SHIVAJI UNIVERSITY, KOLHAPUR
INTRODUCED FROM JUNE, 1998
MASTER OF COMPUTER APPLICATIONS (SCIENCE)
DETAIL SYLLABI OF SEMESTERS I, II, III, IV, V

ORDINANCES AND REGULATIONS

0.MCA.-S1

ELIGIBILITY : - Admission to the course is open to any graduate of this University or graduate of any other University recognized by Shivaji University, satisfying the following conditions :

a) The candidate should have secured at least FIFTY PERCENT marks at the aggregate of all years of Graduation Examination .
b) The student must have taken Mathematics at XII std. as one of the subject.
c) The candidate should not be employed at the time of admission and should not take employment during the tenure of course .
d) The candidate should not be above TWENTY-EIGHT years of age as on 30th June of the year of his admission.
e) Subject to the above conditions, the final admission is based solely on the merit at the entrance test. Every candidate has to appear for the entrance test conducted during the year in which he/she is seeking admission.
f) Subject to the conditions listed in a) to e) above, seats are reserved as per the rules of admission to other Post-Graduate course of this University. However 10% seats are reserved for the candidates from the other University. His/Her entrance test score should not be less than the last admitted candidate of Shivaji University Kop.

0.MCA.-S2

FEES STRUCTURE :- The tuition fees or laboratory fees and other fees have to be paid at the beginning of every semester. At present a student has to pay tuition fees Rs.5000 /- per semester, laboratory fee Rs.1000/-per year and laboratory deposit of Rs.500/-together with other fees. These fees may be revised from time to time. The fees once paid will not be refunded.

0.MCA.-S3

COURSE STRUCTURE :- The MCA course is a SIX semester course. The teaching for the semesters I, III and V will be during the first half of the academic year and for the semesters II and IV will be during the second half the academic year. During the sixth semester the student has to work for the project and the project will be evaluated at the end of that semester.

Shivaji University, Kolhapur

Structure of the course (effective from June 1998)

The following table gives the structure regarding the teaching provisions and the scheme of the examination at MCA (under Science faculty.)
A SIX character code is given to each paper. The first digit following MCA is the semester number. The second digit is 0. 1 or 2 according as the course is a compulsory theory paper an optional theory paper or practical. The third digit indicates the course number in the respective semester.

Sem	Paper Code	Title Of Paper	T	P	Int	Uni	Total Marks
I	MCA-101	Introduction to computer and its operating environment	4	3	25	75	100
	MCA-102	Procedural Programming Methodology	4	3	25	75	100
	MCA-103	Discrete Mathematics	4	1	25	75	100
	MCA-104	Digital Electronics Microprocessors and Application Programming.	4	2	25	75	100
	MCA - 105	Introduction to Management Techniques	4	1	25	75	100
	MCA-126	Practical-I	-	-	25	50	75
	MCA-127	Project and Viva-I	-	2	25	50	75
	Total		**20**	**12**	**175**	**475**	**650**

Sem	Paper Code	Title Of Paper	T	P	Int	Uni	Total Marks
II	MCA-201	Software Engineering-I	4	2	25	75	100
	MCA-202	Data and File Structure	4	2	25	75	100
	MCA-203	Statistical Computing	4	2	25	75	100
	MCA-204	Unix Operating System	4	3	25	75	100
	MCA - 205	Accounting and Management Control	4	1	25	75	100
	MCA-226	Practical-II	-	-	25	50	75
	MCA-227	Project and Viva-II	-	2	25	50	75
	Total		**20**	**12**	**175**	**475**	**650**

Shivaji University, Kolhapur

Pattern of Question Paper :

Each theory paper will be of SEVENTY FIVE marks and of THREE hours duration. There shall be EIGHT questions each carrying FIFTEEN marks. A student has attempt FIVE. Each question will contain at least TWO sub questions of which at least ONE will be based up on a problem.

Practical examination will be of THREE hours duration and will carry FIFTY marks. There shall be TWO sections. Section – I will contain FOUR questions, each carrying FIFTEEN marks and a student has to attempt any TWO. These are based upon implementation of theory papers. Section – II contains TWO questions.

Based upon the programming skill, each carrying 20 marks.

0.MCA –S4

STANDARD OF PASSING

*Each one of the first FIVE semesters as SEVEN heads of passing. In order to pass in head ,a candidate has to obtain minimum of FORTY PERCENT(THIRTY OUT OF SEVENTY FIVE OR TWENTY OUT OF FIFTY)at the university examination and obtain minimum of FORTY PERCENT to clear the head of passing .

A>A student is expected to prepare a write-up on the recent advances in INFORMATION TECHNOLOGY. This could be based upon is own experience an article read a visit to an industry /research institute or even may be based upon a discussion with experts. This write-up has to be attached at the end of the project report.

B> There is no separate passing in the internal examination and hence internal marks ones obtained will be carried forward as and when required

C> If a candidate is absent for the internal examination his or her internal marks will be reported as zero.

D>There shall be TWO HUNDRED AND FIFTY MARKS for the VI semester project work.. Evaluation for FIFTY marks will be done by the concerned internal guide based on
   (i)   the planning , development . seminar/ presentation during the course of the development of the project and

Shivaji University, Kolhapur

(ii)   the external supervisors   report. at the time of the university examination the project work will be evaluated for HUNDRED marks and there shall be a comprehensive viva for HUNDRED marks. A student has to secure a minimum HUNDRED marks to pass this head

E> If a student fails in a head of passing, he has to appear for the external examination and the internal marks will be carried further.

F> At the end of each semester there shall be examination of all the SIX semesters

G> A student has to clear all the heads of passing of first and second semesters to be eligible for the admission to the fifth semester .

H> A candidate will be awarded a class or distinction as per the rules of other science subjects.
A student has to attempt ONE question.

Shivaji University, Kolhapur

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SEMESTER-I

MCA-101 : INTRODUCTION TO COMPUTER AND ITS OPERATION ENVIRONMENT :

1.A. Data representation:
Data types, Number system conversions and implementation. Alphanumeric codes - ASCII & EBCDIC, Fixed and Floating points representation, Computer arithmetic's.

  B. Concepts of Errors:
Truncation errors and Errors due to noise, Error correction and detection techniques.

2.A. Basic Computer Organization and Design:
Illustration of instruction Fetch and Execute cycle in HYPCOMP, Simulation of behaviour of CPU.

  B. Concept of machine language, Assembly language and HLL, Introduction to assembler, interpreter, compiler and linker.

3. History, Evolution and Classification of Computers.

4. Single User Operating Environment:
DOS, Concept of Operating System, Booting of a system, Internal and External commands, Exhaustive study of MS-DOS 6.22 (OR whichever is a recent version available)

5. Multiuser Programming Environment :
Concept of User and Administrator in LAN, Utilization of resources in share mode, Illustration of important / frequently required commands.

6.A. Multi-user and multasking environment:
Introduction to Windows, GUI and user friendliness, etc.

  B. UNIX operating environment - Use of line as well as page editors.

  C. Concept of Client-Server and Distributed network environments.

7. Study of PC productivity tools:
Use of PC packages, Xbase, LOTUS, NU, PCTOOLS, etc. 8. Introduction to Desk Top Publishing, usiness Graphics, Office automation tools for the documents presentation viz. MSOFFICE / CorelDraw / Ventura / LOTUS Smartsuit.

References:
1. Agarwal & Pershad, Mastering PC software.
2. Godbole, Operating Systems.
3. Guy Yost, Learning Netware 4.1.
4. Jamsa K, Complete reference to MS-DOS 6.22, (OMH-87)
5. Morris Mano, Computer system architecture, (PHI-94)
6. Peter Nortons DOS guide, Updated to cover 6.2, (PHI-96)
7. Parmar, Mathur, U. Prasanna & V. Prasanna, Working with Windows-95.
8. Ray Dunkon, Advanced Ms-DOS Programming.

Shivaji University, Kolhapur

9. R.K.Taxali, FoxPro 2.5 made simple for DOS & Windows, (TMH)
10. Sumitabha Das, UNIX system V.4 Concepts & applications,(TMH-93)
11. V.Rajaraman, Fundamentals of computers, (PHI-97).
12. V.Rajaraman & R. Rajaraman, Introduction to Computers, (PHI-89)

MCA-102 : Procedural Programming Methodology:

1. Algorithm Development:
   Problem redefinition, Writing step by step procedure, representation in terms of Flow chart/Decision Trees, Tracing, Testing.Sequential flow of Logic, Control structures, Iterative methodto reach the solution.

2. Solutions to the simple problems:
   Pseudo code generation, variables, constants and their data types, Implementation of sequential, selection and iterativestructures.

3. Coding:
   Syntax and semantics, documentation and debugging of a program, Device(Files) interfacing.

4. Solutions to the complex problems:
   Structured programming, Modular programming, TOP DOWN/BOTTAM UP
   approach, Recursive algorithms, Examples, Illustrating structured program development methodology and use of block structured algorithmic language to solve specific problem.

5. Advanced Data Types and their implementation :
   Arrays, Records, Pointers, Applications in the record keeping of real life system

6. Searching, Sorting and Update of the data :
   Various methods, Design and Analysis of algorithms - Devide and conqure, Backtracking,

7. Introduction to ADTs :
   List, Stacks, Queues,Linked Lists, Choice of the data structure and efficiency issues.
   Emphasis should be given on better programming styles and implementation is expected through C++ compiler.

Reference:

   0. Backhouse, Program construction and verification (PHI)
   1. D. Ravichandran, Programming with C++ (MGH)
   2. Dromey, How to solve it by computer,(PHI-85).
   3. Horowitz & Sahani, Fundamentals of Computer Algorithms,(Galgotia-95).
   4. Knuth, Fundamental algorithms,(Narosa-85).
   5. Knuth, Art of Computer Programming,(Addison Weisley-70-80)
   6. Kruse, Data structures and program design (PHI)
   7. Wilf, Algorithms and complexity (PHI)
   8. N.Wirth, Algorithms + Data structures = Program,(PHI).
   9. Wirth, Algorithms and data structures (PHI)
   10. Schneider,Weingart and Perriman, Introduction to problem solving and problem solving attitude,
        (Wiley Easteren-82).

MCA-103 : Discrete Mathematics:

1. Combinatorics:
Permutations and combinations, Distinct and non-distinct objects, Generating functions for combinations, Enumerators for permutations, Distribution of distinct objects.

2. Recurrence Relations and Solutions:
Linear and with two indices, Principles of inclusions & exclusions, Formula derangement, Restrictions on relative positions.

3. Mathematical Logic:
Notations, Connectives, Normal forms, Theory of inference for statement calculus, Predicate calculus, Inference theory of the predicate calculus.

4. Introduction to the concept of Algorithm proving and testing the correctness.

5. Relations and Functions:
Elementary set theory, product sets, Relations, Closure properties and related algorithm, Functions, Types of functions, Computer representation of sets, Relations, Di-graph representation of relations, functions and their manipulations, ordering functions, Recursion.

6. Algebric structures, Boolean matrices, Algrbra of boolean matrices, Groups, Lattices, Application of the
Residue Arithmetics to computers, Group Codes. Definition & examples of algebric structures, their applications to computer science.

Reference:

1. A.Doerr, Discrete Mathematics for Computer Science,(Galgotia-86).
2. Kolman & Busby, Discrete Mathematical Structures for Computer Science, (Prentice Hall).
3. Joshi K.D., Discrete Mathematics, (Wiely Eastern).
4. Liu C.L., Elements of Discrete Mathematics,(TMH-77).
5. S. Sahni, Concepts in Discrete Mathematics,(Camclot Publisher,USA).
6. Schaums series, Discrete Mathematics (McGraw Hill).
7. Tremblay & Manohar,Discrete Mathematical Structures with applications to the Computer Science,(TMH-77).

MCA-104: Digital Electronics, Microprocessor & Application Programming :

1. Digital Logic Circuits:
Digital Logic Gates, Boolean algebra, Map simplification, Combinational circuits, Filp-flops, Sequential circuits.

2. Digital Components:
Integrated circuits, Decoders, Multiplexers, Registers, Counters, Convertors and memory.

3. Introduction to mictroprocessors and their architecture:
8 bit, 16 bit, 32 bit & 64 bit microprocessors(8085,8086,80x86), Interfacing of I/O peripherals(8255, 8279), Memory interface, Timing diagrams for I/O and memory transfer.

Shivaji University, Kolhapur

4. Assembly Language Programming:

Evolution, Application, Use of 8086 kit and Debug for Hex, Decimal and binary arithmetic, Block transfer, Keyboard/Display interface. 80386 architecture, memory interfacing, math coprocessor and I/O processor, 80386 Assembly Language Programming for Hex arithmetic and memory segmentation using debug program, BIOS and DOS interrupts, addressing modes, instructions and directives, arithmetic and logic instructions, Jump, Shift, Rotate instructions. The stack & subroutines, POP & PUSH instructions.

5. Digital Input & Output:

Analog input & output, interrupts, Text operations, Decimal arithmetic's.

References:

1. Douglas Hall, Microprocessors and interfacing(McGraw Hill-86).
2. Gaonkar, Microprocessor Architecture, Programming & Application 085/8080(Wieley Eastern-88).
3. Novel M. Morris, An introduction to 8086/8088 Assembly Language Programming for beginners,
   (McGraw Hill).
4. Peter Abel, Assembly Language Programming(PHI-97).
5. Refiquazamman, Computer Architecture.
6. Venugopal, Microprocessor X86 programming, (BPB-95).
7. Wyatt, Using Assembly Language.

MCA-105:Introduction to Management Techniques:

1. Basics of Management, General principles of Management, HRD selection, Apprasial Training and Information Systems.

2. Marketing:

Understand the concept of marketing MIS, Marketing MIS cocsists of product policy and design, pricing, choice of marketing to intermedisries, methods of physical distributions, Use of Personal selling, Advertising and sales promotion, Marketing research and marketing organization.

3. Finance:

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-Proforma 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.

4. Manufacturing:

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.

Shivaji University, Kolhapur

5. Strategy:
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.

SEMESTER-II
MCA201 : Software Engineering

1. Introduction to Software Engineering :
Computer based business systems, Importance of Software and Software Engineering ,Software Engineering Paradigms. Role of user and analyst, structured methodologies and CASE.

2. 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.

3. Design:
a. Input, Output and Process Design, Design and controlling the screens, formatting the reports.
b. File Design, Data storage methods, Human Computer interface design.
c. Software design, Program Definition and module design.
d. Guidelines for designing , Design walk through and design review, Use of CASE.

4. Coding standards:
Top-Down and Bottom-Up approaches, structured programming, documentation and other good programming practices, code verification

5. Testing and training :
Errors, Faults and failures, Test cases, test crieterion, test plan, Functional testing, Structural testing, analysis and evaluation of testing Training Methodology, Training management, users and operations staff.

Shivaji University, Kolhapur

6. Quality assurance :
Software metrics, Bench marking, Quality assurance and conversion, maintaining and managing the system.

7. Case study :
Institute administration, Payroll, financial accounting, inventory etc.

References :

1. E. Awad , Homewood , System Analysis and Design (Irwin-79).
2. Fairley, Software Engineering Concepts, (Mc-GrawHill-85).
3. Krishna Moorthy, Handbook of Software Engineering.
4. Pankaj Jalote, Integrated approach to Software Engineering (Narosa - 91).
5. Perry Edwards, System Analysis and Design, (MMH-93).
6. R.S.Pressman, Software Engineering-Practitioners approach, (TMH -87).

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MCA202 : Data and File Structures :

1. Fundamental notions :
Primitives and composite data types , choice of data structure and complexity of an algorithms, various sorts, search algorithms and their complexities.

2. Arrays :
Multidimensional Arrays, dope matrix, sparse matrices.

3. Linked List :
Processing linked list, Circularly linked list, Doubly linked list, Multilinked lists, String and characters manipulation using arrays and linked list.

4. Queues :
Processing the queues, Linked list implementation, Deques, Priority queues and their applications.

5. Stacks :
Processing the stacks, Linked list implementation, Application of Stacks for _expression solving, Non recursive implementation of recursive algorithms.

6. Trees :
Representation of hierarchichal relationships, Tree processing, Binary trees, linked list implementation, traversal algorithms, Graph theoric solutions and tree traversals, Binary trees, Threaded binary trees, Height balanced trees, General Trees.

7. Design and analysis of algorithm for the implementation :
Greedy methods, Dynamic programming, Backtracking, Branch and bound

8. File Structures :
Simulation of data and file structures in HLL, Pie files, Sequential, Indexed sequential organization, Binary tree indexing, B-tree indexing, Trie indexing, Hashed indexing, Multirings etc.

9. Advanced Concepts :
Garbage collection techniques, Database management, Memory Management techniques and effective use of data structures, ADTs and introduction to Object Oriented approch.

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. Dale and Lily, Pascal and Data structures, Algorithms and advanced programming (Galgotia)
4. Karnighan B. and Ritchi D., The C Programming Language (PHI-88)
5. R.L.Kruse, Data Structures and Program design (PHI-96)
6. Trembley and Sorenson, Introduction to Data Structures with application (TMC-84).
7. Weiderberg : Data and file structures

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MCA203 : Statistical Computing :

1. Elementary Concepts :
   Various types of data , Frequency distribution, Tabulation, Graphical Representation of data . Descriptive measures : Measures of central tendency, dispersion, skewness and kurtosis.

2. Probability and Portability Distributions :
   Sample Space , equally likely outcomes, exclusive, exhaustive events. Definition of probability, examples of probability of various events. Addition and multiplication theorems of probability. Conditional probability, Bayes theorem and its applications. Random variable and vector, probability distribution of random variable, marginal and conditional distributions of bivariate random vector.

3. Discrete probability distributions :
   Probability mass function (pmf) and probability distribution function (pdf),Bernoulli, inomial, Poisson, Geometric, Hyper Geometric, Negative Binomial Distributions, Computation of mean and variance of these
   distributions.

4. Continuous Distributions :
   Probability density function (pdf),normal and exponential distributions, computations of mean and variance, their important properties, computation of probabilities of various events, applications of these distributions.

5. Simulation Techniques :
   Random Number (Uniform[0,1]) generation techniques, Random variate generation, inverse of c.d.f. ,relation with uniform variate, rejection method

6. Curve fitting :
   Regression, Correlation, fitting of exponential and power curves, Interpretation of correlation and Regression.

7. Test for randomness :
   Digit frequency tests of serial correlation, Kolmogorov Smirnov test, Chi-Square test of goodness of feet, Poker test.Emphasis be given for sampling from these distributions, Sketching the graphs of the p.m.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. Dixit P.G. Statistics.
4. Devroye, Non uniform random variate Generation.
5. J.Medhi, Introduction to statistical methods.
6. Levin R.I. Statistics for management (Printice Hall, 1980).
7. Poul New Bold,Statistics for Business and Economics,(Printice Hall, New Jercy).
8. S. Ross, A First course in probability.

MCA204 : Unix Operating System :

1. Introduction to UNIX system architecture :
   shell, kernel, user programs, Directory structure, login - logout procedures.

2. Directories and file structures , Path, Protection,
    Options access/manipulation.
3. System capabilities mode, shell commands, redirection, piping process, source code control system, RJE,
   Lexical task and process communication.
4. Editord ed,ex and detailed study of vi.
5. I/O systems, Device Management, disk, printer, tape and terminals, (Administration and configuration).
6. Shell programming Procedures, variables, functions, programming and debugging.
7. Design Considerations :
   Design of a Kernel of a multiprocessing operating system, introduction to SVR V.4 / SCO / LINUX
8. System calls and programming in C under UNIX / LINUX :
    Shell programming practical, Internet tools and programming using C.

References :

1. Andleigh P.K., UNIX system architecture
2. Achut Godbole, Operating systems with case studies in UNIX Netware, Windows NT
3. Banerjee R. Architecture and conceptual design of the UNIX system
4. Bach, UNIX operating system
5. Gandhi, Shetty and Shah, Vijay Mukhi's C Odyssey UNIX
6. Kaare Chiristian, The UNIX operating system.
7. Kanetkar Y., UNIX Shell Programming
8. Kernighan and Pike, The UNIX Programming Environment
9. Maurice Bach, Design of UNIX Operationg System (PHI - 94).
10. Morgan and Mcbiton, Introduction to UNIX system (McGrawHill - 87).
11. Narayanswamy Kutty, C and UNIX Programming
12. Peter Norton's Guide to UNIX
13. Rebecca Thomas, Rogers and Yates, Advanced Programmer's Guide to UNIX
14. Ruth asley and Judi N. Fernandez, Teach yourself UNIX.
15. C.Schirmer, Programming in C for UNIX

Shivaji University, Kolhapur

16. Sumitabha Das, UNIX system V.4 Concepts and Applications. (TMH - 93).
17. Valley J.J., C Programming for UNIX
18. Vijay Mukhi, UNIX Shells (BPB).
19. Stevens UNIX Network Programming
20. W. Richards Steven, Advanced programming in UNIX Environment, (Addison - Wesley -

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MCA 205 : Accounting and Management Control :

1. 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.

2. 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).

3. Introduction to Management Control Systems ,Goals ,Strategies and Key Variables, Performances Measures,

Responsibilty 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.

4. 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).

Shivaji University, Kolhapur

SEMESTER-III

MCA301: Computer Communication Networks

1. Introduction to computer network:
Fundamentals of telecommunication theory , concept of bandwidth , bit rate , error rate , transmission delay , modems ,synchronous and asynchronous transmission , speed and compression standards, network topologies and connectivity.

2. OSI Architecture , Protocols and Interfacing :
Network design problem , Communication protocol , Layered protocol and the OSI model. Communication protocols - Time Division Multiple Access(TDMA) , Time Division Multiplexing(TDM) , Carriers Sense (Collision) System , Token Passing , Peer-to-Peer priority system , Priority slot , Carriers Sense(Collision Free) System , Token Passing(Priority) System.

3. Local Area Network :
Broad Band and Base Band LANs , ETHERNET , Token Ring , Token Bus , LLC and MAC Protocols , 802 standards and their relationship with ISO/CCITT Models. Metrapolitan Area Networks , ANSI Fiber Distributed Data Interface (FDDI) , Radio and Satellite Broadcast Networks , CSMA/CD etc.

4. Switching and Routing :
Circuit switching , Packet Switching , Message Switching , Datagram and vitual circuit , Concepts of Rounting and congestion control , Packet Routing , Packet Switching support to circuit switching networks .

5. Application :
Concepts of welknown ports , Initial Connection problem , Name/Directory Server . Network Applications - File Transfer and virtual terminals OSI Applications - VTAM , FTAM , X.400 , X.500 Client Server Applications - Network File Server

6. Case Study :
X.25 Network and Supporting Protocols - Features , Layers , Comapanion Standards , Channel Options , Flow Control Principle ,Other Packet types , Logical Channel Status , Packet Formats , Internetworking , Connectionless mode , Frame Relay and X.25 Stack. TCP/IP - TCP/IP and Internetworking , examples of TCP/IP , IP address structure , Major features of IP , IP datagram , Major IP services , Source Routing , Value of the transort layer , TCP major features , Passive and active operations , Concept of router based networking , Router , Bridge , Repeater , Gateway , Modem etc. , Transmission Control Back(TCB) Rout Discovery Protocols, Rout Discovery Protocols and application layer protocols .

7. 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 , NOVEL IPX/SPX may be introduced.

8. Programming Applications :
time and date routines , ping , writing routines for file transfer, record locking , resource sharing , remote program execution , e-mail administration etc.

Shivaji University, Kolhapur

References :

1. Block C. -"Computer Networks Protocols ,Standards and Interface" (PHI-96)
2. Stalling A.S. -"Computer Networks" (PHI-93 4th ed.)
3. Tannenbaum A.S. -"Computer Networks" (PHI-81)
4. Martin J. -"Computer Networks and Distributed Processing" (PHI)
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" (Addison Wiesley readings M.-92)

MCA302 : Object Oriented Technologies

1. Object Oriented Programming :
   Introduction to Object Oriented Paradigm, Basic terminology and features Class diagram, relationship, associations, generalization etc. Skeleton of an Object Oriented Program - Creating and Using Classes
   and members, constructors and distructors, polymorphism, function and operator overloading, Inheritance - derived classes, virtual function, abstract classes, multiple inheritance. Stream I/O, files, class and function templets.

2. Object Oriented Approach :
   UML - Object Oriented Methodologies + Booch method, OMT objectory methods + ... UML - views, diagrams, model elements, UML extensions, Use Case modeling - Dynamic modeling and real time modeling Modeling tools - Logical and physical architectures, component diagram deployment diagram, tagged values and properties, constraints and stereotypes.

3. Overview of Booch methods :
   Defining the problem, analysis, definition and evolution, upgrading from Booch to UML

4. Overview of OMT methods :
   Conceptualisation, domain analysis, application analysis, functional analysis, testing, system design, object design, evolution, upgrading from OMT to UML.

5. Object databases :
   History of ODBMS, Concept of persistence, problems posed by persistent objects, RDBMS to solve persistent objects, designing object database, Concept of ODBC

6. Case studies :
   Foundation class libraries, container libraries, building CASE tools and others.

References :

1. Hans Erik Erikson and Magnus Penker -"UML toolkit"
2. Lookheed Martin - "Suceeding with the Booch and OMT methods"
3. A.L.Stevens - " C++ database development"
4. Ivan Jacobson - "Object Oriented Software Engineering"
5. Ian Graham - "Object Oriented Methods"
6. Robert C. Martin - "Designing Object Oriented C++ applications using the Booch Method"
7. Rambaugh et.al. - " Object Oriented Modeling and Designing"

8. David Rambaugh - "Object Oriented Development Building CASE tools using C++"
9. Grady Booch -"Object Orient Analysis and Design with applications"
10 Rebecca Wirfs, Brock et.al. - "Designing Object Oriented software" PHI-96)
11. Booch G. - "Object Oriented analysis and design", (2nd ed, Benjaming /Cumnis publishing company,
    Redwood City, C.A. USA)
12. Bajarne Stroustrup - "The C++ programming language"(Addison Wesley)
13. W. Balgurusamy - "OOP with C++" (TMH)
14. Timothy Budd - "An Introduction to OOP" (Addison Wesley)
15. Parasnas D. -"Object Oriented Programming"
16. Spurr K., Layzell P., Jennison L., Richards N. -"Business Objects Software solutions"
17. Keith Weiskamp, Bryan Flaming - The complete C++ Primer (2nd ed.)
18. Namir C. Slammas -"Foundation C++ and OOP"
19. Robert Lafore -"OOP in Turbo C++"
20. Robert Schildt -"C++, The complete reference"(Osborne/McGrawHill)
21. D. Ravichandran
22. Liffman

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MCA303 : Interactive Computer Graphics :

1. Graphics Hardware:
   Graphics Input, Output devices and processors Raster algorithms for 2-D output primitives - Scan Converting Lines, Circles and Polygons , Polygon Filling algorithms , Windowing and Clipping,(Point, Line and Polygon Clipping), attributes of output primitives .

2. General Transformations :
   Homogeneous Coordinates , Basic 2-D and 3-D transforms , Composite transformations , Window to view port transformations 3-D viewing - General view specification , Viewing transformations , Mathematics of projections (Parallel and perspective projection), View volume specification , Clipping in 3-D

3. 3-D Object Representation :
   Polygonal Models , Curve and Surface Representation(Polynomial Curves and Surfaces , Coon Pathces ,hermit interpollation , Bazier curves and surfaces , Fractals , Constructive Solid geometric representations ,
   boundry representations , sweep representations

4. Colour in Computer Graphics :
   Chromatic and achromatic light , tri-chromatic theory , colour models, color lookup tables , color quantization.

5. Image Synthesis :
   Illumination Models , Shading methods , Ray tracing

6. Visual Realism in computer generated images :
   Visible surfaces and visible lines determination , shadows and transparency , aliasing , antialiasing and
    filtering, dithering and halftoning .

7. User Interface Design :
   Logical Input Devices,Interaction task,Interaction modes,Interaction techniques.

8. Case study :
    3-D studio max and multimedia applications.

References :

1. Donald Hearn and M. Pouline Basker - "Computer Graphics" (PHI-95)
2. F.S.Hill J.R. - "Computer Graphics " (McMillan-90)
3. Newmann Sproul R.F. - "Principles of Interactive Computer Graphics" (MGH-80)
4. Foley J.D.,Van Dam A. - "Fundamentals of interactive Computer Graphics" (Addison Wesley-82)
5. Plastock and Kalley - " Theory and problems of Computer Graphics"
6. David Rogers - "Procedural elements for Computer Graphics"
7. Steven Harrington - "Computer Graphics : A Programming Approach"
8. David Rogers - "Mathematical elements of Computer Graphics "
9. S.P. Bhandari and S.A. Joshi - "Computer Graphics"
10.(Survey)

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MCA304 : Computer Systems Architecture

1. Overview :
   organization of CPU, Memory and I/O devices, Machine level and chip level programming. Device drivers, Controlling peripheral devices, interfacing between devices and system programs.

2. Introduction to Computer architecture :
   Processor organization, classification of architecture- Main frame to PC, mini, super and parallel architectures, Stack machines, Languages directed architectures, Parallel processing mechanism, Parallalism in uniprocessor system, CISC Vs. RISC technologies.

3. Pipelining and vector processing :
   Instructions and arithmetic pipelines, Vector processing requirements, pipelines computers and vectorization methods, various vector processors, STAR-100, CRAY, CYBER-205, Fujitsu-200 and their special features.

4. SIMD and MIMD :
   SIMD - Parallel algorithms for array processors, SIMD architectures and performance enhancements
   Multiprocessor architecture and programming - functional structures, interconnection networks, parallel memory organization, multiprocessor scheduling strategies, parallel algorithms for multiprocessors, synchronous and asynchronous types.

5. Data flow machines :
   Data driven computing and languages, advantages and potential difficulties etc.

6. Functional discription of an Operating System, File/memory management methods, Control of multiple processes

Reference :

1. Hawang and Briggs F.A. - "Computer Architecture and parallel processing"(MGH)
2. Koggi H -"The architecture of pipelined computers" (MGH)
3. Baer J.L. -"Computer System Architecture" (Computer Science Press)
4. Sasikumar -"Parallel Computer Architecture"(Narosa)

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MCA 305 : Advanced topics in database theory and applications

1. DBMS (Database Management Systems) :
   Concept and architecture , Schemas , instances and data independance, data modeling using ERD(Entity-Relationship Diagram). Introduction to convetional data models , Network Hierachical ,Relational

2. Relational database model :
   Concept ,Constraints , Relational Algebra and Calculus SQL - Relational database language - DDL , View , Query , Specifying constraints , Indexing RDBMS - Oracle/INGRES

3. Relational database design :
   Functional dependencies , Normal Forms , Loss less join and Dependencies preserving decomposition

4. Concurrency Control , Locking , Time stamp ordering , Granularity of data items

5. Security and protection :
   Role of DBA , File structure , table space , segments , User database, Data dictionary management , memory structure , process structure , SQL statement processing , transactional control , backup and recovery from catastropic failures

6. Developing application software :
   Using Oracle products , SQL*Plus , PL/SQL , SQL*Report writer , SQL*Loader and other utilities ,
   SQL*Forms , Pro C etc.

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

SEMESTER-IV
MCA401 : Distributed Operating Systems

1. Overview of Operating System :
   Operating System - concept, need and requirements of operating system, Processor, Memory, Device and File management, Virtual memory, Pipes, Deadlocks and Protection issues, Comparitive study of Various/ types of operating systems.

2. Introduction to Distributed system :
   Goal ,Hardware Concepts ,Software concepts , Design issues

3. Communication in distributed system :
    Layered protocols , client server model , remote procedure call , group communication , Comparison of Client   Server Vs. Distributed operating system

4. Synchronization in distributed system :
Clock synchronization , mutual exclusion , election algorithms, automatic transaction , deadlocks in distributed systems.

5. Processes and processors in distributed systems:
Threads , System models , Processor allocation , Scheduling in distributed systems .

6. Distributed file system :
Distributed file system, Design and Implemetation trends in distributed file system .

7. Case study :
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)
12. Windows NT Browsing, WINs and directory services (Techmedia)
13. Windows NT : Shell scripting (Techmedia)
14. Windows NT - Administration using PERL for WIN32 (Techmedia)
15.Novel Netware Manuals
16.MS-Windows NT Manuals

MCA402 : VISUAL COMPUTING

1. Visual Programming :
Concept, Need and Distinguished Characteristics, Characteristics of screen format design

2. Visual Programming Environment :
Visual BASIC Comparison of GUI and Visual IDE, Features of Visual environment, Forms and their properties, Form events, Form methods, Handling Multiple Ddocument 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, Dialog, Print, Handling with peripherals Developing applications in Visual BASIC, Introduction to the current trends like ActiveX, WWW, DLL and Windows API Visual C++ Technical overview of Windows, Visual C++ and Application Framework Fundamentals - event handling, GDI, dialog boxex, Memory Management, SDI and MDI, Printing and print previews, Help workshop dvanced concepts : Multithreading, DIBs, ODBC, DAO and DLLs
ActiveX : COM, Automation and OLE Programming for the Internet : TCP/IP, Winsock and Winlnet, Internet
Information Server, Activex Document Servers and the Internet

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References :

1. Adam Danning - ActiveX controls insde out (Microsoft press)
2. Dale Rogerson, Inside COM (Microsoft press)
3. Devid Kruglinsky, Inside VC++ (Microsoft press)
4. Don Box - Creating components using DCOM and C++ (Microsoft)
5. Evangelos Petroutsos, Mastering Visual BASIC (BPB)
6. Ivor Horton's, Beginning Visual C++ (SPD)
7. Jeffery Richter, Advanced Windows (Microsoft press)
8. Jorge Shepherd and Scot Wingo, MFC internals (Addison Wesley)
9. Kraig B., Inside OLE (Microsoft press)
10. Steven Holzner, Visual BASIC - programming Black Book (BPB)
11. Steve Brown, Visual BASIC (BPB)

MCA403 : Computer Oriented Numerical Methods and Optimization

1. Computer Arithmetics :
   Floating point number operations, normalization and their consequeses, Iterative methods, Zero of a single transcedental equation and zeros of polynomials using bisection, false position, secant and Newton-Raphson method, Convergence of solution

2. Solution of system of linear algebric equations :
    Cramer rule, Gauss elimination and pivoting, ILL condition equations and refinements, LU-decomposition, Doo-Little reduction, Siedel, Jacobi's methods

3. Unconstrained optimization techniques :
   Interpolation and approximation : Using Newton's finite difference method, Lagrange's formula

4. Numerical integration :
   Methods based on interpolation, undetermined coefficient, composite integration methods, trapezoidal and Simpson's rules, Double integration (derivation, application and errors in the formulae, comparison between two formulae)

5. Numerical differentiation :
   Methods based on interpolation, finite differences and undetermined coefficients

6. Solution of differential equations :
   Eulers and modified Eulers methods, Taylor's series, Range-Kutta method Milne's and Adams Bash Froth's method

7. Constrained optimization :
   LPP, Simplex and revised simplex methods, application, duality, dual simplex method, sensitivity analysis.

References :

1. Balguruswamy," Computers and Numerical Methods" (TMH)
1. Gillett -"Introduction to Operations Research" (MGH)
2. Golub G.H., Charles, F. Vanloan-"Matrix computations" (John Hopkin's press,Baltimora M.A.-83)
3. Hillerand Liberman-"Introduction to Operation Research"(Holden Day Inc.)
4. Kanti Swarup, "Operation Research"

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5. Krishnamoorty E.V. and S.K.Senn -"Computer based numerical algorithms" (East West Press)
6. Motewar S.N. -"A Course in Computer Programming with numerical Techniques"(Dhanpat Rai and Sons., Delhi)
7. V. Rajaraman - "Computer oriented Numerical techniques" (PHI)
8. Ravindran -"Operations Research" (Wiley Eastern)
9. Sastry S.S. -"Introductory methods of numerical analysis" (PHI)
10. Sharma -"Operation Research"
11. Taha H.A. -"Operations Research" (McMillan)
12. Yakonotz S., F Szidarovszky-"An Introduction to numerical computation"(McMillan-89)

MCA404 : Theory of Computation

1. Preliminaries :
 Strings, Alphabet and Languages, Graphs and Trees, Inductive proofs, Set notation, Relations.Finite Automata and Regular Exprssions : Finite State Systems, Basic definitions, Non-Deterministic Finite Automata, Finite Automata with moves, Regular _Expression, Two-Way finite automata, Automata with output,
 Application on Finite Automata

2. Properties of regular sets :
 The Pumping Lemma for regular sets, Closure properties of regular sets, Decision algorithms for regular sets
 Context Free Grammar : Motivation and Introduction, CFG, Derivation trees, simplification of context free grammar, Chomsky Normal Form, Grebach normal form, The existence of inherently ambigous context free languages

3. Push-Down Automata :
 Informal description, definitions, push-down automata and context free languages Properties of Context Free Languages : The Pumping Lemma for CFL, Closure properties of CFL, Decision algorithm for CFL

4. Turing Machine :
 Introduction, The Turing Machine Model, Computable languages and functions, Techniques for Turing Machine construction, Modification of T.M., Church's hypothesis, T.M. as enumerators, restricted
 T.M., Equivalent to the basic model.

5. The Chomsky Hierarchy :
 Regular grammar, Unrestricted grammars, Context sensitive languages, Relation between classes of languages
 Deterministic Context Free Languages : Normal forms for DPDAs, Closure of DCFLs under complementation, Prediction machine, Additional Closure Property of DCFLs, Decision Properties of DCFL's LR(O) grammars and DPDA's LR(K) grammars.

6. Closure properties of families of languages :
 Trios and full Trios, Generalised Sequential machine mapping, other closure properties of trios, Abstract families of languages, Independence of AFL's operations.

Reference :

1. J.E. Hopcroft & J.D. Ullmann, Introduction to Automata Theory, Languages and Computations.
2. E.V. Krishnamoorthy, Theory of Computer Science

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MCA405 : Modern Information Technologies for Business Analysis

1. Overview of Business concepts :
 MIS, DSS, GDSS, EIS and ERP, Need, characteristics and differences

2. Data warehousing :
Client-Server computing model and data warehousing, parallel processors and cluster systems, distributed DBMS implementation, Client server RDBMS solutions Concepts of Datawarehousing, building Datawarehouses, mapping the datawarehouses to a multiprocessor architectures, DBMS schemes for decision supports, data extraction, cleanup and transformation tools, metadata

3. Business analysis :
Tools, OLAP, Pattern and nodes, role of statistics and Artificial Intelligence,

4. Data mining :
Introduction, use of decision trees, neural nets, genetical algorithms, clustering algorithm etc.

5. Introduction to internet technology :
WEB page designing, Help system designing, E-Commerce JAVA and HTML programming may be used for the implementation issues

References :

1. Alex Berson, Stephen J.Smith-"Data warehousing, data mining and OLAP"
2. David L. Olson, James Courthew Jr.-"Decision support models and expert system"
3. Ernest Ackermann, Leaarning to use the world wibe wed (BPB)
4. Jawadekar, Management Information System
5. Ralph H. Sprague Jr, Hugh Jwatson -"DSS, Puting theory into practice"

Proposed course structure for MCA Semester-V
Compulsory courses :
MCA-501 : Artificial Intelligence and Expert systems
MCA-502 : Parallel Computing
MCA-503 : Systems programming and compiler construction
Optional Courses (Group-I/Group-II/Group-III):
Group-I
MCA-514 : Advanced Information Retrieval Systems
MCA-515 : Advanced Programming Concepts
Group-II
MCA-514 : Professional Computer Graphics
MCA-515 : Web-based Applications Development
Group-III
MCA-514 : Computer Systems Technology
MCA-515 : Network Programming Concepts

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SEMESTER-V

MCA-501 : Artificial Intelligence and Expert Systems

a. AI Problem Solving : Historical development of AI. Introduction to AI problems, State space representation,
   Heuristics, Heuristics evaluation functions, Problem reduction.
b. Search methods : Generate and test, Hill climbing, means-ends analysis,Depth-first, breadth-first, Best-first
   searches, Exploiting domain constraints, dependancy-directed backtracking, Minimax, Alpha-Bita pruning,
   Iterative deepening, A* and AO* algorithms.
c. Knowledge representation and inference : Adequecy, richness, granularity, ease of representation and use,
   modelling uncertainty, the frame problem, declarative and procedural representations, equivalance in representations.
d. Logic programming : Overview of Propositional and Predicate logic, representation-atom, connectives,
   literals, CNF, DNF and clause form, interpretation and modeling, satisfability, resolution principle and
   unification algorithms.
e. Rule based system design issues : rules - working memory, rulebase, conflict set, conflict resolution stratigies
    (including spacificity, recency, refractoriness), backword and forward chaining, meta-rules.
f. Structured representation : Semantic networks, frames, conceptual dependance, scripts; inheritance, default
   values, example systems, blackboards, truth maintenance systems.
g. Uncertainty reasoning : Probability theory, bayesain networks, certainty   factor methods, basics of fuzzy
   logic, non-monotonic reasoning.
h. Application of AI (Overview): Pattern recognition, Symbolic description, machine perception, line finding,
   interpretation semantics and models, object identification, speech recognition. Planning and Robotics : STRIPS, ABSTRIPS, NOAH, MOLGEN planneres, priliminary ideas of distributed and real time planning, subsumption architecture based planning. Vision : Edge detection, point corresponds & stereopsis, surface directions. Natural Language Processing
j. AI techniques: introduction to Neural network learning, Genetical algorithms
k. Expert systems : Concept of Expert system, Difference between AI problem and Expert problem, architecture
   of expert system, rule based systems, MYCIN model of uncertinty, knowledge engineering, rule based verification, model based reasoning, case based reasoning, knowedge based reasoning. Implementation through Prolog and/ or LISP

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References :

1. David Rolston ; Principles of AI and Expert system development (MGH,1988)
2. E.Ritch and K. Knight; Artificial Intelligence (MGH)
3. M.Sasikumar,S.Ramani,S.Muthuraman; Rule base Expert System : Practical Introduction (NAROSA)
4. M.Sasikumar,S.Ramani,S.Muthuraman; Knowledge base reasoning systems(NAROSA)
5. Smith ; Expert system development in Prolog and Turbo Prolog
5. P.H.Winston; Artificial Intelligence(III ed)(Addison Wisley)
6. P.D.Wassermann ; Neural computing theory and practice (Van Nostrand,1989)

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MCA-502 : Parallel Computing

a. Parallel Computer -
  Concept, need and requirement, various concepts in pipelining, issues involved in complex pipelining, configuring a parallel computer

b. Parallel Architecture -
  Vector processor, message passing and shared memory multiprocessors

c. Parallel Programming -
  Using sequential computing elements, data flow approach

d. Elementory Algorithms -
  Matrix manipulation, Graph connectivity and traversal, Tree traversal, Sorting and searching on PRAM

e. Complexity of Parallel algorithms -
  Various processor interconnection schemes : mesh, hypercube, perfect shuffle etc.

f. High Performance Computing approach for complex problems -
  problems in Computational Geometry, Permutations and Combinations, Fourier transforms, Traversing combinational spaces, Decision and Optimization.

g. Software issues in Parallel computing -
  Parallalism in Prolog, Parallel programming environment,

h. Case studies -
  Multidimensional Multilink System, Thread Simulation System

Reference :

1. Ratan Ghosh, Rajat Moona, Phalguni Gupta - Foundation of parallel processing (NAROSA)
2. V.Rajaraman - Elements of Parallel Computing (PHI)
3. Selim Akl - The design and analysis of parallel algorithms (PHI)
4. Prof. B.P.Sinha, Prof. N.Das, Prof. B.B.Bhattacharya at ISI-CAL(Editors) -Proceedings of international
   workshop on HIPC, Dec-30,1998 to Jan-5,1999

MCA-503 : Systems Programming and Compiler Construction.

a. System Software : Concept, historical development, Review of machine architecture, Assembly language
   Instructions

b. Assemblers : Overview of the assembly process, Design of Single pass and   Two pass assemblers, Macros &
   Macro processors.

c. Compilers : Definition, Structure, Syntax and semantics of programming Languages, issues involved with
   various different Compiler Designs and Construction, Compiler construction kits and compiler construction
   languages

d. Lexical Analysis : Lexical Analysis, concept of regular grammer and it's implementation throgh automata,
   Implementing a lexical analyser.

e. Grammers and Parsing : Overview of Grammer context, Free grammers, Error in context, Parsars and
   Recognizers, Syntax and Semantic Analysis, Top-Down and Bottom-Up Parsing, Lexer and parser generators,   atribute grammer systems Application of automata theory to generate the parsers, spell checkers, long arithmetics etc., Comparison with Parser free techniques of language processing

f. Code Generation : Intermediate code generation, Different types of code generation from a tree, Code
   optimization techniques, Run time allocation storage and access, Hardware issues, Program analysis and optimization tools

g. Loaders and Linkage Editors - Loading, Linking and Relocation, Text Editors Interpreters and program
   generators.

h. CASE support and compiler construction with JAWA

i. CASE study : Comparative study of Compilers under DOS, UNIX and Windows O.S.; Device drivers,
   language drivers, text drivers and filters, SQL drivers, Debuggers and profilers, virus-scan software etc.
   Borland C++ system software can be an illustration.

References :-

Aho and Ulman; Principles of compiler construction; Charles N. Fisher & Richard J. Leblanc; Crafting a Compiler- Fundamental Methods & Issues; Deswatson; High level Languages & their Compilers;
Donovan J.J.; Systems Programming; D. M. Dhamdhere; Systems programming & Operating systems;
Dhamdhere; Compiler Construction; Holub; Compilers construction in C; T. W. Parsons; Introduction to Compiler construction Computer Science Press; Peter Calincart; Compiler Science Press- Program Transaction
Pittman T. & Peters J.; The art of Compiler Design;

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MCA-514(Gr-I) :Advanced Information Retrieval Systems

a. IR systems :
Historical Development, Sophistication in technology,Information explossion and challenges in IR systems, Conceptual Information Retrieval from multimedia documents, self recovery and fast/ meaningful (Intelligent/ Efficient) IR systems for very large archives.

b. IR Techniques :
Case based resoning, Rule based resoning, Constraint satisfaction and search, Classification and clustering using statical methods, Market - Basket analysis, filtering and simplification, Content based approach, parser free techniques for NLP, Neural networks, Genetical algorithms, rough sets and fuzzy logic, Activation networks and thesaurus based approach, wavelets etc. Improvement in efficiency.

c. Data structures and algorithms :
Inverted files, signature files, PAT trees PAT arrays, file organization for optical disks, lexical analysis and

stoplists, stemming algorithms, thesaurus construction, string searching algorithms, relevence feedback and query modification techniques, Bolean operations and extended Boolean methods, hashing, ranking, clustering

algorithms, Parallel information retrieval algorithms

d. Case study :
Diet expert system, pattern recognition and digital image processing, speech recognition, scheduling problem, NLP - Translation, Question answering, summerising etc.Software agent and personal agent- Concept, need and requirement, Implementation issues etc.

Reference :

Anil K Jain; Fundamentals of Digital Image Processing(PHI) Cowell,
Dawid, Lauritzen and Spiegelhalter; Probabilistic networks and expert systems (Springer)
W.Frake,Yates; Information retrieval - Data structures and algorithms(PHI)
Karen Sparck Jones and Willett; Readings in IR (Butterworths) Oddy,
Robertson and Rijsbergen; IR research Pal, Dey and Das; Advances in Pattern recognition & Digital tech.(Narosa)
Ramani, Anjeneyelu and Sasikumar; Proceedings of KBCS - 98,99 (Narosa)

MCA-515(Gr-I) : Advanced Programming Concepts

a. Developing Database Applications : Overview of visual IDE, Introduction toIntegrated Database Application
Programming Interface(IDAPI), Architectural and implementation perspective, Creating and maintaining tables/fields, Defining keys and validations, referential integrity, password, security, customizing table views, ordering, various match fidings, multiple table handling, multiple user handling, group queries, SQL links etc.

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b. Advanced language features : Punctuators, modifiers, autopointers, Type casting - constant cast, dynamic

cast, reinterpreted cast, static cast, Run time type identification, Constructors and distructors - Overview, atexit, abort, #pragma startup , #pragma exit etc., Class generators, exception handling, preprocessors and macros, Compilation process in OO models, name mangling, tentative definitions and possible declarations etc.

c. Windows advanced programming : Overview of elementory programming concepts-resource script file,

module defined files, import libraries, winmain etc., Prologs, epilogs and exports, win32 API, portable code,

Runtime libraries - Static Vs. DLL run time libraries, creating and using DLL, Import and export of functions and/or classes, DLL and memory models, Inline assembly - syntax and usage, compilation, Built in assembler(BASM), Container class Library (CCL) - ADT and FDs classes, pointers in containers, iterators, creating and managing container objects, IOstreams classes and persistent streams classes and macros, service classes- String, TDate, TTime, Tfile, TSubstring, TRegexp, TCriticalSection, TMutex, TSync, TThread etc.

d. Developing full featured windows applications : Case study - MFC and/or Borland's Object windows class

library, Working with class hierarchies, creation of OLE applications, including containers, servers and automated applications, DOC/VIEW classes, for easy data abstraction and display, Portability between 16 bit and 32 bit platforms, porting to other compilers and environments, automated massage cracking, exception and error handling, encapsulation of windows GDI objects, printers and print preview classes, support for VB controls, Input validations etc.

Reference :

Bjarne Stroustrup; The C++ programming language
David Kruglinski; Inside VC++ (Microsoft)
Don Box - Creating components using DCOM and C++ (Microsoft)
Lippman and Lajoie; C++ primer (PHI)
Petzold; Windows programming BC++ manuals

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MCA-514(Gr-II) : Professional Computer graphics

a. Graphics Designing and drawing in CORELDRAW : Introduction to CORELDRAW, Drawing free hand

lines, shapes, applying colours, moving, editing, copying, grouping-ungrouping, repeatation, combination of shapes, Perspective Drawings - Parallel, Angular, Eye level view, Bird's eye view, Ant's eye view, Colour theory - colour schemes, tonal values of colours, psychology of colours, applying textures and patterns, Transformation of Shapes and Colours to get the in between stages, Colour transperency, Text features - Spacing, fitting text to path, Shadow Effects and other special effects, Calligraphic applications, Basics of printing processes

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b. Photo editing in PHOTOSHOP : Introductio to PHOTOSHOP and it's differences with CORELDRAW,

Vector-Raster concept, Resolution, RGB and CMYK colour theories, editing tools and their applications, scanning and mixing of photographs and illustrations, creating various textures, special effects, creating frames for multimedia presentations etc. c. Multimedia : Introduction to audio-visual concepts, framewise script

writing, designing and development, animation concept (2-D and 3-D), Digital sound recording - Introdution to musical tracks, trackwise recording and editing, applying special effects, mixing sound files and sound over, video grabbing, creating interactive multimedia presentations

d. Using AUTOCAD and 3-D STUDIO MAX : AutoCAD screen terminology, co-ordinate systems, command

entry, data entry techniques, Set up for drawings, Units, Limits, Drawing 2-D objects, object snapping, selection and editing, Drawing display control, Layout concept, Inquiry techniques, Dimensioning, Text creation, 3-D co-ordinate system, 3-D modeling, viewing, editing and processing, Block concepts, External references, Model/Paper space concept, Customisation - Line types, hatching, menu, commands Programming interfaces - AutoLISP, VisualLISP, V.B.A.,Object ARX, Rendering in AutoCAD 3-D Studio Max - Introduction, Screen terminology, 2-D shaper, Bezier Spline creation tools, 3-D construction, 3-D editor, material editor, Key framer, animation and advance techniques.

Reference :

Manuals of CORELDRAW, PHOTOSHOP, AUTOCAD and 3-D Studio Max

MCA-515(Gr-II) : Web Based Applications Development

a. Overview of Internet and intranet : Theorotical and Practical Perspectives, Understanding Hardware and

Software, Web technology, Techniques of building secure, scalable and highly available web servers, Apache, IIS, POP3, IMAP and Mail clients

b. Fundamentals of Web Programming : Using Markup languages - HTML, DHTML, XML, VRML, COM,

DCOM, ASPs, SOM, Java scripts, VB scripts, Frontpage, InterDev and Splash, Information retrieval from very large archives

c. Application programming : Interactive design of mouse over, image over, DNS configuration and

connectivity, regestration, web-space, CGI, Design of data bound applications - Various front ends and back ends viz. ACCESS, SQL server, C, PERL, MYSQL, Postgrage On-Line chat, credit card validations, client side scripting etc.

d. E-commerce : Mail order/ Telephone order systems, managing payments across the networks, point of scale

transactions, bill payment authenticity, integrity, provability e. Security issues : Digital signatures, Digital watermarks, Certification, Firewalls, privacy and anonymity protocols, security hardware and software,

Third party customer

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f. Laws and legislation : Legal and social environment of E-Commerce, Uniform commercial code, nforceability
 of electronic agreements, Privacy, Consumers   rights, intellectual property, criminal statutes, transborder issues
g. Case study : Design, development and deployment of web site

Reference :

1. Ernest Ackerman; Learning to use World Wide Web (BPB)

MCA-514(Gr-III) : Computer Systems Technology

a. Basics of netware installation and administration : LAN, NT, UNIX,LINUX, LOTUS NOTES and their
 components, Web server setup and DNS configuration, Familarity with various trends in hardware and software markets viz. Quantum computers, Database computers, MACH, RISK, GENEE,...
b. Hardware issues : Overview of various configurations of PCs, Hardware and software specifications,
 functionalities, upgrading issues and setups, Architecture of advanced Microprocessor Motherboard- Pentium,
 P-II, P-III, MMX technology. High end system configurations viz. Servers, Bus architecture - ISA,EISA, MCA, PCI, Add-on cards - Display cards, floppy disk controller and disk drivers, hard disk controller, sound blaster card, serial cards, Lan card, Fax modem card etc. Floppy disk drive - drive types, FOD, Disk sensors Head alignment, Hard disk - Hard drives and Interfaces, Disk geometry, Installation characteristics, Drive nterfaces, STSO6, Address Jumpers, Master and slave Jumpers, physical or low Level formatting, partitioning, configuring the system CMOS, Booting process etc. PC assembling - Testing motherboard, SMPS, connecting verious peripherals viz. SMPS, FDD, HDD, Artistic Bands, common Reassembling Mistakes, Assembling addon cards.
c. External Peripherals : Various Input-Ouput devices viz. Printers, plotters, joystick, mouse, keyboard, CD-
 writers, scanners, drives, their types and technologies, components, interfaces and installations Multimedia - sound blaster card, sound characteristics, FM synthesis, IRQ, DMA, port add, Movie player enhance graphics card, Installing mike and digital camera, speaker system, The video memory, vertical/ horizontal scan frequency, Dot pitch, Multi-frequency monitor, Resolution of colors, Types of monitors and power supply units etc. Modems - Types of modems, Installation, solving port & cable problems, Hardware interfacing and CNC etc.
d. Networked infrastructure : Cabling - types of cables, connecting cables and edge connectors, Hubs,
 Switches, Routers, UPS, Invertors and other supporting infrastructure design and implementation issues,
 Internet and email - concept feature and types of E-mail services. Working principle, storing, forwarding scheduling messages

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e. Customer service : Common module problems, trouble shooting, system malfunctions and recovery measures,

suggessions regarding potential hazards due to lazer, high voltage devices etc., safty and preventive maintenance, Procedures environmental hazards, environmental comply disposals of right offs Customer satisfaction - Authenticity, interpersonal interaction, efficiency, credibility and confidence, total quality assurance, zero faults, minimum service time, log maintenance, stress testing, performance optimization and fine tuning, security measures etc.

f. Case study : Comparative study of various hardware and software troubleshooting tools, Characteristic features

of maintenance in various environments viz. stand alone, internet, intranet and extranets

Reference books

1) Govindrajalu ; IBM PC clones
2) G.C.loveray ; Electronic fault diagnosis,(Longman Scintific & technical)
3) Minasi ; The Complete network upgrade and maintenance guide
4) Peter Norton ; Inside the IBM PC
5) Robert D. Ainsbury ; Using your Hard disk
6) Robert e. Branner ; IBM PC troubleshooting techniques
7) Scott Mueller ; Upgrading and repairing PCS
8) IBM PC\XT technical reference manual.(IBM)

MCA-515(Gr-III) : Network programming Concepts

a. Java and CORBA - Client Server programming : Historical development of client server programming,

Introduction to the concept of CORBA. Java Programming environment and it's significance in network programming b. Fundamental concepts : Object Bus, Distributed Objects, interoperability of Distributed objects, concept of open object bus, Common Object Request Broker Architecture (CORBA) product of Object Managment Group (OMG), and Distributed Component Object Model (DCOM) product of Microsoft. OMG's Object Managment Architecture and it's elements - Object Request Broker, CORBA Services, CORBA facilities, Application Objects

c. Architecture : ORB Vs RPC, 3 tier Client-Server architecture, Interaction of Client-Server on Object web, the

3 tier CORBA/Java object web. d. Method of Invocation : Static Vs Dynamic, Object reference, CORBA - Interoperable Object References (IOR), Dynamic Invocation and callbacks, CORBA Naming Services, Naming Services Vs Bind, Portable Object Adapter, Dynamic Invocation Interface.

e. Network interfacing issues : Socket Vs CORBA / Java ORBs, JAVA Stream sockects and JAVA Datagram

Sockets Hyper Text Transfer Protocol(HTTP), Common Gateway Interface(CGI), Servlet, servlets Vs CGI, Servlet chaining, remote method of invocation(RMI), Basic object adopter etc.

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f. Advanced programming : JDBC - Java Database connectivity, component co-ordinator i.e. object transaction
   monitor(OTM), component developers, component assemblers, Beans vs Applets.

Reference :
1. Alex Berson ; Client Server architecture
2. Balagurusami ; JAVA programming
3. Rober Orfali, Dan Harkey ; Java and CORBA (SPD)

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