<$ & $>>$) operators, User defined Conversions. Inheritance- defining a class hierarchy, Base class member access, Base and Derived class constructor, Object Slicing, public, private & protected inheritance, multilevel inheritance. Direct base classes & indirect base classes, Multiple inheritance.

Unit-III **(15)**

Virtual functions and Polymorphism- early and late binding, virtual table, virtual pointer, pure virtual functions, virtual base class, virtual inheritance, Run Time Type Identification. Generic Programming- overview, Function templates, Class templates, member templates, Specialization, overview of Standard Template Library. Exception handling- keywords, basics of c++ exceptions, catching an exception, re-throwing an exception and stack unwinding.

Unit-IV **(15)**

Unified Modeling Language –history, views, diagrams, model elements, UML extensions, Use Case modeling - Dynamic modeling and real time modeling tools - Logical and physical architectures, component diagram deployment diagram, tagged values and properties, constraints and stereotypes, Relationships, Diagram and Case study.

References :

1.C++ Primer – Lippman
2.C++ How to program – Deitel & Deitel (Pearson Education)
3. A.L.Stevens - " C++ database development"
4. Mastering C++ - K.R.VenuGopal, Rajkumar, T. RaniShankar (TMG)
5. Effective C++ - Scott Meyers (Pearson Education)
6. Object Oriented Programming in C++ - R. Subburaj (Vikas Publication)
7. Rambaugh et.al. - " Object Oriented Modeling and Designing"
9. Grady Booch -"Object Orient Analysis and Design with applications"
10. Bajarne Stroustrup - "The C++ programming language"(Addison Wesley)

Credit System Syllabus

Master of Computer Application
Semester -III
Paper-XIII- (MCA-303) : Computer Oriented Numerical Methods And
Optimization Technique

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Unit-1: A) Computer arithmetic :   **(15)**

Floating point number operations, normalization and their consequences, Iterative methods, Zero of a single transcendental equation and zeros of polynomials using bisection, false position, secant and Newton-Raphson method, Convergence of solution.

B) Finite differences: Difference operators, forward, backward and central difference operator**,** other difference operators

C) Interpolation :

Introduction and approximation, Newton-Gregory Forward and backward difference formula, Newton's divided difference formula, Lagrange's formula for interpolation, Hermite interpolation formula, Central difference interpolation formulae – Gauss forward and backward interpolation formula.

Unit-2: A) Numerical differentiation   **(15)**

Numerical differentiation using forward, backward & central difference formula.

B) Solution of system of linear algebraic equations :

Gauss-elimination method and pivoting, Gauss-Jordan method, Ill condition equations and refinements, LU decomposition, Doo-Little reduction, Newton Crouts method, Gauss-Siedel and Jacobi method.

Unit-3: A) Numerical integration   **(15)**

Newton Cotes quadrature formula, Romberg integration, Gaussian quadrature formula Legendre polynomial.

B) Solution of Differential equation :

Taylor series method, Euler's method, Graphical representation of Euler's method, Modified Euler's method, Improved Euler's method, Runge-Kutta second and fourth order method, Heun's method, Predictor and corrector methods---Milne's and Adams-Bashforth method.

Unit-4: Optimization techniques :   **(15)**

a) Introduction, LPP, To solve LPP by using Simplex method, Big-M method, Two-phase method, Duel Simplex method and Revised Simplex method.

b) Transportation problems : Initial basic feasible solution by North-West corner rule and VAM, Test for optimality by MODI method, Degeneracy

c) Assignment Problem : Assignment problem by Hungarian method.

References:
1) Theory and Problems in Numerical Methods   by T Veerarajan, T Ramachandran
2) Numerical Methods   by S Balachandra Rao , C K Shantha
3) Introductory Methods of Numerical Analysis by S S Sastry
4) Computer Oriented Numerical Analysis by R Roychoudhury
5) Computers and Numerical Methods by Balgurusamy
6) Computer Oriented Numerical Methods by V Rajaraman

7) Computer Based Numerical Algorithms by Krishnmoorthy E V and S K Senn
8) Operations Research by Kanti Swaroop
9) Operations Research by Taha H A
10) A course in Computer Programming with Numerical Techniques by Motewar S N
11) Numerical Methods by S Arumugam, A Thangapandi Isaac, A Somasundaram

Master of Computer Application
Semester -III
Paper-XIV- (MCA-304): Advanced Computer Architecture

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Unit 1 (15)
Parallel Computer models : The state of computing, Elements Of Modern Computer, Evolution of computer architecture, System attributes, Multiprocessor and Multicomputer, Multivector and SIMD computer, PRAM models.
Program and Network Properties : Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Program flow mechanism, System Interconnect Architectures.

Unit 2 (15)
Processor and Memory Hierarchy:
  Advanced processor technology , Instruction set architecture, CISC Scalar
  Processor, RISC scalar processor, Superscalar and vector processors,
  VLIW Architecture. Hierarchical memory, Inclusion, Coherence,
  Locality of reference, Virtual memory technology, Virtual memory models,
  TLB, Paging, Segmentation, Memory replacement policies.

UNIT 3 (15)
Cache Memory I/O and Pipelining:
  Cache memory : Direct mapping ,Associative mapping ,Set Assciative mapping
  Sector mapping. Characteristics Of I/O subsystem, Interrupt mechanism,
  Linear Pipeline Processor, Nonlinear pipeline processor, Instruction pipeline
  Design, Arithmetic Pipeline Design, Vector processors : Star -100 ,Cray-1,
  Fujitsu-VP-200 and their special features.

UNIT 4 (15)
Structures and algorithms for array processors:
  SIMD array processor, SIMD interconnection network, SIMD matrix
  multiplication, Illiac-IV, BSP systems architecture.
Multiprocessors and Multicomputers:
  Multiprocessor system interconnect , Hierarchical bus system, crossbar switch,
  Multiport memories, Multistage network, Functional structures , Multiprocessor
  Scheduling , Data Flow machine architectures.

Reference :
1. Kai Hwang, "Advanced computer architecture"; TMH. 2000
2. Hawang and Briggs F.A. Computers Architecture and parallel   processing"(MGH)

Master of Computer Application
Semester -III
Paper-XV- (MCA-305): Advanced Topics In Database Theory And Applications

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Unit –I   **(15)**

Introduction to DBMS :
Concept and architecture of DBMS ,Schemas,instances and data independence,
Introduction to conventional data models (Network ,Hierarchical and Relational)
Relational model : Concept , Relational Algebra and Tuple and Domain Calculus
SQL – basic structure of SQL Queries, set operation, aggregate function ,nested
subqueries, Complex queries, Views ,modification of the database.
Integrity constraints , Indexing   RDBMS - Oracle

Unit –II   **(15)**

Database Design and the E-R Model: Overview of the design process, E-R Model, constraints, E-R diagrams,
E-R design Issues
Relational database design : Functional dependencies , Normal Forms , Loss less join and Dependencies
preserving decomposition

Unit-III   **(15)**

Transactions and Concurrency Control:- Transaction concept, transaction state, concurrent execution ,
serializability, Recoverability, Locking , Time stamp ordering , Multiple Granularity of data items.

Recovery System :- Failure classification, storage structure, recovery and atomicity,
log-based recovery
Security and protection : Role of DBA , File structure , table space , segments , User
database, Data dictionary management , memory structure , process structure .

Unit IV   **(15)**

Developing application software : Using Oracle products , SQL, PL/SQL
Advance techniques in databases : History of ODBMS, Concept of persistence,
problems posed by persistent objects, RDBMS to solve persistent objects, designing
object database, concept of ODBC, Introduction to parallel ,distributed databases.

References :
1. Korth and Silderschutz - "Database systems concepts" (TMH)
 2. C.J.Date - "Introduction to database systems" (Narosa)
3. Desai B. - "Introduction to database concepts"(Galgotia)
4. Ulman J.D. - "Principles of database systems" (Galgotia)
5. Oracle installation and user manual
6. Raghu Ramakrishna-"Database management system"

Credit System Syllabus
Master of Computer Application
Semester -IV
Paper-XVI- (MCA-401): Distributed Operating Systems

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Unit I - Overview of Operating System :   **(15)**

Operating System - concept, need and requirements of operating system, Processor, Memory, Device and File management, Virtual memory, Pipes, Deadlocks and protection issues, Comparative study of Various/ types of operating systems.
Introduction to Distributed system:
Goal, Hardware Concepts, Software concepts , Design issues

Unit 2 - Communication in distributed system: **(15)**

Layered protocols , client server model , remote procedure call , group communication , Comparison of Client Server Vs. Distributed operating system Synchronization in distributed system : Clock synchronization , mutual exclusion , election algorithms, automatic transaction , deadlocks in distributed systems.

Unit 3 -Processes and processors in distributed systems: **(15)**

Threads , System models , Processor allocation , Scheduling in distributed systems .
Distributed file system : Distributed file system, Design and Implementation trends in distributed file system .

Unit 4 - Distributed shared memory:
Introduction to shared memory, consistency models Case study :   **(15)**

Detail and comparative study of MS-windows NT and Novel Netware, Windows programming concepts. Emphasis be on administration, optimization and trouble shooting

References :

1. A.S. Tanenbaum - "Modern Operating Systems" (PHI)
2. Donovan Madnick, Operating System
3. Peterson, Operating System
4. Hansen Per Brinch, Operating systems principles
5. Cowart, Windows NT 4 - Server and Workstation unleashed(Techmedia)
6. Helen Custer - "Inside Windows NT" (Microsoft Press)
7. Jeffery Richter - "Advanced Windows NT : The Developer's Guide to the WIN32 application Interface
8. Peter Norton's maximizing Windows NT server 4 (Techmedia)
9. Peter Norton's complete guide to Windows NT workstation (Techmedia)
10. Charles Petzold - Programming windows 3.1 (Microsoft Press)
11. Windows NTs Automated Deployment and Customization (Techmedia)

Master of Computer Application
Semester -IV
Paper-XVII- (MCA-402): Visual Programming

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Unit I:- **(15)**

Visual Basic: Features of Visual environment, Forms and their properties, Form events, Form methods, Handling Multiple Document Environment, Selecting and using controls : Command buttons, Labels, various types of boxes and their usages, property sheets, wizard sheet etc. Creating and using code modules, sub procedures, menus, toolbars etc. Storing and retrieval of data.

VC++: Introduction to MFC, windows programming Model, VC++ components, Application framework, Documents and view.

Unit II **(15)**

Messages and Events: Basic event handling, Mapping modes, Windows messages, scrolling view , keyboard messages, mouse messages.

GDI: Graphical device interface, colors and fonts, GDI objects.

Dialog Boxes and windows common controls: modal v/s modeless dialogs, resources and controls, windows common controls, windows common dialog.

Unit III **(15)**

Document/view architecture : Menus ,keyboard accelerators, rich edit control, property sheets, SDI,MDI, Memory Management, Printing and print previews.

Data retrieval and storage: Database management with ODBC and Database Management with DAO.

Unit IV **(15)**

Advanced Topics: Multithreading, Dynamic link libraries, COM/DCOM, ATL and ActiveX controls.

Programming for Internet: TCP/IP, WinSock, Winlet, Internet Information Server, Activex Document Servers .

.Net Introduction: Introduction to VB.net, Introduction to VC++.net

References :
 1. David Kruglinski, Programming Visual C++ (Microsoft press)
 2. Don Box - Creating components using DCOM and C++ (Microsoft)
 3. Evangelos Petroutsos, Mastering Visual BASIC (BPB)
 4. Ivor Horton's, Beginning Visual C++ (SPD)
 5. Steven Holzner, Visual BASIC - programming Black Book (BPB)
 6. Steve Brown, Visual BASIC (BPB)
 7. Julia case Bradley, Programming in Visual Basic .NET(Tata McGraw Hill)
 8. Pappas, Visual C++.NET the Complete Reference (Tata McGraw Hill)0.

Master of Computer Application
Semester -IV
Paper-XVIII- (MCA-403): Java Programming

UNIT-I **(15)**
Introduction: The Java Virtual Machine, Editions of Java, A simple java program.
Writing a java class, Instantiating an object, Garbage collection, Accessing fields and methods, this reference.Methods: Method call stack, invoking methods, Method Signature, Arguments and parameters, Call-by-value, Overloading methods, constructors, Multiple constructors, using this in a constructor.
UNIT-II **(15)**
Inheritance: The *is a* Relationship, Implementing inheritance, Single versus multiple inheritance, The Java.lang.Object class, Methods of object class, Super and final keywords, final methods, Invoking parent class constructor. Advanced concepts: An overview of packages, adding a class to a package, the namespace created by packages, the import keyword, directory structure of packages, Static members, Static initializers, Instance initializers. Polymorphism and Abstraction: overview, using parent class references to child objects, casting references, instanceof keyword, virtual methods, overview of abstraction, abstract classes and methods.

UNIT-III **(15)**
Collections: Arrays, multidimensional; arrays, Overview of Java collection framework, the vector class. Interfaces & Exception handling: overview, declaring interfaces, user defined interfaces, implementing an interface, Overview of exception handling, throwable classes, methods of throwable classes, try/catch blocks, Handle or Declare rule, User defined exceptions.   Introduction to GUI programming: AWT versus Swing, creating windows, Containers and Components, adding components to a container, Layout managers, FlowLayout, BorderLayout, Panels, GridLayout, BoxLayout, Nesting Panels.GUI Components and event handling: The delegation model, event listener interfaces, creating and registering event listener, event adapter classes, Buttons, Check boxes, Radio buttons, Labels, Lists, Combo Boxes, Menus.
UNIT-IV **(15)**
Applets: Overview of applets, java.applet.Applet class, Swing applet, Life cycle of an Applet, Sandbox Security, The applet context, Displaying images, Playing Audio.
Threads: Overview, Life cycle of a thread, creating and implementing threads, Methods of thread class, Multi threading issues, Deadlock issues, wait() and notify() methods.
Input and Output: The Output Streams, The Input Stream Classes, The writer Class, The reader class , Low-level Sreams, High- level Streams, Chaining Streams together, Low level Readers & writers, High-level Readers & writers, File I/O.
Network programming: Overview, Using sockets, socket class, communication between sockets, secure socket.
References:-
1. Learning Java- Rich Raposa- Willey, dreamTech Publication
2. Java in a nutshell desktop quick reference – Flanagan-SPD, O'reilly
3. The complete Reference Java- 5th edition – Herbert Schildt- Tata McGraw Hill

Master of Computer Application
Semester -IV
Paper-XIX- (MCA-404): Theory Of Computation

Unit - I   (15)
Introduction to the theory of computation: Symbol, alphabet, sets, relations and functions, strings and languages. Finite state machines: Finite automata definition & description, transition system, DFA, NFA, equivalence of DFA and NFA ,finite automata with outputs, Moore machine, Melay machine ,equivalence between Moore and Melay machines.

Unit – II   (15)
Regular expressions and regular grammars: Regular expressions, equivalence of regular expressions and FA. Regular sets and properties: Pumping lemma for regular sets, closure properties of regular sets.

Unit - III   (15)
Context free languages: Introduction, context free grammars, derivation trees, leftmost and rightmost derivations, ambiguity in CFG, simplification of CFG, normal forms-Chomsky normal form CNF, Greibach normal form GNF .

Unit - IV   (15)
Pushdown automata: Definition of PDA, deterministic PDA, nondeterministic PDA, the pumping lemma for CFL's, closure properties of CFL's, Turing machines: Turing machine model, representation of TM, design of TM, types of TM.

References:

1) Hopcroft, J., and Ullman, J., *Introduction to Automata Theory, Languages and Computation*, Addison-Wesley, 1979, Chapters 2-8, 13.1-13.6 (except material on NP-completeness).
2) Theory of computer science by Cohen's
3) Theory of computation by Varma & Rao

Master of Computer Application
Semester -IV
Paper-XX- (MCA-405): Data Warehousing and Data Mining

Unit I   **(15)**
        Introduction: Data Warehouse and OLAP Technology: Data warehouse concept, A
        multidimensional data model, data warehouse architecture, From data warehousing to   data
mining. **Data Preprocessing:** Descriptive   data summarization, data cleaning,   data   integration
and transformation, data   reduction

Unit II   **(15)**
        Introduction: Data mining concepts, Data mining functionalities, classification of   data
mining systems, Integration of data mining system with a database or   data   warehouse   system,
major issues in data mining. **Mining frequent patterns,   Associations   and   Correlations:**   Basic
concepts and road   map, efficient and   scalable   frequent itemset mining methods,

Unit III   **(15)**
        Classification and Prediction: Concept   of   classification   and   prediction,   issues
        regarding classification and prediction, classification by decision tree induction,   Bayesian
classification, rule-based classification, classification by   backpropagation,   support   vector
machines, lazy learners, other classification methods.

Unit IV   **(15)**
Cluster analysis : Concept of cluster analysis**,** types of data in cluster analysis, a categories of major
clustering methods, partitioning methods, hierarchical methods, data mining applications.

Reference books:
    1) Data Mining concepts and techniques --- Jiawei Han and Micheline Kamber
    2) Data Warehousing in real world – Sam Anahory, dennis murray
    3) Data Warehousing – Amitesh sinha
    4) Data mining – Pieter adriuans, dolf zantinge.
    5) Data Mining Methods --- Rajan Chattamvelli
    6) Data Mining Methods --- Arun Pujari

Master of Computer Application
Semester -V
Paper-XXI- (MCA-501): ARTIFICIAL INTELLIGENCE

Unit I: **(15)**

AI Problem solving: Historical development of AI, Role of heuristic in problem solving, AI problems and Expert problems, Knowledge representation and inference, Comparison of database with knowledgebase, Expert system case study.

Unit II: (15)

Fuzzy Systems and ANN:, Predicate logic, Fact-table, Rulebase, Fuzzy logic, Case based reasoning, Design of fuzzy rulebase, Construction and implementation of knowledgebase systems, Artificial Neural Networks — concept and ANN architectures, Perceptron learning, Training and implementation of a neural network.

Unit III: **(15)**

Genetic Algorithms and other hybrid models: Genetic Algorithms: History and evolution of G.A, Modeling a problem for the application of G.A.—Representation of data in chromosomes, Fitness function, reproduction and convergence, Comparison of ANN and GA, Applications of G.A., Hybrid models: Combinations of ANN, Fuzzy and GA and their applications.

Unit IV: **(15)**

AI research: Natural Language Processing—Text categorization, text summarization and Text elaboration, Vision and perception, image analysis and pattern matching, Robotics

Books and references
1. Neural networks, fuzzy logic and genetic algorithms, synthesis and applications by S. Rajsekaran,
G.A. Vijayalaxmi Pai (EEE)
2. Genetic algorithms by David Goldberg (Addison and Wesley)
3. Principles of AI and Expert system development by David Rolston (MGH)
4. Artificial Intelligence by E. Ritch and K. Knight (MGH)

Credit System Syllabus
Master of Computer Application
Semester -V
Paper-XXII- (MCA-502): Parallel Computing

Unit-I (15)

Introduction of Parallel Computing, Implicit Parallelism, Dichotomy of Parallel Computing Platforms, Physical Organizations of Parallel Platforms, Cache Coherence in Multiprocessor System, Communication Costs in parallel machines. Routing mechanism
for interconnection networks, Impact of process-processor mapping and mapping techniques.

Unit-II (15)

Principles Of Parallel Algorithm Design: Basics of computation, Decomposition techniques, mapping techniques for load balancing. Parallel Algorithm Models. Communication Operations: One-to-All Broadcast and All-to-one reduction, All-to-All Broadcast and Reduction, All-Reduce and prefix-Sum operations,Scatter and Gather, Allto-All personalized communication . Circular Shift.

Unit-III (15)

Message Passing Computing : Principles of Message Passing Programming , send and receive
operations , Message passing interface, Topologies and embedding, Overlapping
Communication with computation, Collective communication and Computation Opeartions, Groups and communicators, MPI programming.

Unit-IV (15)

PRAM algorithms:
 SELECTION: Introduction,The problem and a lower bound, Sequential
 algorithm, Parallel algorithm. Merging, Merging network, merging on PRAM models
 Sequential ,Parallel Merging. Sorting on linear array, Sorting on PRAM models.
 Searching on PRAM model ,Matrix Operations on PRAM models.

References :
1. Anath Grama,Anshul Gupta,George Karypis and Vipin Kumar-Introduction to parallel Computing.
2. V.Rajaraman - Elements of Parallel Computing (PHI)
3. Selim Akl - The design and analysis of parallel algorithms (PHI)
4. Kai Hwang, Advanced Computer Architecture Parallelism Scalability Programmability,TMH (2001)
5. Michael J.Quinn, Parallel Computing Theory and Practice, McGrawHill
6. Michael J. Quinn Parallel Programming in C with MPI and OpenMP McGrawHill

Master of Computer Application
Semester -V
Paper-XXIII- (MCA-503): Principles of compiler Construction
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UNIT 1:   (15)

Introduction to Compiling: Compilers, Phases of a compiler, Compiler construction tools, a simple one pass compiler. Lexical Analysis: Role of a Lexical analyzer, input buffering, specification and recognition of tokens, finite automata implications, designing a lexical analyzer generator.

UNIT 2:   (15)

Syntax Analysis: Role of Parser, Writing grammars for context free environments, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers.

UNIT 3:   (15)

Syntax Directed Translation: Syntax directed definitions, construction of syntax tree, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down translation and Bottom-up evaluation of inherited attributes, analysis of syntax directed
definitions. Intermediate Code Generation: Intermediate languages, declarations, assignment statements and Boolean expressions, case statements, back patching, procedure calls.

UNIT 4:   (15)

Code Generation: Issues in design of a code generator and target machine, Run time storage management, code generation from Dags and the dynamic code generation algorithm. Code Optimization: Sources of optimization, Data flow analysis and equations, code improving transformation and aliases, Data flow analysis and algorithms, symbolic debugging of optimized code.

Text Book:
1. Compilers - Principles, Techniques and Tools - A.V. Aho, R. Shethi and J.D.
Ullman (Pearson Education.)

References: -
1. Compiler Construction - Dhamdere (Mc-Millan)
2. Compilers - Principles, Techniques and Tools - A.V. Aho, R. Shethi and J.D.
        Ullman (Addison Wesley publishing company.)
3. Compiler Construction - Barret, Bates, Couch (Galgotia)
4. Unix Programming - Pepkin Pike.

Master of Computer Application
Semester –V
Paper-XXIV- (MCA-504): Elective – I: Advanced Java Programming

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Unit –I **(15)**
Java Database Connectivity: JDBC overview , Architecture , Drivers, database connection statements , Result sets, transaction, Metadata and Aggregate functions , callable statements.
Java Servlets: Servlet life cycle , servlet basics , HTTP servlets, The Servlets API, request server side – Cookies , session tracking , databases and non-HTML content , request dispatching , shared attributes, resource abstraction.

Unit-II **(15)**
Java Networking: Remote Method –introduction , architecture, defining remote objects, creating stubs and skeleton, object serialization, dynamically loaded classes, RMI activation, registrating remote objects, marshaled objects. CORBA-concepts, object bus, distributed objects, interoperability of distributed objects, concept of open object bus, a java interface to CORBA, creating a basic CORBA server, creating CORBA clients with Java IDL, RMI v/s CORBA.

Unit-III **(15)**
Java Beans: Basics of designing JavaBeans, creating and using properties, using events to communicate with other components, Enterprise Java Beans- basics of EJB, implementing session beans , implementing Entity Beans , Deploying an Enterprise Java Beans.

Unit-IV **(15)**
JSP(Java Server Pages: Introduction to JSP, Use of JSP, JSP Architecture, JSP tags, Implicit and Explicit objects, Request forward, Request –time include ,use of Beans in JSP and their scopes
JSF(Java Server Faces):Introduction of JSF, components of JSF, Benefits of JSF,   disadvantages of JSF, JSF   Application   life   cycle,   Components   and   Renderers (UIComponents:UIViewRoot,UIForm,UIGraphic,UIInput,UIOutput,UIPanel,UISelectOne,,UISelectMany,UIS electItem,,UIMessages etc.), Managed Beans and Navigation.

References:-
1. Java 2 Complete Reference - (Tata McGraw Hill)
2. Java server pages -
3. Java 2EE – Ivan Bayross (PHI)
4. Java 2 Black Book –(DreamTech)

Master of Computer Application
Semester -V
Paper-XXIV- (MCA-504): Elective – I: Digital Image Processing

Unit-I : Introduction   (15)
What is Digital Image Processing?, The origins of Digital Image Processing, Examples of fields that use Digital Image Processing, Fundamentals steps in Digital Image Processing, Components of an Image Processing System

Digital Image Fundamentals
Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships Between Pixels, Linear and Nonlinear Operations

Unit-II : In Enhancements in the Spatial Domain   (15)
Background, Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

Image Enhancement in the Frequency Domain
Background, Introduction to the Fourier Transform and the Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters, Homomorphic Filtering, Implementation.

Unit-III : Image Restoration   (15)
A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Resuction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Weiner) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter, Geometric Transformations

Unit-VI : Color Image Processing   (15)
Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation, Noise in Color Images, Color Image Compression.

Image Compression
Fundamentals, Image Compression Models, Elements of Information Theory, Error-Free Compression, Lossy Compression, Image Compression Standards.

Reference Books :
1) Digital Image Processing   --- R C Gonzalez, Richard E Woods
2) Digital Image Processing   --- A K Jain
3) Introduction to Image Processing --- W K Pratt

Master of Computer Application
Semester -V
Paper-XXV- (MCA-505): Elective – II:
Dot Net

Unit 1:   **(15)**
Introduction to .NET, evolution of .NET platform, advantages of working .NET, .NET framework, CLR, Basic of ASP .NET, Unified programming classes, security in .NET Language and web upport {C#, VB, script .NET, web support for .NET, web services]
ASP .NET Basics : ASP .NET page structure, directives, code declaration blocks, code render blocks, ASP .NET server controls, server side include directives, HTML tags, view state.

                                                                                      (15)

Unit 2:
VB. Net and C# programming basic:
Control event, Variables and variable declaration, Arrays, Functions, Operators, Conditional logic, Loops, namespace, OOP concepts , Objects, Properties, Methods, Classes, Scope, Events, Inheritance, Delegates , Interface.

Unit 3:   **(15)**
Validation Controls:
Client side v/s servers side validation, configuring client side validation, Required field validate, compare validater, Range Validater Range validate, Regular expression validator. Custom validater.

Unit 4:   **(15)**
Database Design and development :
Introduction, creating database for inheritance application, designing tables for intranet application, Relationship mgt., stored procedures, queries, introduction to data grid, data list and data sets.
Error Handling: Introduction, Types of error, viewing error information, Handling errors, .NET debugger.

Reference Books:
1. **Build your own ASP .NET website using C# and VB .NET,**
                     -Zak Ruvacaba [Site Point]
2. **ASP .NET Bible. –**Mridula Parihar

Master of Computer Application
Semester -V
Paper-XXV- (MCA-505): Elective – II:
DESIGN OF APPLICATION SPECIFIC DATA STRUCTURES

Unit I: **Overview of data structures for large and multi-dimensional databases**:   **(15)**

b-trees and b+ trees, tries, red-black trees, clusters etc. and their variants. Data-ware house, star schema, Hash, CAM and other types of tables for static and dynamic databases, Object oriented data structures and Design patterns, Data structures for knowledgebase systems

Unit II: **Application specific designs**: Evolution of data structures, hardware and software **(15)** constraints motivating the research in data structures, e.g. CD, pen drives, mobile technology, multimedia applications, data mining applications and their requirements

Unit III: **Data structures in information security domain**—   **(15)**

Case study-1: Password management system, Case study-2: Steganographic systems, Case study-3: Pattern matching in forensics

Unit IV: **Data structures in information retrieval domain**—   **(15)**

Case study-4: Natural language processing systems, Case study-5: MIS

Books and references

1) Searching and sorting by Knuth (vol. 3)
2) Information retrieval systems by Frakes and Yates
3) Research articles and web references

Master of Computer Application
Semester -V
Paper-XXV- (MCA-505): Elective – II: Pattern Recognition

Unit-I : **(15)**

Introduction : Introduction to statistical, syntactic and descriptive approaches, features and feature extraction, learning. Bayes Decision Theory – introduction, continuous case, 2-category classification, minimum error rate classification, classifiers, discriminant functions, and decision surfaces, Error probabilities and integrals, normal density, disriminant functions for normal density, Bayes Decision Theory Discrete Case.

Unit-II : **(15)**

Parameter estimation and supervised learning – Maximum likelihood estimation, the Bayes classifier, learning the mean of a normal density, general Bayesian learning

Nonparametric technique -- density estimation, parzen windows, k-nearest neighbour estimation, estimation of posterior probabilities, k_n nearest neighbour rule, nearest-neighbour rule, k-nearest neighbour rule

Unit-III : **(15)**

Linear discriminant functions – linear discriminant functions and decision surfaces, generalized linear discriminant functions, 2-category linearly separable case, non-separable behavior, linear programming procedures.

Multiplayer neural networks – Feed forward operations and classification, Back propagation algorithm, error surfaces, back propagation as feature mapping, practical techniques for improving back propagation.

Unit-IV : Image Enhancement in the Frequency Domain **(15)**

Supervised learning and clustering – Mixture densities and identifiably, maximum likelihood estimates, application to normal mixtures, unsupervised Bayesian learning, data description and clustering, Hierarchical clustering, low dimensional representation of multidimensional map.

Reference Books :

1) Duda and Hart P E, *Pattern Classification and Scene Analysis*,
   John Wiley and sons, NY, 1973
2) Earl Gose, Richard Johnsonbaugh, and Steve Jost
   Pattern Recognition and Image Analysis, PHI Pvte Ltd, NewDelhi-1, 1999
3) Fu K S, *Synthetic Pattern Recognition and applications*,
   Prentice Hall, Eaglewood cliffs, N J, 1982
4) Rochard O Duda and Hart P E and David G Stork, *Pattern classification*,
   2nd edition, John Wiley and sons inc., 2001

Master of Computer Application
Semester -VI

- Industrial projects to be developed in this semester.

Master of Computer Application (MCA)

Sr. No.	Paper No.	Revised Paper	Equivalence Paper in the old syllabus
1	MCA101	Fundamentals of Computers	Fundamental of computers & its environment
2	MCA301	Computer Communication Networks	Computer Communication Networks
3	MCA303	Computer Oriented Numerical Methods and Optimization Techniques	Computer Oriented Numerical Methods and Optimization Techniques
4	MCA304	Advanced Computer Architecture	Advanced Computer Architecture
5	MCA405	Data Warehousing and Data Mining	Data Warehousing and Data Mining
6	MCA502	Parallel Computing	Parallel Computing