

University of Pune
First Year Master of Computer Applications (MCA)
Under Faculty of Engineering 2005 Course

Semester I

Subject Code	Subject	Teaching Scheme		Examination Scheme				Marks
		Lect.	Pract	Th	Tw	Pr	Or	
115001	Problem Solving & Programming in C	03	—	100	—	—	—	100
115002	Discrete Mathematics	04	—	100	—	—	—	100
115003	Foundations of Information Technology	04	—	100	—	—	—	100
115004	Probability and Statistics	04	—	100	—	—	—	100
115005	Management Science	04	—	100	—	—	—	100
115006	Soft Skills	01	02	—	50	—	—	50
115007	Programming Laboratory	—	04	—	25	50	—	75
115008	Information Technology Laboratory	—	04	—	25	50	—	75
Total		20	10	500	100	100	—	700

Semester II

Subject Code	Subject	Teaching Scheme		Examination Scheme				Marks
		Lect.	Pract	Th	Tw	Pr	Or	
115009	Object-Oriented Programming	03	—	100	—	—	—	100
115010	Data Structures and Files	04	—	100	—	—	—	100
115011	Operations Research	03	—	100	—	—	—	100
115012	Microprocessor Applications	04	—	100	—	—	—	100
115013	Management Information Systems	04	—	100	—	—	—	100
115014	Data Structures Laboratory	—	04	—	50	50	—	100
115015	Microprocessor Laboratory	—	04	—	50	50	—	100
115016	Object Oriented Programming Laboratory	—	04	—	50	50	—	100
Total		18	12	500	150	150	—	800

Th: Theory Tw: Term Work Pr: Practical Or: Oral

115001: PROBLEM SOLVING AND PROGRAMMING IN C

Teaching Scheme:
Lectures: 3 Hrs/Week

Examination Scheme:
Theory: 100 Marks

Objectives:

1. To develop logical thinking and programming ability.

Unit I (6 Hrs)

Introduction to Problem Solving Aspect:

Notations of Flow Charts and its implementation, Top-Down-step wise refinement, Implementation of algorithms, Program Verification, Efficiency of algorithms, Analysis of algorithm, Basic Algorithms: Exchange of values of two variables, Summation of set of numbers, Factorial Computation, Sine function computation, Generation of Fibonacci Sequence, Reversing of digits of an integer, Base conversions, Character to Number conversion, Finding Square Root, Factorial, GCD, Generating Prime numbers

Unit II (6 Hrs)

C Programming Basics:

Data Types, Variables, Constants, Expressions, Operators, Operator precedence and associativity, Basic Input-Output statements, Control Structures, Simple Programs in C using all the operators and control structures, Functions: Concept of Functions, Parameters, Parameter passing method, Recursion, local and global variables, scope and extent of variables, Writing programs using recursive and non-recursive functions, Arrays and Strings: Single and Multi Dimensional arrays – Strings, String manipulations, Writing C programs using Strings

Unit III (6 Hrs)

Pointers: Definition and use of pointers, address operator, pointer variable, pointer arithmetic, arrays of pointers, passing arrays to functions, pointers and functions, constant pointers, pointers to functions.

Dynamic Memory Allocation: Library functions for Dynamic Memory Allocation, Dynamic multi-dimension arrays, Writing C program using Dynamic Memory allocation functions.

Unit IV (6 Hrs)

Structures and Unions: Declaring and using Structures, operations on Structures, arrays of structures, user defined data type, nested structures, “sizeof” operator, pointer to structure, Self referencing structures.

Unions: Difference between Unions and structures, operations on a Union, Scope of a union, Bit fields, Writing C programs using structures and unions,

Bit-wise and shift operators, command-line arguments, using argc, agrv and env variables, Storage classifiers: auto, static, register and external, compiling multi-file programs

Macro Preprocessor: macro definitions, macro with parameters and conditional compiling.

Unit V (6 Hrs)

Files: Introduction, File Structure, File handling functions, File types, Error Handling, Low level file I/O, redirection and piping, Writing C Programs using files with high level and low level I/O and BIOS system calls.

Unit VI **(6 Hrs)**

Numerical Methods and Analysis: Numerical solutions of linear equations (Iterative techniques and their analysis), Direct and iterative methods, Gauss elimination methods, Gauss seidal Iterative method, Linear difference equation: Trapezoidal rule for numerical Integration, Simpson's $1/3^{\text{rd}}$ rule, Simpson's $6/8^{\text{th}}$ rule.

Text Books:

1. Dromy R., "How to solve it by computer", Prentice Hall of India, 81 – 203 – 0388 – 1
2. S. Kochan, "Programming In C", CBS Publishers and Distributors.
3. Jain M., Iyengar S., Jain R., "Numerical Methods for Scientific and Engineering Computations ", 2nd Edition, Wiley Eastern, 1986, ISBN 85226 – 434 – 8

REFERENCE:

1. Schildt H., "The Complete Reference - C", 4th Edition, Tata McGraw-Hill, 2004, ISBN 0 – 07 – 041183 – 2
2. Kernigham B., Ritchie D., "The C Programming Language", 2nd Edition, Prentice Hall of India, 1991, ISBN 0 – 87692 – 596 – 4
3. Kanetkar Y., "Understanding Pointers in C", 3rd Edition, BPB Publications, 2002, ISBN 81 – 7656 – 358 – 7

115002: DISCRETE MATHEMATICS

Teaching Scheme:
Lectures: 4 Hrs/Week

Examination Scheme:
Theory: 100 Marks

Objectives:

1. To study discrete objects and relationships among them
2. To demonstrate how these concepts can be applied to solve nontrivial real life problems

Unit I **(8 Hrs)**

Introduction: History of mathematics as related to discrete structure, motivations for discrete structure, Sets: introduction, combination of sets, finite and infinite sets, uncountably infinite sets, mathematical induction, Principle of inclusion/exclusion (addition principle)

Unit II **(8 Hrs)**

Propositional Calculus: Propositions, logical connectives, truth table, methods of proof using inference rules: equivalence and implications, universal and existential quantifiers, propositional calculus

Unit III **(8 Hrs)**

Permutations and Combinations: Rules of sum and products, permutations, combinations, generations of permutations and combinations

Relations and Functions: Definitions, properties of binary relation, equivalence relation, partial ordering relations, lattices, chains, anti-chains, definition of a function, pigeonhole principle

Unit IV **(8 Hrs)**

Graphs and Planer graphs: Basic terminology, multigraphs and weighted graphs paths and Circuits, shortest path in weighted graphs, Hamiltonaian and Eulerian paths and circuits

Trees and cut sets: Trees, rooted trees, path lengths in rooted trees, prefix code, binary search trees, spanning trees and cutsets, minimal spanning trees, Shortest path algorithm, Warshall's algorithm for transitive closure

Unit V **(8 Hrs)**

Groups and Rings

Algebraic Systems, Groups, Semi Groups, Monoid, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Rings, Integral Domain, Field, Ring Homomorphism, Polynomial Rings and Cyclic Codes

Unit VI **(8 Hrs)**

Regular expressions and State Machines: Introduction to alphabet and strings, basic operations on strings, regular expressions language, equivalent regular expressions, basic machines, types of machines, finite state machines, non-deterministic finite automata, finite state with output: Moore machine, Melay machine

Text Books:

1. J. Tremblay, Manohar R., "Discrete Mathematical Structures with application to Computer Science", Tata McGraw-Hill, 2002 ISBN 0-07-463113-6
2. Deo N., "Graph theory with application to Engineering and Computer Science", Prentice Hall of India, 1990, ISBN 0 – 87692 – 145 – 4

Reference Books:

1. LIU C., "Elements of Discrete Mathematics", 2nd Edition, Tata McGraw-Hill, 2002, ISBN 0-07-043476-X.
2. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9
3. Johnsonbaugh R., "Discrete Mathematics", 5th Edition, Pearson Education, 2001 ISBN 81 – 7808 – 279 – 9
4. Goodaire E., Parmenter M., "Discrete Mathematics with Graph Theory", 2nd Edition, Pearson Education, 2003 ISBN 81 – 7808 – 827 – 4
5. Biggs N., "Discrete Mathematics", 2nd Edition, Oxford, 2002 ISBN 0 –19 – 850717 - 8

115003: FOUNDATIONS OF INFORMATION TECHNOLOGY

Teaching Scheme:

Lectures: 4 Hrs/ Week

Examination Scheme:

Theory: 100 Marks

Unit I **(8 Hrs)**

Introduction: Characteristics of computer, Evolution and generations of computer, **Basic Computer Organization** :Input and Output Unit, Primary and Secondary storage, CPU: ALU, Control Unit, **Classification of computers:** Notebook, PCs, Workstations, Mainframe, Super computers, Client and server **Number Systems:** Binary, Hex, Octal, Decimal numbers, Floating-point Numbers, **Computer codes:** BCD and EBCDIC codes, ASCII, collating sequence,

Boolean Algebra and Logic circuits: Boolean algebra, Boolean functions, logic gates, Logic circuits, Design of combinational logic

Unit II (8 Hrs)
Processor and Memory: study of CPU and different parts of CPU, Memory and types of memory

Secondary storage devices: Sequential and direct access devices, Magnetic tape, disk, Optical disk, Mass storage, **Input-output Devices:** Study of different Input/Output devices

Unit III (8 Hrs)
Computer Software: What is software? Relationship between Software and Hardware, Types, Logical system architecture, Acquiring software, Software development steps, Firmware, **Computer Languages:** Analogy with natural language, machine language, Assembly Language, High-Level language, Object Oriented Programming languages, Study of Some Higher level Languages, characteristics of good program, Languages, Selecting language for coding, subprogram

Unit IV (8 Hrs)
Operating Systems (OS): What is an OS? System Performance, Process Management, Memory Management, File management, Security, OS capability enhancement software, some popular OS **Application software packages:** Word Processing, Spreadsheets, Graphics, Personal Assistant Package

Unit V (8 Hrs)
System Implementation and Operation: Testing and debugging, Documentation, Changeover to new system, System evolution, System maintenance,
Business data processing: What is data processing? Standard methods of organizing data, File management system, Database management system
Multimedia: What is multimedia? Components of multimedia, Applications

Unit VI (8 Hrs)
Data communications and Computer Networks: Basic elements, Data transmission modes, speed, Transmission media, digital and analog computers, Communication processors, Asynchronous and Synchronous Transmission, Switching techniques, Routing techniques, Network Technologies, network types, Communication Protocols, Internetworking tools, Wireless networks, Distributed computer systems, **The Internet:** History, Basic services, www, browsers

Reference Books:

1. Sinha P., Sinha P., “Foundation of Computing”, BPB Publication, 1st Edition, 2003 ISBN-81-7656-663-2
2. Rajaraman V., “Computer Fundamentals” – ISBN 0B- 87692-387-2

115004: PROBABILITY AND STATISTICS

Teaching Scheme:
Lectures: 4 Hrs/Week

Examination Scheme:
Theory: 100 Marks

Objectives:

- To provide an introduction to probability and statistics

Unit-I

(8 Hrs)

INTRODUCTION

Motivation, Probability Models, Sample Space, Events, Algebra of Events, Graphical Methods of Representing Events, Probability Axioms, Conditional Probability, Independence of events, Bayes Rule, Bernoulli Trials

Unit-II

(8 Hrs)

RANDOM VARIABLES

Random variables and their event spaces, The probability mass function, distribution functions, special discrete distributions, analysis of program MAX, Discrete random vectors, independent random variables, the Exponential distribution, Some important distributions, functions of a random variable, jointly distributed random variables, order statistics, distributions of sums

Unit-III

(8 Hrs)

EXPECTATION

Moments, Exception of functions of more than one random variable, introduction of conditional distribution and exception, mixture distribution, conditional expectations.

Unit-IV

(8 Hrs)

SAMPLING THEORY

Population and sample, Statistical interference, Sampling with and without replacement, Random samples, Random numbers, Population parameters, sample statistics, Sampling distributions. The sample mean, Sampling distribution of means, The sampling distribution of proportions, Sampling distribution of differences and sums, The sample variance, Sampling distribution of variances, Case where population variance is unknown, Sampling distribution of ratios of variances, Other statistics, Frequency distributions, Relative frequency distributions, Computation of Mean, Variance and moments for grouped data

Unit-V

(8 Hrs)

ESTIMATION THEORY

Unbiased Estimates and Efficient Estimates, Point Estimates and Interval Estimates, Reliability, Confidence Interval Estimates of Population Parameters, Confidence Intervals for Means, Confidence Intervals for proportions, Confidence intervals for differences and sums Confidence intervals for the variance of a normal distribution, Confidence Intervals for variance ratios, Maximum likelihood Estimates

Unit-VI

(8 Hrs)

Test of Hypotheses and Significance

Statistical Decisions, statistical hypothesis, Null hypothesis, Tests of hypothesis and significance, Type1 and Type 2 Errors, Level of Significance, Tests involving the normal Distributions, One -Tailed and Two-tailed tests, P value, special tests of Significance for large Samples and small Samples, Relationships Between Estimation theory and Hypothesis testing,

Operating characteristics curves, Power of tests, Quality control charts, Fitting Theoretical Distributions to Sample frequency Distributions, The Chi-Square Test for goodness of Fit, Contingency Tables, Yates' Correction for continuity, Coefficient of contingency

Text Books:

1. Trivedi K., "Probability and Statistics with reliability, Queuing, and Computer Science Applications", PHI, ISBN: 81-203-0508-6
2. Spiegel, Schiller, "Probability and Statistics" 2nd Edition, TMH, ISBN: 0-07-058610-1

Reference Books:

1. Papoulis, Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, TMH, ISBN: 0-07-048658-1

115005: MANAGEMENT SCIENCE

Teaching Scheme:

Lectures: 4 Hrs / week

Examination Scheme:

Theory: 100 Marks

Objectives:

- To make the student familiar with management concepts

**Unit I
(8 Hrs)**

Introduction to Management:

Evolution of Management Science, Contributions of F.W. Taylor, Henry Fayol, Gantt, Gilbreth etc. Definitions of Management, Management as an art, Science and profession, Management, Administration and Organization concepts, Levels of Management, Functions of Management, Management by Objectives (M.B.O.)

Unit II

(8 Hrs)

Managerial Economics:

Basic Economic concepts: Human needs, Economics Goods, Price, Value, Utility, Wealth, Law of Demand, Law of Supply, Scales of production, internal and external economics of scale, Concepts of E-commerce, E-Business Management, E-Governance, Enterprise Resource Planning (ERP), Intellectual Property laws: Patents, Copyrights, Trademarks Law of Contracts: Salient Features, Role of Chambers of Commerce and Industries

Unit III

(8 Hrs)

Business Organization:

Forms of Business Organization, Definitions, features, advantages, disadvantages of Individual proprietorship, Partnership, Joint stock Companies, co-operatives and Public Sector Under takings, Types of companies, Formation of Joint stock company, MOA and AOA, Organizational

structures, Definition, types, merits and demerits of each of structures (Line, Functional, Line and staff, Committee, Matrix and Project structure)

Unit IV

(8 Hrs)

Human Resource Management:

Manpower Planning, Factors affecting Manpower Planning, process of manpower planning, Recruitment, selection, training, Job evaluation, Performance Appraisal, wages and incentives, self and time management

Communication: elements, process principles, barriers, listening skills, body language, Media of communication, Communication in Organization (vertical, horizontal etc.) Motivation concept and meaning, Maslows Theory of need hierarchy, Mc Gregors Theory X and theory Y

Unit V

(8 Hrs)

Industrial Act

Industrial Act: Introduction, Factory act, Pollution control, Industrial safety: Causes of accidents, Safety, accident prevention, techniques and related legal provisions

Unit VI

(8 Hrs)

Quality Management

Quality Management: Concept and importance of quality circles and Total Quality Management (TQM), ISO 9000, Patents, Patent procedure

Note:- Lecturers by experts from industry should be arranged.

Reference Books:

1. Shukla M., "Business Organization and management ", ISBN 81-219-0813 2
2. Aryasri A., "Management Science", Tata McGraw Hill.
3. Khanna O., "Industrial Management"
4. Koontz H., Weihrich H., "Essentials of Management", Tata McGraw Hill, ISBN 0-07-035516-9

115006: SOFT SKILLS

Teaching Scheme:

Lectures: 1 Hr/Week

Practical: 2 Hrs/Week

Examination Scheme:

Term Work: 50 Marks

Objectives:

1. To encourage the all round development of students by focusing on soft skills
2. To make the students aware about of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration, and practice
3. To develop and nurture the soft skills of the students through individual and group activities
4. To expose students to right attitudinal aspects and to build the same through activities

The coverage of soft skills that help develop a student as a team member, leader, all round professional in the long run have been identified and listed here for references. As the time

allotment for the soft skills laboratory is small and the fact that these skills are nurtured over years, students are encouraged to follow up on these skills as self-study and self driven process.

Unit I

(6 Hrs)

Self Development and Assessment: Self-Assessment, Self-Awareness, Perceptions and Attitudes, Values and Belief Systems, Personal Goal Setting, Career Planning, Self-Esteem, Building of Self Confidence

Unit II

(6 Hrs)

Verbal and Nonverbal Spoken Communications: Includes planning, preparation, delivery and feedback and assessment of activities like: Public speaking, Group Discussions, Oral Presentation skills, Perfect interview, listening and observation skills, Body Language, Use of presentation graphics, Use of presentation aids, study of Communication Barriers

Unit III

(6 Hrs)

Written Communications: Technical Writing – Technical reports, Project Proposals, Brochures, Newsletters, Technical Articles, Technical Manuals, Official / Business Correspondence: Business Letters, Memos, Progress Reports, Minutes of Meeting, Event Reporting, Use of Style, Grammar and Vocabulary for effective Technical writing, Use of Tools, Guidelines for technical Writing, Publishing

Unit IV

(6 Hrs)

Ethics and Etiquettes: Business Ethics, Etiquettes in social as well as office settings, E-mail etiquettes, Telephone Etiquettes, Engineering ethics, and ethics as an IT Professional, Civic Sense

Unit V

(6 Hrs)

Leadership and Interpersonal Communications: Leaders – their skills, roles, and responsibilities, Vision, Empowering, delegation, motivating others, organizational skills, Problem Solving and conflict management, team building, interpersonal skills. Organizing and conducting meetings, decision making, giving support

Unit VI

(6 Hrs)

Other Skills – Managing Time, Meditation, Understanding roles of Engineer's and their responsibilities, Exposure to work environment and culture in today's job places, improving personal memory, Study skills that include Rapid Reading, Notes Taking, Complex problem solving and creativity.

References for students for self-improvement by self-study

Topic 1: Any good book like

1. Shiv Khera, "You Can Win" – Macmillan Books – 2003 Revised Edition, ISBN 0333 93740 6
2. Stephen Covey, "7 Habits of highly effective people "

Topic 2 and 3

1. John Collin, "Perfect Presentation", Video Arts MARSHAL.
2. Jenny Rogers, "Effective Interviews", Video Arts MARSHAL.
3. Raman, Sharma, "Technical Communciations", OXFORD. ISBN 0-19-566804-9
4. Sharon Gerson, Steven Gerson", "Technical Writing process and product", Pearson education Asia, LPE Third Edition.
5. R Sharma, K. Mohan, "Business correspondence and Report writing", Tata McGrawHill ISBN 0-07-044555-9
6. Videos for Technical Education Catalog, National Education and Information Films Ltd, Mumbai.
7. Management Training and Development Catalog, National Education and Information Films Ltd, Mumbai.
8. XEBEC, "Presentation Book 1, 2, 3", Tata McGraw-Hill, 2000, ISBN 0 – 040221 – 3

Topic 4 and 5 and 6

1. Tim Hindle, "Reducing Stress", Essential Manager Series DK publishing.
2. Sheila Cameron, "Business students Handbook", Pitman Publishing.
3. Dr R L Bhatia, "Managing Time for a competitive edge".
4. Lorayne, Lucas "Memory Book".
5. Robert Heller, "Effective leadership", Essential Managers DK publishers.
6. Newstrom, Keith Davis, "Organizational Behavior", Tata McGraw Hill.
7. Sasikumar, P Dhamija, "Spoken English (with video cassettes)" Tata McGraw Hill ISBN 0-07-460358-2

It is proposed that experts from industry be invited to conduct lecturers and work shops to understand the industry soft skill requirements,

LIST OF POSSIBLE ASSIGNMENTS

1. Write a Personal essay and or resume or statement of purpose which may include:
 - a. Who am I (family background, past achievements, past activities of significance).
 - b. Strengths and weaknesses (how to tackle them) (SWOT analysis).
 - c. Personal short-term goals, long-term goals and action plan to achieve them.
 - d. Self assessment on soft skills
2. Students could review and present to a group from following ideas:
 - a. Book review.
 - b. Biographical sketch.
 - c. Any topic such as an inspirational story/personal values/beliefs/current topic.
 - d. Ethics and etiquettes and social responsibilities as a professional.
3. Students will present to a group from following ideas:
 - a. Multimedia based oral presentation on any topic of choice (Business/Technical).
 - b. Public speaking exercise in form of debate or elocution on any topic of choice
4. Students will undergo two activities related to verbal/nonverbal skills from following:
 - a. Appearing for mock personal interviews.
 - b. Participating in Group Discussions on current affairs/social issues/ethics and etiquettes.
 - c. Participating in Games, Role Playing exercises to highlight nonverbal skills.

5. Students will submit one written technical documents from following:
 - a. Project proposal.
 - b. Product brochure.
 - c. Literature survey on any one topic.
 - d. User manual.
 - e. Technical help.
6. Students will submit one written business documents from following:
 - a. A representative Official correspondence.
 - b. Minutes of meeting.
 - c. Work progress report.
7. Students will participate in one or two activities from following:
 - a. Team games for team building.
 - b. Situational games for Role Playing as leaders, members.
 - c. Organizing mock events.
 - d. Conducting meetings.
8. Faculty may arrange one or more sessions from following:
 - a. Yoga and meditation.
 - b. Stress management, relaxation exercises, and fitness exercises.
 - c. Time management and personal planning sessions.
 - d. Improving memory skills.
 - e. Improving leadership skills.
 - f. Improving English conversation skills.
 - g. Reading comprehension skills and Notes taking skills.

Students are expected to keep a personal record of ANY SIX activities that they undertook in the Soft skills Laboratory in the form of a journal. All students need not do the same assignments. Colleges have a freedom within the framework to customize set of activities to be followed.

Guidelines for Conduction and Assessment of Laboratory Work

1. This laboratory can be seen as a departmental activity with one of the faculty as coordinator.
2. Professionals from HRD departments of companies could assist in training sessions.
3. Certain activities can even be team activities such as technical report submission or joint presentations.
4. Popular science, INTERNET, Magazines, Newspapers, and Training MEDIA from BCL, BBC, Management Institutes, and Management Gurus can also be used as resources.
5. Generally an exercise can be designed to allow multiple skills exposure for example a group task encouraging discussions, team building, value sharing, leadership and Role Play all at the same time.

ASSESSMENT Guidelines

1. WRITTEN Communications 20 Marks
 - a. Students could submit for example
 - b. Personal resume, essay
 - c. Technical document or business document.
2. Spoken communications 20 Marks
 - a. One elocution event of say 8-10 minutes individually
 - b. One group discussion or group presentation event

3. Overall participation in soft skills based lab activities 10 Marks
- a Attendance and enthusiasm
 - b Participation and contribution in event management, organizing
 - c Group games, group exercises, interpersonal skills observed.
 - d Quality of journal for soft skills laboratory indicating personal progress, participation.

Guidelines for batch wise Time management for laboratory sessions (Two hour session at a time)

A Semester allows for 12-14 sessions. Students can do Lot of preparation at leisure time.

1. Batches could be of size 25 to 30 students.
2. Written communication exercises could be done for whole batch at same time (3 sessions)
3. Spoken communications exercises can be done with around 10-15 students covered in one two-hour slot so total need for one exercise. (2 sessions).
4. Group discussions could be done for groups of 5-8 students at a time for half hour so total need for two group discussions for each student of the batch will be required. (2 sessions).
5. Sessions could be organized for trainers to give directions, knowledge, experience sharing or common viewing of training material on Video etc. (4 sessions).
6. Group exercises for team building, role-playing and interaction with professional. (3 sessions)

115007: PROGRAMMING LABORATORY

Teaching Scheme:
Practical: 4 hours/Week

Examination Scheme:
Term Work: 25 Marks
Practical: 50 Marks

Suggested list of assignments

1. Write a program to perform various string operations such as copy, length, reversing, palindrome, concatenation and to find occurrence of a sub-string using and without using library functions
2. Write a program to understand various logical and bit wise operators
3. Write a program to generate permutations and combinations of a given list
4. Write a program to perform various operations such as union and intersection on sets
5. Write a program to perform addition and multiplication operations on matrix. Write functions to determine whether the matrix is symmetric and skewed?
6. Write a program for saddle point or magic square
7. Write a program to compute Inverse of a matrix
8. To create a text file, read it and convert into uppercase and write the contents into another text file by using command line arguments.
9. Write a program to implement a small project to understand the concept of structures, pointers, various operations on files such as create, open, add/modify/delete/process/append a record, search a record, sort, merge, close.
10. Solve simultaneous equations using Gauss elimination/ Gauss Seidal method
11. Solve Numerical Integration using Trapezoidal Simpson's $1/3^{\text{rd}}$ / Simpson's $6/8^{\text{th}}$ rule
12. Solve linear differential equations

Note:

1. Proper indenting, coding styles, commenting, naming conventions should be followed.
2. Avoid using global variables as far as possible
3. Use of functions is necessary
4. Faculty should prepare a lab manual including standard test cases and should be available to students for reference

Student should submit term work in the form of a journal consisting of minimum 12 assignments based on the above list. Practical examination will be based on the term work. And questions will be asked during the examination to judge the understanding of the practical performed at the time of examination. Candidate is expected to know the theory involved in the experiment.

115008: INFORMATION TECHNOLOGY LABORATORY

Teaching Scheme:
Practical: 4 Hrs/ Week

Examination Scheme:
Term Work: 25 Marks
Practical: 50 Marks

Assignment No 1:

WINDOWS 98/2000/XP/Linux: Installation, Desktop setting - new folder, rename, recycle bin operations, briefcase function, control panel utility, Network setting, Display properties : Screen saver, background settings, Using Command line utilities of Linux/DOS/Windows etc.

Assignment No 2:

Ms - Word: Create a document such as your resume or notes of any topic of your text book using facilities below

Creating file: save, save as, save as HTML, save as Text, template, RTF format, Page setup utility: Margin settings, paper size setting, paper source, layout, Editing: cut, paste, paste special, undo, redo, find, replace, goto etc, View file: Page layout, Normal outline, master document, ruler, header, footer, footnote, full screen, Insert: break, page number, symbol, date and time, auto text, caption file, object, hyperlink, picture etc. Format: font, paragraph, bullets and numbering, borders and shading, change case, columns, Tools: Spelling, merge documents, protect document, mail merge, macro. Table: Draw label, insert table, cell handling, table auto format, sort formula, Give password to document

Assignment No. 3

Ms-PowerPoint: Create any presentation using following facilities

Creating new slide, formatting slide, slide layout, slide show and sorter, Inserting new slide, slide no., date, time, chart, formatting slide, tool operation, Animation, Timing, Inserting Video clips

Assignment No. 4

MS Access: Create a database for Inventory or reservation system or student information system (with multiple tables and relation) and generate different reports

Parts of an Access Window, Tool Bars and Their Icons, Starting Microsoft Access, Creating a New Database, Creating a Database through Table Wizard, Creating a New Table, Rename Columns, Saving the Database, Relationships, Creating Table through Design View, Relationship, Query, Forms, Reports, Import/export tables etc.

Assignment No. 5

Excel Basics: Create small accounting applications such as Maintaining invoices/budgets or totaling of various transactions or Maintaining daily and monthly sales reports or any other application using following facilities of excel

Menus, Opening of Spread Sheet, creation of cells and addressing of cells, Cell inputting, Manipulation of cells, Enter texts numbers and dates, Creation of tables, Cell Height and Widths, Copying of cells, Providing Formulas, Using basic functions/formalism a cell such as Sum, average, Percentage and Other basic functions and draw graphs, import/export

Assignment No. 6

Internet:

A. Creation of New Email Account: Create your own Email account on <http://www.hotmail.com> / <http://yahoo.com> or rediff.com and set the account preferences while registration. Create your signature in hotmail account with following details: 1) Name, 2) Postal Address, 3) Phone, 4) PRN etc.

B. Email with File Attachment: Send an email to your hotmail account with sample image file attachment from your hotmail account. Receive this email and confirm signature appended with it

C. Outlook Express Exercise: Add your email (hotmail) account in 'outlook express' and explore the settings. Create your signature in 'outlook express' with following details: 1) Name, 2) Postal Address, 3) Phone, 4) PRN etc.

D. MSN Messenger/ Yahoo messenger Exercise: Add your account in MSN or yahoo Messenger and add the contacts list to your account on messenger.

E. Search the important information on search engine such as www.google.com/www.altavista.com etc.

F: Create a group on Yahoo groups for your class (set properties)

G: MS Front Page: Introduction, Toolbars, Commands and Their Icons, Starting MS Front Page, Creating a Web Page without a Wizard, Creating a Web Page with a Wizard

115009: OBJECT ORIENTED PROGRAMMING

Teaching Scheme:
Lectures: 3 Hrs/Week

Examination Scheme:
Theory: 100 Marks

Unit I (6 Hrs)

Introduction to Object Oriented Programming

Introduction to procedural, modular, object-oriented and generic programming techniques, Limitations of procedural programming, Need of object-oriented programming, fundamentals of object-oriented programming: objects, classes, data members, methods, messages, data encapsulation, data abstraction and information hiding, inheritance, polymorphism.

Unit II (6 Hrs)

Programming with C++

C++: Extensions to C: Variable declarations, global scope, 'const', reference variables, comments, default parameters, function prototypes, function overloading, inline functions, default and constant arguments, 'cin', 'cout', formatting and I/O manipulators, new and delete operators

Classes and Objects: Defining a class, data members and methods, public, private and protected members, inline member functions, static data members, static member functions, 'this' pointer, constructors, destructors, friend function, dynamic memory allocation, array of objects, pointers and classes, class as ADTs and code reuse

Unit III (6 Hrs)

Operator Overloading

Introduction, Need of operator overloading, overloading the assignment, binary and unary operators, overloading using friends, rules for operator overloading, type conversions

Inheritance and Polymorphism

Concept and need, single inheritance, base and derived classes, friend classes, types of inheritance, hybrid inheritance, member access control, static class, multiple inheritance, ambiguity, virtual base class, polymorphism, virtual functions, pure virtual functions, abstract base class, virtual destructors, early and late binding, container classes

Unit IV (6 Hrs)

Templates: Introduction, Templates: Function template and class template, function overloading vs. function templates, member function templates and template arguments, Introduction to Generic Programming: Introduction to Standard Template Library (STL), containers, iterators and algorithms, study of container template classes for vectors and stacks and related algorithms

Name Spaces: Introduction, Rules of namespaces

Unit V (6 Hrs)

Managing Console I/O Operations: Introduction, C++ streams, stream classes, unformatted I/O, formatted I/O and I/O manipulators

Files and Streams

Concept of a file, file operations, streams, opening and closing a file, detecting end-of-file, file modes, file pointer, structures and files, classes and files, sequential file processing, Error handling

Exception Handling: Introduction, syntax for exception handling code: try-catch-throw, Multiple Exceptions, Exceptions with arguments, Introduction to RTTI

Unit VI (6 Hrs)

Introduction to Java:

Advantages of java, Java programming paradigm Programming in Java, Building Java application (no Java Applets), OO Mechanism in Java, Class definition, Constructor, Inheritance, Polymorphism, Interfaces and Packages, Interfaces in Java, Packages in Java, Exception handling in Java, Built-in classes, Mechanism, Error handling

Text Books:

1. Balaguruswamy E., "Object Oriented Programming with C++", Tata McGraw-Hill Publishing Company Ltd, New Delhi ISBN 0 – 07 – 462038 – X.
2. Eckel B., "Thinking in Java", 3rd Edition, Pearson Education, ISBN 81 – 297 – 0524 – 9

Reference Books:

1. Schildt H., "The Complete Reference Java 2", TMH, ISBN 0-07-049543 - 2
2. Lippman S., "C++ Primer", Pearson Education, 1991, ISBN 0 – 201- 32753- 8
3. Lafore R., "The Waite Group's Object oriented Programming in C++", 3rd Edition, Galgotia Publications, 2001, ISBN 81-7515-269-9.
4. Stroustrup B., "C++ Programming Language", 3rd Edition, Pearson Education, 1997, ISBN 0 – 201 – 32755 – 4.

115010: DATA STRUCTURES AND FILES

Teaching Scheme:

Lectures: 4 Hrs / week

Examination Scheme:

Theory: 100 Marks

Objectives:

1. To study the representation, implementation and applications of basic data structures
2. To develop the ability to synthesize and analyze algorithms

Unit I

(8 Hrs)

Introduction to data structures: Concept of data, Data types, Data Object, Data structure, Abstract Data types (ADT), realization of ADT in C, Linear data structures using sequential organization: Concept of sequential organization, Concept of Linear data structures, arrays as ADT, Multidimensional arrays, Storage representations (row major and column major and their address calculation). Concept of ordered list and polynomial representation using arrays, Representation of sparse matrix using arrays, algorithm for sparse matrix addition, multiplication, simple and fast transpose for sparse matrix, string manipulations using arrays

Unit II

(8 Hrs)

Linear data structures using linked organization: Concept of linked organization, singly linked list, doubly linked list, circular linked list, Insertion, deletion and traversal on above data structures. Representation and manipulations of polynomials using linked lists, Concept of a Generalized List

Unit III

(8 Hrs)

Stacks and queues: Concept of stack and queues as ADT, Implementation of stacks using sequential and linked organization, linear queue, circular queue using linked and sequential organization, Application of stack for expression conversion, recursion, Concept of multi-stacks, multi-queues, dequeue and priority queue

Unit IV

(8 Hrs)

Non-linear data structures:

Trees and binary trees-concept and terminology, Data structures for binary trees, Algorithm for tree traversals (recursive and non recursive), Conversion of general tree to binary tree. Binary search trees, Threaded Binary Trees: Concept, Insertion and deletion of nodes in inorder threaded binary tree. Preorder, Inorder and Postorder traversals of an inorder threaded binary

tree, Notion of a symbol table. AVL trees, static and dynamic trees, OBST, Huffman's algorithm.

Graphs: Representation of graph - Adjacency matrix and Adjacency list, Graph traversals, minimum spanning tree and shortest path computation

Unit V (8 Hrs)

Searching and Sorting

Searching: Sequential, binary and Index sequential search, Sorting: General concepts: sort order, sort stability, efficiency and passes, Bubble sort, Selection sort, Insertion sort, Shell, Radix, Quick and Merge sort.

Files:

Organization of files: sequential and direct access file, hashing function and its characteristics, collision resolution, linear probing, chaining with and without replacement, rehashing, simple Index file

Unit VI (8 Hrs)

Algorithmic strategies:

Types of algorithms: Use and the peculiar characteristics of each type, Divide and Conquer (eg. Quicksort, mergesort, Tower of Hanoi), Dynamic Programming (eg. The Triangulation Problem, matrix multiplication, 0-1 knapsack), Greedy Algorithms (eg. Graph Colouring Problem, job scheduling, knapsack), Backtracking (eg. Tic-tac-toe, Eight Queens Problem, mazing problem), Randomized algorithms (Traveling salesman problem).

Text Books:

1. Balagurusamy E., "C and Data Structures", Tata McGraw-Hill, 2003, ISBN 0 – 07 – 053473 – X
2. Horowitz E., Sahani S., "Fundamentals of Data structures", PHI
3. Aho A., Hopcroft J., Ulman J., "Data Structures and Algorithms", Pearson Education, 1998, ISBN-0-201-43578-0

REFERENCES:

1. Langsam Y., Augenstein M., Tannenbaum A., "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9
2. Tremblay J., Soresan P., "An Introduction to Data Structures with Applications", 2nd edition, Tata McGraw-Hill International Editions, 1984, ISBN-0-07-462471-7
3. Horborn T., "File Concepts"
4. Brassard G., Bratley P., "Fundamental of Algorithms", PHI, 1999, ISBN 81 – 203 – 1131 – 0

115011: OPERATIONS RESEARCH

Teaching Scheme:

Lectures: 3 Hrs/Week

Examination Scheme:

Theory: 100 Marks

Unit I

(6 Hrs)

Introduction to Linear Programming - Construction of the LP Model - Graphical LP Solution - Computer Solution of LP Models, The Simplex Method: Standard LP Form and its basic

solutions -the Simplex Algorithm, Artificial Starting Solution, Special Cases in simplex method application. Duality and Sensitivity Analysis: Definition of the Dual Problem - Relationship between the Optimal, Primal and Dual Solutions, Dual Simplex Method - Primal – Dual Computations, Postoptimal of Sensitivity Analysis

Unit II (6 Hrs)

Transportation Model and its variants: Definition of the Transportation Model - Nontraditional Transportation Models-the Transportation Algorithm-the Assignment Model–The Transshipment Model

Unit III (6 Hrs)

Network Models: Scope of Network Applications - Network Definitions, Minimal Spanning Tree Algorithm, Shortest Route Problem, Maximal flow model, Minimum cost capacitated flow problem - CPM and PERT

Unit IV (6 Hrs)

Goal Programming: Goal Programming Algorithms
Integer Linear Programming: Integer-Programming Solution Algorithms
Forecasting Models: Moving Average technique, Exponential smoothing, regression

Unit V (6 Hrs)

Decision Analysis: Decision - Making under certainty - Decision - Making under Risk, Decision under uncertainty.

Unit VI (6 Hrs)

Simulation Modeling: Monte Carlo Simulation, Generation of Random Numbers, Method for Gathering Statistical observations

Reference Books:

1. Taha H., “Operations Research: An Introduction”, 7th Edition, 2004, ISBN 81-203 – 2235- 5
2. Winston W., “Operations Research”, 3rd Ed.; Windows Lindo Logo, 1997
3. Hillier F., Lieberman G., “Introduction to Operations Research”, 7th Edition, Tata McGraw-Hill, 2001, ISBN 0-07-047387-0

115012: MICROPROCESSOR APPLICATIONS

Teaching Scheme:
Lectures: 4 Hrs/Week

Examination Scheme:
Theory: 100 Marks

Objectives:

- To learn the architecture and assembly language programming of 8085 microprocessor
- To study the peripherals and their interfacing with 8085 microprocessor.
- To provide insight to DOS and BIOS and their functions.

Unit I (8 Hrs)

Introduction to 8-bit processor architecture, 8085 microprocessor architecture, Pin Diagram, Functional Block Diagram, Concepts of Tri-state logic, Latches, Buffers and Decoders, 8085

based system with associated latches, buffers, Memory interfacing: Memory Map, Address decoding logic

Unit II (8 Hrs)

8085 Programmer's model, 8085 Addressing modes and Instruction set, Machine code and Assembly language programming, Assembler directives, Stacks and subroutines. Timing diagrams: Instruction and machine cycles and wait states

Unit III (8 Hrs)

I/O programming, Memory mapped I/O, I/O mapped I/O, Polled I/O, I/O ports using latches, PPI 8255, Various operating modes of 8255, interfacing, and programming, 4x4 key matrix interfacing, Seven Segment display interfacing

Unit IV (8 Hrs)

8085 Interrupt structure, ISR, PIC 8259 interfacing and programming, 8253 Timer, 8279 Keyboard Display Controller, interfacing and programming of both.

Unit V (8 Hrs)

HOLD state and DMA, DMAC 8257/37. Serial I/O, 8085 SID, SOD; Asynchronous and Synchronous serial I/O, 8251 USART programming and interfacing, RS232C interface.

Unit VI (8 Hrs)

Introduction to 16 bit processor - 8086/8088 architecture, minimum and maximum mode, supporting chips 8284, 8282, 8286, 8288 programmers model - Instruction encoding format, 8086 assembly language programming. DOS components, use of BIOS and DOS calls.

Text Books:

1. Hall D., "Microprocessors and Interfacing", 2nd edition, 1992, McGraw-Hill, ISBN – 0 – 07 – 100462 – 9.
2. Gaonkar R., "Microprocessor Architecture, Programming and Application", 3rd Edition, Penram International, ISBN 0 85226 297 3

Reference Books:

1. Abel P., "Assembly Language Programming", 5th edition, Pearson Education, 2002, ISBN 81 – 203 – 1037 – 3.
2. RayDenkon, "Advanced MS-DOS Programming", 2nd edition, BPB Publications, 2002, ISBN 81 – 7029 – 485 – 1 (Chapters 2, 3, 4, 14).
3. Liu Y., Gibson G., "Microcomputer Systems: The 8086/8088 Family, Architecture, Programming and Design", 2nd Edition, Prentice-Hall of India, 1986, ISBN 0 – 87692 – 409 – 7.
4. Rafiquzzaman M., "Microprocessors – Theory and applications: Intel and Motorola", Revised edition, 2002, Prentice Hall, (Chapters 5, 7, 8) ISBN 81 – 203 – 0848 – 4

115013: MANAGEMENT INFORMATION SYSTEMS

**Teaching scheme:
Scheme:**

Examination

Lecturers: 4 Hrs/Week

Paper: 100 Marks

Objectives:

- To learn and understand fundamentals of Information Systems
- To learn and understand architecture, methodology and applications of MIS

Unit I (8 Hrs)

Foundations of Information systems and Management: Why Information systems? Components and resources of information systems, Information system activities, Types of information systems: Operations support systems and Management support systems

Management Information Systems: Definition, role and impact of MIS, Introduction to Management, Approaches to Management, Functions of the managers: Management effectiveness, planning, organizing, staffing, coordinating and directing, MIS as a support to the management and a tool for management Process, Organization structure and theory: Organization structure, behavior, organization as a system, MIS: Organization

Strategic Management of Business: Concept of Corporate Planning, Essentiality of strategic planning, development of business strategies, types of strategies, MIS for Business Planning

Infrastructure management: Selection, maintenance of hardware, communication equipments and software as per MIS needs of the organization. Ensure uptime of hardware resources, database management, end user training etc.

Unit II (8 Hrs)

Applications of MIS

Manufacturing Sector: Introduction, Personal Management, Marketing Management, Accounting and Finance Management, Production Management, Materials Management and Marketing Management, MIS Applications in Banking and Insurance Sector

Service Sector: Introduction, MIS applications in service industry

Cross-Functional Enterprise Systems: Introduction, Collaboration systems in Manufacturing, Enterprise application Integration, Transaction Processing systems

Implementation Challenges: Integration, implementing IT, End user Resistance and Involvement, Change Management

Unit III (8 Hrs)

Enterprise Management Systems: Introduction, Enterprise Resource Planning (ERP) systems: Basic features, benefits, selection, implementation, EMS and MIS

Business Process Re-engineering (BPR): Introduction, Business process, Process and Value stream model of the organization, MIS and BPR

Business Process Outsourcing (BPO): What is BPO? Voice BPO i.e. Call center, non-voice BPO, Scope of BPO, challenges in BPO management etc.

Unit IV (8 Hrs)

Customer relationship Management: Introduction, What is CRM? Three phases of CRM, Benefits, challenges and trends in CRM

Supply Chain Management: What is SCM? Role of SCM, Benefits, challenges and trends in SCM

Electronic Commerce Systems: Introduction, scope, B2C, B2B and C2C, Essential e-Commerce processes, Electronic Payment Processes, e-Commerce Applications

Unit V (8 Hrs)

Decision support systems: Concept and philosophy, Using Decision Support systems: What-if analysis, sensitivity analysis, Goal-seeking analysis, Optimization analysis, Introduction to Data Warehouse: Architecture, Organization and Management of Data Warehouse, Implementation, Data Mining for Decision support, Executive Information systems, Enterprise Information portal and knowledge management systems, Introduction to Artificial Intelligent systems, Knowledge Based Expert systems and GIS

Unit VI

(8 Hrs)

Security and Ethical Challenges: Introduction, Ethical responsibility of Business Professionals, Computer crime, Hacking, Cyber Theft, Software Piracy, Privacy issues, Health issues

Security Management: Introduction, Tools, Encryption, firewalls, e-Mail monitoring, biometric security, disaster recovery, fault-tolerant systems, system controls and audits, What is Disaster Recovery? Contingency management and solutions

Global Management of Information Technology: Cultural, political and Geo-economic challenges, global business/it strategies, applications, platforms and Data access issues

Note:- Lecturers by experts from industry should be arranged.

Text Books:

1. O'Brien J., "Management Information Systems: *Managing Information Technology in the Business Enterprise*", 6th Edition, Tata McGraw-Hill Publishing Company Limited, 2004, ISBN 0 – 07 – 058739 – 6
2. Jawadekar W., "Management Information Systems", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, 2002, ISBN 0 – 07 – 044575 – 3

Reference Books:

1. Post G., Anderson D., "Management Information Systems", 3rd Edition, Tata McGraw-Hill Publications, ISBN 0 – 07 – 049940 – 3
2. Gupta U., "Management Information Systems: A Managerial Perspective", Galgotia, ISBN 81 – 7515 – 085 – 8

115014: DATA STRUCTURES LABORATORY

Teaching Scheme:

Practical: 4 Hrs/Week

Examination Scheme:

Term Work: 50 Marks

Practical: 50 Marks

Suggested List of Assignments

1. Represent sparse matrix using array and perform simple transpose, fast transpose and matrix addition.
2. Write a menu driven program to perform following operations on singly linked list: Create, Insert, Delete, Display, Reverse
3. Create two doubly linked lists. Sort them after creation using pointer manipulation. Merge these two lists into one list so that the merged list is in sorted order. (No new node should be created.)
4. Represent polynomial as a circularly linked list and write a menu driven program to perform addition, multiplication and evaluation.

5. Write a program to create generalized linked list and perform following operations: copy, depth, equivalence
6. Implement stack as an ADT. Use this ADT to perform expression conversion and evaluation. (Infix – Postfix, Infix-Prefix, Prefix-Infix, Prefix-Postfix, Postfix-Infix, Postfix-Prefix)
7. Implement circular queue and double ended queue using arrays.
8. Implement following sorting methods: Merge sort, Heap sort
9. Create binary tree and perform recursive and non-recursive traversals.
10. Implement binary search tree as an abstract data type.
11. Create binary search tree. Find height of the tree and print leaf nodes. Find mirror image, print original and mirror image using level-wise printing.
12. Create binary in-order threaded tree and perform traversals.
13. Represent graph using adjacency list and perform DFS and BFS.
14. Represent graph using adjacency list or matrix and generate minimum spanning tree using Prim's algorithm
15. Implement simple index file.
16. Implement direct access file. Collision handling to be done by chaining with or without replacement.

Note:

1. Proper indenting, coding styles, commenting, naming conventions should be followed.
2. Avoid using global variables as far as possible
3. Use of functions is necessary
4. Faculty should prepare a lab manual including standard test cases and should be available to students for reference

Student should submit term work in the form of a journal consisting of minimum 16 assignments based on the above list. Practical examination will be based on the term work, and questions will be asked during the examination to judge the understanding of the practical performed at the time of examination. Candidate is expected to know the theory involved in the experiment.

115015: MICROPROCESSOR LABORATORY

Teaching Scheme:
Practical: 4 Hrs/Week

Examination Scheme:
Term Work: 50 Marks
Practical: 50 Marks

Suggested List of Experiments

Assembly Language Programming of 8085

1. Arranging the numbers
2. Lookup table for BCD to Seven Segment Conversion etc.
5. Programs using subroutines.
1. Multiplication by shift and add.

Assembly Language Programming of 8086

1. HEX-BCD, BCD-HEX conversion.
2. BCD addition.
3. String Manipulations and Text Processing

4. Sequential File Processing
5. Calling, Extern far Procedures.

Interfacing of

1. 8279 Keyboard/display controller
2. 8255 Operations in various modes (Application Expected)
3. 8259 Priority Interrupt Controller.
4. 8251 For Serial Communication.
5. 8253/8254 various operating modes
6. ADC, DAC interfacing.
7. Assignments on .exe, .com files.

Students are expected to study DOS interrupts, functional calls. Staff members will suitably frame assignments. Students will submit the term work in the form of journal with at least 12 assignments. Practical examination will be based on the term work and questions will be asked to judge the understanding of assignments performed, at the time of examination.

115016: OBJECT ORIENTED PROGRAMMING LABORATORY

Teaching Scheme:
Practical: 4 Hrs/Week

Examination Scheme:
Term Work: 50 Marks
Practical: 50 Marks

Suggested List of Assignments

Assignment – 1: Design a Class ‘Complex’ with data members for real and imaginary part. Provide default and parameterized constructors and member functions to get, set, display, add, subtract, multiply and divide two complex numbers.

Assignment – 2: Design and Implement Class ‘String’ with a default, parameterized and copy Constructors. Provide member functions to accept and display string and friend function to concatenate and compare two strings without using operator overloading.

Assignment – 3: Design a class “Distance” with kilometers, meters, centimeters as data items. Provide parameterized and copy constructor and overload ‘+’, ‘-’, ‘*’, ‘<<’ and ‘>>’ operators or Design a class “Time” with Hours, minutes and seconds as data members. Provide parameterized and copy constructor and overload ‘+’, ‘-’, ‘<<’ and ‘>>’ operators.

Assignment – 4: Write a class ‘Point’ with x and y coordinates as data members. Derive two classes ‘Line’ and ‘Circle’ from ‘Point’ with appropriate data members. Derive a class ‘Triangle’ from class ‘Line’. Implement read () and draw () member functions for all the above classes.

Assignment – 5: An organization has to maintain information of employees for calculation of salary. An Employee can be a ‘Waged employee’ or a ‘fixed salaried employee’. A waged employee is paid on hourly basis. A ‘Salesperson’ is a Waged employee who is paid commission on the sales made.

Design all the above classes and implement member functions to accept the employee details, display employee details and Compute the salary of an employee.

Assignment – 6:

- a) Write a template function SWAP () to swap the variables of type int, char and complex.
- b) Design template class 'QUEUE' with relevant data members. Implement member functions to add an element and delete an element from queue. Test this class for putting integer and character data items in the queue.

Assignment – 7: Declare class 'STACK' and handle the run time anomalies like Overflow – when the stack is full and Underflow – when the stack is empty. Display error numbers and error message when error is thrown.

Assignment – 8: Write a 'C++' Program to maintain the employee details using files. Implement functions to add a new employee, delete a record of an employee, modify an employee detail and display the details of an employee.

Assignment – 9: A bank maintains three kinds of accounts for customers -- Savings account, fixed deposit account and Current account. The Saving account provides compound interest and withdrawal facilities but no chequebook facility. The fixed deposit account can be Short term, Long term or Medium term. The current account provides chequebook facility but no interest. Both savings and current account holders should maintain minimum balance and if the balance falls below the minimum balance amount, a service charge is imposed. Design all the classes and provide necessary member functions to deposit and withdraw amount, check for minimum balance and compute and deposit the interest.

Assignment – 10: Design a class 'Array' and handle the following run time anomalies

- Array index Out of bound – when index exceeds the limit
- Array store – when storing out of limit.

Note:

1. Proper indenting, coding styles, commenting, naming conventions should be followed.
2. Avoid using global variables as far as possible
3. Use of functions is necessary
4. Faculty should prepare a lab manual including standard test cases and should be available to students for reference

Student should submit term work in the form of a journal consisting of minimum 12 (minimum 4 should be using Java) assignments based on the above list. Practical examination will be based on the term work and questions will be asked during the examination to judge the understanding of the practical performed at the time of examination. Candidate is expected to know the theory involved in the experiment.

Guidelines for setting question paper at the First Year Master in Computer Applications (MCA) 2003 course under faculty of Engineering to be effected from the academic year 2005 – 2006

- 1) Since the syllabi of all the subjects in this curriculum is unitized in SIX units, equal weight age shall be given to all the units with respect to number of questions and allotted marks
- 2) Each paper shall consists of TWO sections viz. Section A and B. Units I through III shall be under Section A and Units IV through VI shall be under section B.

- 3) Every unit shall carry TWO questions with internal choice/option offered to the candidate as follows

Section A

Unit – I	Q. 1	OR	Q. 2	MARKS 17
Unit – II	Q. 3	OR	Q. 4	MARKS 17
Unit – III	Q. 5	OR	Q. 6	MARKS 16

Section B

Unit – IV	Q. 7	OR	Q. 8	MARKS 17
Unit – V	Q. 9	OR	Q. 10	MARKS 17
Unit – VI	Q. 11	OR	Q. 12	MARKS 16