

NORTH MAHARASHTRA UNIVERSITY

JALGAON - 425 001

Syllabus

FOR M.C.A. (Master of Computer Applications)

with effect from July 1997

DEPARTMENT OF COMPUTER SCIENCE

STRUCTURE OF M.C.A. IMPLEMENTED FROM 1997-98

Course Code	Course Name	Lecture	Practical
<u>SEMESTER-I</u>			
CA-101	Computer programming and problem solving in C/C++ .	04	----
CA-102	Computer Organization and Operating System.	04	----
CA-103	Computer oriented Numerical Techniques	04	----
CA-104	Mathematical Foundations of Computer Science.	04	----
CA-105	Computer Architecture	04	----
CA-LAB-I	DOS , UNIX , WINDOWS, C/C++ Programming.	----	04
CA-LAB-II	Office automation software tools - I and Computer Oriented Numerical methods.	----	04
<u>SEMESTER-II</u>			
CA-201	Data and Files Structure	04	----
CA-202	Accounting and Financial Management	04	----
CA-203	Theoretical Computer Science	04	----
CA-204	Database Management Systems.	04	----
CA-205	System Software	04	----
CA-LAB-III	Data and Files Structures and System Software.	----	04
CA-LAB-IV	Office automation software tools - II and Visual FoxPro .	----	04
<u>SEMESTER-III</u>			
CA-301	Organisational Structures and Personnel Management.	04	----
CA-302	Advanced Database Management concepts	04	----
CA-303	Modern Operating Systems.	04	----
CA-304	Design and Analysis of Algorithms.	04	----
CA-305	Computer Networks and Distributed Computing.	04	----
CA-LAB-V	RDBMS Package and Network Programming,	----	04
CA-LAB-VI	UNIX, WINDOWS-NT and Design and Analysis of Algorithms.	----	04
<u>SEMESTER-IV</u>			
CA-401	Computer Graphics.	04	----
CA-402	Parallel Computing.	04	----
CA-403	Artificial Intelligence and Expert System Design.	04	----
CA-404	Software Engineering	04	----
CA-405	Management Information System and Decision Support System.	04	----
CA-LAB-VII	Parallel Programming, A.I. and Expert System Design.	----	04
CA-LAB-VIII	Computer Graphics and Case Tool (TURBO ANALYST)	----	04

SEMESTER V

CA-501	Compiler Construction	04	---
CA-502	Simulation & Modeling	04	---
CA-503	Optimization Techniques	04	---
CA-504	Principles of Programming Languages	04	---
CA-505	Current Computing Trends	04	---
CA-LAB IX	Visual Basic and Windows programming	---	04
CA-LAB X	Compiler Construction and Visual C++	---	04

SEMESTER VI

Full Time Six Month Industrial Training.

CA 101 COMPUTER PROGRAMMING AND PROBLEM SOLVING IN C/C++

C language programming : Data types, expression evaluation, precedence rules, type conversion, sequential structure, selective structure, repetitive structure(including recursion), array, pointers, structure and unions, operation on bits, file processing, preprocessor.

Object Oriented Concepts : objects, classes, messages, inheritance, dynamic binding, polymorphism, OO paradigm, reusability and extensibility, abstract data types, encapsulation, information hiding, genericity.

Data abstraction in C++ : classes, ADT implementations, interface and implementation, member, methods, static members, member functions, public and private, initialization, constructors and destructors, operators and functions overloading, I/O operators, parameter passing by value and reference, function returning a reference, function signatures and name mangling, dynamic memory allocation and new and delete, assignment operator overloading, shallow and deep copies, copy constructor, encapsulation and friend functions and classes, genericity and template functions and classes

Container classes, iterators, i/o stream class library, error handling and exceptions in c++.

Inheritance in c++ : base and derived classes, public, private and protected derivations, control of access and visibility using public/private/protected keywords, type compatibility among super and sub-types value /pointer/reference assignment semantics, virtual functions and polymorphism, multiple inheritance, virtual derived classes. Object oriented design and programming using classes and inheritance.

Relevant books:

1. The C++ programming language by **Bjarne Stroustrup** Addison Wesley.
2. Object oriented programming with C++ by **W. Balgurusamy**, TMH.
3. An introduction to object oriented programming by **Timothy Budd**, Addison Wesley
4. C programming by **Kernighan and Ritchie**.

CA 102 COMPUTER ORGANIZATION AND OPERATING SYSTEM :

Architecture : digital logic circuit, boolean algebra, adders, flipflops, registers, counters, Logical design principles

Number systems : binary, octal and hexadecimal systems, fixed point arithmetic, complement representation, floating point representation, error detection.

Computer structure : components and functions, interconnection methods, bus, interrupts and interrupt handling, CPU registers, control unit, basics of microprogramming.

Instruction set : characteristics, formats, functions, addressing modes, typical types of instructions.

I/O : I/O techniques (programmed, interrupt driven and DMA), memory mapped versus I/O mapped I/O

Memory : types and hierarchy, module level organization, cache memory(design, organization, performance, mapping, replacement and write policies)

Operating system : Fundamental of O.S., monitors, buffering, spooling, multiprogramming, time sharing, protection, OS components, OS services, virtual machines, OS design and implementation. Processes.

File system : file concepts, access methods, directory system, file protection methods.

Relevant books :

1. Structured computer organization by **Tanenbaum**
2. Computer organization and architecture by **William Stallings**
3. Computer system architecture by **Morris Mano**
4. Operating system concepts by **Peterson**
5. Operating system concepts : design and implementation by **A.S. Tanenbaum**

CA 103 COMPUTER ORIENTED NUMERICAL TECHNIQUES

Computer Arithmetic: Floating point numbers - operations, normalization's and their consequences; Iterative methods: Zero of a single transcendental equations and zeros of polynomials using bisection, false position, secant, Newton-Raphson, convergence of solution.

Simultaneous linear equations: Solution of simultaneous linear equations - Direct methods - Cramer rule, Gauss Elimination method and pivoting, Ill-condition equations and refinement of solution; Gauss- LU decomposition, Doo-little reduction, Seidel iterative method, Jacobi method.

Interpolation and approximations: Polynomial interpolation using finite differences, Difference tables - Central, Forward, Backward, Newton, Lagrange's formula.

Numerical Integration: Method based on interpolation, method based on undetermined coefficient, Composite integration methods - Trapezoidal and Simpson's rules Double integration (Derivation, applications and errors in the formulae, comparison between two formulae).

Numerical Differentiation: Methods based on Interpolation, finite differences and undetermined coefficients

Regression Analysis: Least square fit Polynomial and curve fitting; Linear regression and non-linear regression algorithms, multiple regression algorithms Introduction to popular statistical packages.

Solution of differential equations: Numerical methods- Euler's method, modified Euler method, Single step methods- Taylor series, Runge - Kutta methods, Multi step methods- Milne's and Adams bash froth's method.

Relevant books

1. Krishnamurthy E. V., S K Sen, Computer Based Numerical Algorithms, East West Press.
2. Motewar S.N., A course in Computer Programming with Numerical techniques, Dhanpat Rai & Sons, Delhi.
3. Rajaraman V., Computer Oriented Numerical Techniques, Prentice Hall of India pub.
4. Sastry S S., Introductory methods of Numerical Analysis, Prentice Hall of India pub.
5. Yakowitz S., F. Szidarovszky, An Introduction to Numerical Computations, Macmillan Publishing Co., 1989.
6. Golub G.H and Charles and F. Van Loan. Matrix Computations, John Hopkins Press, Baltimore. MA, 1983

CA 104 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Set theory : Intuitive set theory , Russel's Paradox, Informal axiomatic set theory. Diagonalization. Countable and uncountable sets. Computability(an introduction).

Relations : partial orderings, Equivalence and Partitions.

Combinatorics : counting Rule of sum and product. Permutation and combinations. Placing balls in boxes : distinct balls and distinct boxes; distinct balls and identical boxes- sterling numbers of second kind; non distinct balls and distinct boxes : Nondistinct balls and nondistinct boxes.

Propositional logic : interpretation and models, basic notations like tautology, satisfiability Functional completeness. Axiomatic system of deduction. Natural system of deduction.

Quantificational logic : interpretation and models, first order logic. Resolution based theorem proving.

Recurrence relations : Homogeneous and particular solutions : Generating functions.

Graph Theory : Basics notations, directed multigraph, directed graph, degree, regular graph, Antisymmetric graph, Clique, bipartite graph, chain, path, connected graph.

Matrix representation of graphs, Incidence, Adjacency matrices and their properties

Shortest path in weighted graphs- Dijkstra, s algorithm, tree, strongly connected graph, Quasi- strongly connected graph, Rooted tree, binary tree, recursive definition of (rooted) tree, sequential (arrays) representation of binary tree, full binary tree, complete binary tree

Planner Graph : combinatorial and Geometric duals : Kuratowaski' graph ;Detection of planarity.

Group, Rings, Fields : Definition and simple examples.

Relevant books :

1. Elements of discrete mathematics by C. L. Liu McGraw Hill
2. Set theory and logic by R. R. Stall W. H Freeman and co. San Fransisco
3. Discrete mathematics by Rossen McGraw Hill
4. Discrete mathematics by Trembley and Manohar
5. Graph Theory by N. S. Deo

CA -105 COMPUTER ARCHITECTURE

Introduction of Parallel Processing : Parallel processing mechanism, Parallelism in uniprocessor system.

Parallel Computer Structures : Architecture classification scheme.

Pipeline and vector processing : Instruction and arithmetic pipelines, vector processing requirements, pipeline computers and vectorization methods, various vector processors- STAR 100, Cray, CYBER-205, Fujitsu-200 and their special features.

SMID Array processors : Parallel algorithms for array processors, SMID computers and performance enhancement.

Multiprocessor architecture and Programming : functional structures, Interconnection networks, Parallel memory organizations, Multiprocessor Scheduling strategies, Parallel algorithms for Multiprocessor-synchronous and asynchronous.

Data flow computers : data driven computing and languages : Advantages and Potential difficulties. Etc.

Relevant books :

1. Hawang K & Briggs F A: Computer Architecture and Parallel Processing, McGraw Hill
2. Koggi H: The Architecture of Pipelined Computers, McGraw Hill
3. Baer J L : Computer system Architecture, Computer Science Press

CA-LAB I - Computer Fundamentals and C, C++ Programming

(A) DOS

Theory Topics - Internal commands(dir, copy, con, del, type, cd, rd, md, rename, prompt, ver, path, time, date, sys) and External commands (tree, diskcopy, undelete, chkdisk, fdisk, fdisk, backup, restore, format, unformat, attrib, xcopy, diskcomp); Concept of wild cards, batch files, config files, filtering, piping and redirecting).

Practicals-

- 1) Use and observe the effect of following MS-DOS commands -
(Make use of all the switches)

(i) INTERNAL COMMANDS

- | | | | |
|-----------|-----------|--------------|----------|
| (1) DIR | (2) CD | (3) COPY CON | (4) COPY |
| (5) DEL | (6) MD | (7) RD | (8) TYPE |
| (9) REN | (10) PATH | (11) TREE | (12) SYS |
| (13) DATE | (14) TIME | (15) PROMPT | (16) VER |

ii) EXTERNAL COMMANDS

- | | | | |
|-------------|---------------|--------------|--------------|
| (1) FORMAT | (2) UNFORMAT | (3) UNDELETE | (4) BACKUP |
| (5) RESTORE | (6) CHKDSK | (7) FDISK | (8) DISKCOPY |
| (9) XCOPY | (10) DISKCOMP | (11) ATTRIB | (12) TREE |

- 2) Create a batch file to do following tasks-

- (a) Clear screen
- (b) Change prompt with drive destination date and time
- (c) Correct the date by inputting the current date
- (d) Change directory to EXCEL
- (e) Set path for WordStar and TURBO PASCAL
- (f) Load WS

- 3) Use backup to make copy of sub directory say TP in floppy. Restore it to another sub directory say TMP.

(B) UNIX

Theory Topics-Structure of UNIX system; Concepts of UNIX file system; Files and directories; File oriented commands like cat, cp, grep, pwd, chmod, mv, rm, pg, passwd, bc, File permissions; Directory oriented commands like ls, mkdir, cd, rmdir; inter-user communication commands like write, mail, mesg, General utilities like bc, echo, cut, passwd, kill, date, wc, sleep, who, ps; Shell programming, Introduction to VI editor.

Practicals-

1) Use and observe the effect of following commands

(Make use of suitable parameters and switches)

(i)ls	(ii)cat	(iii)mail	(iv)cp	(v)who
(vi)grep	(vii)kill	(viii)pwd	(ix)chmod	(x)ps
(xi)mv	(xii)wc	(xiii)rm	(xiv)mkdir	(xv)cd
(xvi)rmdir	(xvii)write	(xviii)mesg	(xix)date	(xx)sleep
(xxi)pg	(xxii)passwd	(xxiii)echo	(xxiv)cut	(xxv)bc

(C)WINDOWS 3.1

Theory Topics-Introduction to Windows: Program Manager, File Manager, Customizing windows with Control Panel, Print Manager, The PIF Editor, Sharing information among applications (OLE-Object Linking and Embedding).

Practicals-

1) Open groups: Main, Startup, Accessories, Applications and games

Arrange the icons

(i)in cascade form

(ii)in title form

2) Create your own icon for non-window application, say WordStar

(i)by choosing ready-made icons from the list of icons

(ii)by creating icon from paintbrush

3) Run non-window application dBASE under window with graphical user interface

(GUI) using PIF editor

4) Use file manager to

(i) create a sub directory

(ii)copy files with extension DOC of C:\msoffice.winword

(iii>Delete all files with extension TMP from 'C' drive.

5) Open File manager, without closing file manager open Control Panel, change default printer to LASERJET. Invoke task list and switch to Filemanager.

6) In Desktop change screen saver to North Maharashtra University, JALGAON. Protect your screen saver with password "nmu".

(D) C PROGRAMMING

Practicals-

1) (a)Write a program in C to solve

$$S=(P*R*T)/100$$

(b)Write a program in C to exchange the value of two variables

2) (a)Write a program in C to find out the sum of the digits of a numbers

(b)Write a C program to arrange N numbers in ascending order.

3) (a)Write a program in C to find out the reverse the digits of a number

(b)Write a program to print Fahrenheit temperature their centigrade in Celsius equivalently using the formulae

$$C=(5/9)(F-32)$$

4)(a)Write a C program to calculate the real roots of the quadratic equation

$$AX^2+BX+C=0$$

(b)Write a program in C to evaluate the formula

$$Y=U+U/2+U/3+U/4$$

where $U=(X-1)/X$

- 5) (a) Write a program in C to calculate the sum of the first 100 numbers of the following series
2,4,6,8,.....
(b) Write a program in C to generate the first 50 numbers of the following series
0,1,1,2,3,5,8,.....
- 6) (a) Design an algorithm to evaluate the function $\sin(x)$ as defined by the infinite series expansion
$$\sin(x) = x/1! - x^{**3}/3! + x^{**5}/5! - \dots$$

(b) Write a program to find sum of the COS series.
- 7) (a) Write a C program to input any 20 numbers and find out the lowest one.
(b) Write a C program to input any 20 numbers and find out the greatest one.
- 8) (a) Write a C program to find out the first 100 prime numbers
(b) Write a C program to find out the leap year with a suitable message.
- 9) Write a C program to input any 20 name and print only those names which are started by S.
- 10) Write a program to store 10 names in one dimensional array. Sort them alphabetically and print the sorted array.
- 11) Write a program to check whether inputted word is palindrome.
- 12) Write a program to
(a) Concatenate two strings
(b) Count the words in inputted sentence
- 13) Write a program to store the names of ten students and marks obtained in three subjects by each student in two dimensional array using pointers; sort the above array. Display the merit list.
- 14) Write a program to create a file (use structure) with following structure:
Name 25 characters
Gross Pay 5 digits
Read the above file and print the payroll with appropriate heading.
- 15) Write a general program to convert inputted amount in words. For example after inputting 234.60 the result should be Rs. Two hundred thirty four

C++ PROGRAMMING -

- 1) Write a c++ program that tells you how many bits are used to represent objects of type char, short, int, and long.
- 2) Write a hash table class that stores and retrieves records with a character string key . Provide public member function to insert, lookup, and remove records from hash table. Hide the implementation details in the private part of the class.
- 3) Design a directed graph data type class.
- 4) Design a two - way list whose implementation uses only a single link pointer . Include in your design an iterator that can traverse the list in either direction.

CA-LAB II : OFFICE AUTOMATION SOFTWARE TOOLS AND COMPUTER ORIENTED NUMERICAL METHODS

UNIT-1

Word Processing (Using Word) : Introduction to word processing and WordStar package, Editing an existing document and printing Setting the margin , changing the line spacing , Centering, Underlining , Making entries bold and Italics, Entering characters in superscript and subscripts, ruler line and tab setting, page size and other page related matters. Copying , Moving, and Deleting Blocks of handling find Replace feature. Spell Checking , Mail Merge , Mathematical calculation, Dot commands, short macros.

UNIT-2

Introduction to spreadsheet (Using Lotus 1-2-3) : Advantages of using electronic worksheet, organization of worksheet, entering simple text and formulae , or any other information in worksheet , Editing cells and saving worksheet, copying , deleting ,moving and formatting worksheet ; Using Mathematical functions, Statistical function and Financial function, Printing worksheet, Worksheet commands, Insert Delete, Global,

range, Status, Titles Windows, Copy, Move . Data commands ; Distribution, File, Matrix . Parse , Query, Regression, Sort, Table; Graph commands: Types, Name ,View ,Options , Print, Graph utility

UNIT -3

Introduction to database and dBASE package : Ideas of database hierarchy (bit, byte, field, record, file)
dBASE commands . CREATE, USE , LIST , DISPLAY , EDIT BROWSE APPEND, INSERT, DELETE, ZAP, PACK , COPY TO PRENT QUIT , CLEAR GO TOP, GO BOTTOM, MODIFY STRUCTURE, RECALL, REPLACE, SORT, INDEX , LOCATE, CONTINUE , SEEK, SEARCH, FEND, OPEN , CLOSE

UNIT-4

Arithmetic ,date , time and string function with database using commands such as COUNT , AVERAGE, SUM DATE , CTOD, DTCC, CMONTH, DMONTH, LTREX, RTFUM , Converting numeric to character by STR () command Creating a memory variable in dBASE , displaying and manipulating information with ? and ?? Generation of Report , Label and Customized Screen Use of multiple files - master file updation Setting relations.

UNIT-5

Programming . input , Output statement and Conditional statements using commands: ACCEPT INPUT, IF-ELSE-ENDIF, DO CASE-ENDCASE, DO WHILE-ENDDO, IEXT-ENDTEXT, SKIP, WAIT STORE, SPACE, SET Commands; import/ Export feature to Transfer files among dBASE-III plus, LOTUS and WordStar.

Relevant Books

1 Taxali R.K. PC Software made simple

COMPUTER ORIENTED NUMERICAL TECHNIQUES

1. Program to find the root of algebraic equation using bisection method.
2. Program to find the root of algebraic equation using false position method.
3. Program to find the root of algebraic equation using Newton Raphson method.
4. Program to find the root of algebraic equation using Secant method.
5. Program to find the root of algebraic equation using Successive approximation method.
6. Program to find the solution of simultaneous equations using Gauss elimination method.
7. Program to find the solution of simultaneous equations using L-U decomposition method.
8. Program to generate symmetric positive definite (spd) matrix.
9. Program to find the solution of simultaneous equations using Gauss Jordan method.
10. Program to find the inverse of a matrix using Gauss Jordan method.
11. Program to find the solution of simultaneous equations using Gauss Siedal method.
12. Program to fit a n- degree polynomial using linear interpolation formula.
13. Program to fit a n- degree polynomial using Lagrange interpolation formula.
14. Program for Newton- Gregory Forward interpolation formula.
15. Program to generate forward difference table.
16. Program to generate backward difference table.
17. Program for numerical integration using trapezoidal rule.
18. Program for numerical integration using Simpson's 1/3 rule.
19. Program for numerical integration using Simpson's 3/8 rule.
20. Program for solution of differential equation using second order Runge-Kutta method.
21. Program for solution of differential equation using fourth order Runge-Kutta method.

CA 201 DATA AND FILE STRUCTURE

Elementary data organization, primitive and composite data types, data structures, operations, mathematical notations, ADTs.

Simple Data types Arrays, records and pointers. Concepts of ordered list and traversing(insertion, deletion, searching, sorting).

Multidimensional arrays, records, structures, matrices, sparse matrices, stacks, queues, dequeues, polish notation, linked list, circularly linked list, doubly linked list (insertion, deletion, searching, sorting).

Trees : different types including binary, full binary, complete binary, almost complete binary, binary search, balanced binary trees (including AVL trees, heaps, multiway search trees and B trees). Traversal, insertion, deletion of nodes in these types of trees.

File organization : sequential file organization. Variable length records, text files, indexing structures, B tree as index structure, index file, ISAM, index sequential files, line sequential files, hashing, direct files, inverted files.

Graphs : representation, shortest path algorithms, transitive closures, connected components, traversal. Spanning forests. Minimum spanning tree.

Internal sorting techniques : bubble sort, selection sort, insertion sort. Quick sort and merge sort. Heap sort. External sorting and merging.

Relevant books :

1. Wirth, Nielaus : algorithms + Data structures = Programs, PHI, 1976
2. Horowitz, E. And Sahani s. : Fundamental of Data structure, Computer Science Press, 1978
3. Aho, A. V. Hopcraft and Ullman, J. E. : Data Structures and algorithms. Addison Wesley
4. Trembley and Sorenson : Data structure using Pascal MGH.
5. Beltz Salzbergs, File structure : An analytical Approach. PHI (1988)

CA 202 ACCOUNTING AND FINANCIAL MANAGEMENT

Accounting : Basic concepts, conventions and principles, double entry system, Introduction to basic books of accounts, Journal, Ledger, Closing of books of accounts, Trial balance, Final Accounts : Trading, profit and loss accounts and balance sheet.

Introduction to financial Management : Meaning and scope, Ration analysis : Meaning, advantages, Limitations, types.

Fund flow statement : Meaning, Important, preparation and interpretation

Cash flow statement : Meaning, Important, preparation and interpretation.

Introduction to costing : Nature, Importance, principles and types. Marginal costing and shared costing

Budget and Budgetary control : Nature, Importance, Types (Master budget and Flexible budget) and preparation.

Introduction to computerized Accounting system : coding logic and codes required, master files, transaction files, introduction to documents used to data collection, processing of different files and outputs obtained. Introduction to important accounting packages. E.g. Tally

Relevant Books

1. Shukla & Greval, Advance Accounts, s Chand & co.
2. Sharma & Gupta, Financial Management, Kalyani. Pub.
3. Sharma & Gupta, Management Accounting, Kalyani, Pub.

CA 203 THEORETICAL COMPUTER SCIENCE

Formal languages, phrase structured grammar. Type 0, type 1, type 2, , type 3 languages and their examples. Chomesky hierarchy. Theory of context free grammar. Chomesky normal form and Greibech normal form.

Formal models of computation : Finite automata. push down automata, turing machines, halting problem of T.M., correspondence between languages and automata.

Recursive and recursively enumerable sets, partial recursive function.

Introduction to Church-Godel hypothesis. Computability. Turing computability.

Relevant books

1. Zohar Manna, Mathematical theory of computations, MGH (1974)
2. W. S. Brainered and L. H. Landweber Theory of computations John Wiley, 1974
3. J. E. Hopcraft and J. D. Ullman, Formal Languages and their relation to automata, Addison Wesley, 1969
4. A. V. Aho, J. E. Hopcraft and J. D. Ullman, Design and analysis of algorithms, Addison Wesley, 1974.

CA 204 DATABASE MANAGEMENT SYSTEM

Database system : Basic concepts : data, database, DBMS; data models, data abstraction, data independence, 3 level architecture, DDL, DML, overall system architecture of DBMS, data dictionary, schema processor, query processor, three classical data model (hierarchical, network, relational)

Relational data model : relational structure- tables (relations), rows(tuples), domains, attributes, keys, candidate keys, primary keys, entity integrity constraints, referential integrity constraints, query languages- Relational algebra, relational calculus, SQL.

Data base design : relational database design, normalization based on functional dependencies and multivalued dependencies, normal forms (1, 2, 3, BCNF, 4, 5) conceptual design, entity relationship model, translation of ER schemes to relational schemes (logical design).

Query Processing : query expression trees, equivalence, query expression, tree optimization, cost estimation, implementation of relational algebra operations.

Transaction Processing : recovery techniques, WAL based recovery, check pointing, concurrency control, serializability, Lock based concurrency control, strict two phase locking, multiple granularity locking, time stamped based concurrency control.

Other issues Security and integrity, authorization and views. security specification in SQL types of integrity constraints, triggers in SQL, declarative constraints in SQL.

Relevant books

1. Database system KORTH. TMH.
2. Fundamentals of database systems by Ramez Elmasri and Shamkant Navathe, Benjamin Cummings, 94.

CA 205 SYSTEM SOFTWARE

1. Review of machine architecture, instruction set, addressing modes of the 80x86 family.
 2. Distinction between system software and application software layered organization of system software.
 3. Introduction to assembly language programming of x86 family and programming exercises.
 4. Assemblers, cross assemblers, Macro processor, linking/loading, relocating, compilation and interpretation (lexical and syntax analysis), Use of automation tools.
 5. Editors, debuggers, interactive programming environment.
 6. Programming examples for text handling, file management interface and device driver programming on UNIX, multiple precision arithmetic and logic operations, floating point operations, interrupt handling.
 4. **Operating system** Process management, process scheduling, context switching, concurrent processes, producer-consumer problems, interprocess communication, critical section, semaphores, monitors, language construct for concurrency. CPU scheduling, performance criteria, scheduling algorithm.
- Deadlocks** : characterization, prevention, detection, recovery.
- Memory management** : basics, memory partitioning, swapping, paging, segmentation, virtual memory (basics, demand paging, page replacement algorithm, thrashing, performance). I/O hardware and software, interrupt handlers, device drivers, device controllers, DMA.
5. Introduction to UNIX shell programming.

Relevant Books :

1. Dhamdhare D. M. : Introduction to system software, TMH
2. Donovan J. J. : System programming, MGH, 1972.
3. Peterson, James L. And Silberschatz. A : Operating System concepts, Addison Wesley.
4. Bach M. : design of the UNIX operating systems.
5. Deitel, H. M. : An Introduction to operating system Addison Wesley.

CA LAB III : DATA STRUCTURES AND SYSTEM SOFTWARE

DATA STRUCTURES :

1. Write a recursive program to solve the problem of tower of Hanoi.
2. Coloring of graph problem
3. Finding all pairs shortest path
4. Finding minimum spanning tree using Prim's and Kruskal's algorithm with comparative study.
5. Creation and manipulation of binary trees using linked representation
6. Implementation of different tree traversal algorithms.
7. Implementation of sorting algorithms.
8. Implementation of application depicting use of B-trees as index structures.
9. Implementation of at least one application for each of the following
 - i. Stack
 - ii. Queue
 - iii. Linked list.

SYSTEM SOFTWARE

1. Develop the complete software for performing PASS I of the two pass assembler. (Generate intermediate code file)
2. Develop the complete software for performing PASS II of the two pass assembler. (Use intermediate code file generated in ass. 1 as input to this program)
3. Develop the complete software for the two pass macroprocessor.
4. Write a program to generate precedence matrix for the given grammar.
5. Write a program for evaluation of infix expression.
6. Develop and implement algorithm to evaluate the prefix expression;
 - a) with a single right to left pass
 - b) with a single left to right pass.
7. Write a program to perform recursive descent parsing with semantic processing for the given grammar.
8. Write a semantic routine for processing a REPEAT-UNTIL loop.
9. Write an algorithm and program for a file manager routine that performs the blocking and buffering operations.
10. Develop algorithm and data structures for operating system routines that implement the request and release functions.
11. Develop algorithm for processing an I/O interrupt.

CA LAB IV : OFFICE AUTOMATION SOFTWARE TOOLS II AND VISUAL FOXPRO

OFFICE AUTOMATION SOFTWARE TOOLS II :

Introduction of MS-OFFICE : Installing Ms-Office, The Office Manager, Sharing information with Microsoft Office, the Clipboard, Alternatives to the clipboard, using the clipboard to cut, copy, paste, The clipboard viewer, Object linking and embedding, editing linked information, editing embedded objects.

Word Processing with Word for Windows : Word Basics : Undo, Redo, Repeat, Inserting Text, Replacing Text, Formatting Text, Copying and copying from one Word document to Another, Printing, Autoformat.

Working with Headers, Footers and Footnotes : Tabs, Tables and Sorting : Converting Tables to Text and vice versa, Sorting; working with graphics : importing graphics, sizing and cropping graphics with the picture command, using word's drawing features, drawing objects, callouts, filling; templates, wizards and sample documents : writer's Tools : typing symbols and special bulleted list command, spelling checker, autocorrect, auto text, grammar checker, word count and other statistics, tables of contents, creating an index; Macros; introduction to mail merge.

Excel Basics : The usual spreadsheet Features, overview of Excel features, creating a new selecting cells; Rearranging worksheets : moving cells, deleting parts of a worksheet, clearing parts of a worksheet; Excel page setup, changing column, using border buttons and commands, changing colors and shading, inserting

and removing page breaks, hiding rows and columns, working with multiple worksheets, viewing multiple windows, summarizing information from multiple worksheets.

An introduction to Functions Parts of a function, functions requiring Add-ins, the function wizard, examples of functions by category, error message from functions; Excel's chart features : chart parts and terminology. instant charts with the chart wizard, creating charts , rotating charts, deleting charts, setting the default chart type; working with graphics in Excel : creating and placing graphic objects, resizing graphics, positioning graphics on, drawing lines and shapes, example of graphics in Excel, possible sources of Excel graphics, Excel slide shows; introduction to Excel's command macros : using worksheets as databases : sorting Excel database, cross tabulating database; automating "what if" projects, general organizational tips, Scenario manger, finding the right number with solver; auditing and troubleshooting worksheets : using error values to locate problems, using iteration to solve circular references, using the info-window to find errors, using the auditing commands to troubleshoot.

Power point Basics : Terminology, power point templates, creating presentation, autocontent wizards, adding slides; working with text in power point : editing and moving text , working in outline view, spell checking, finding and removing periods in sentences , formatting text, aligning text; working with graphics in power point: importing images from outside world, the clipart gallery, drawing in power point, creating organizational charts. inserting photos in your presentation, Excel charts in power point, arranging, previewing and rehearsing, transitions and build effects, showing slides out of order, deleting slides, printing presentation elements, creating overhead transparencies, sharing presentation files with others., "What is Microsoft mail ?".

VISUAL FOXPRO :

1. Understanding the concepts of visual FoxPro programming.
2. Developing an application to demonstrate following
 - I] Manipulate objects on different forms.
 - II] Event models of Visual FoxPro.
3. Develop a small application like payroll, inventory, financial application.
4. Creating database with at least 4 dbf files and do following
 - I] Setting persistent relationship.
 - II] Writing referential integrity codes / triggers.
 - III] Creating more than one forms.
 - V] Creating more than one reports.
 - VI] Create database and write queries to extract information from tables. (At least from 4 tables). and display the output of queries using forms, also prepare reports for the queries.

3. Developer 2000 : Installation and User manual.

CA 303 MODERN OPERATING SYSTEM

Introduction to Distributed system: Goals, hardware concepts, software concepts, design issues.

Communication in Distributed systems : Layered protocols, the clients server model, remote procedure call, group communication.

Synchronization in Distributed systems : Clock synchronization, mutual exclusion, election algorithms, automatic transactions, deadlocks in distributed systems.

Processes and processors in distributed systems : threads, system models, processor allocation, scheduling in distributed systems.

Distributed file systems: Distributed file system design, distributed file system implementation, trends in distributed file systems.

Case study : Detail study of modern OS :- MS windows-NT, Comparative study of Novell Netware and MS windows NT

Relevant Books:

1. Modern operating systems A. S. Tanenbaum, PHI
2. Novell netware 4.1 manuals
3. MS Windows -NT manuals

CA 304 DESIGN AND ANALYSIS OF ALGORITHMS

Sorting Algorithms; String processing, Graph and Geometric Algorithms; Most exploited paradigms for problem solving; Analysis of algorithms and computation of upper bound of complexity, Techniques of computation of lower bounds for the complexity of algorithms; Definition of non deterministic polynomial algorithms and the proof establishing NP-completeness of some problems.

Relevant Books :

1. Horowitz and Sahani : Computer Algorithms. Galgotia Pub. India
2. D. E. Knuth : The art of programming VOL. III. Addison Wesley Inc.
3. Aho, Hopcraft and Ullman : Data Structures and algorithms.

CA 305 COMPUTER NETWORKS AND DISTRIBUTED COMPUTING

7 layer OSI architecture of ISO, concept of layer protocols and layer interfaces.

Physical layer concept of bandwidth, bit rate, error rate, transmission delay, modems, speed and compression standards.

LAN, WAN, MAN network topologies.

LAN standards- ETHERNET, token ring, token bus, MAC layer concept of LANs, FDDI, radio and satellite broadcast networks.

Data link and network layer : Protocols and concepts, circuit switching, packet switching and message switching, datagram and virtual circuit, concepts of routing and congestion control.

Transport layer : transport connections, understanding of different levels of transport level protocols and their applications.

Concepts of well known ports, initial connection problems, name/directory server.

Network application for file transfer and virtual terminals, knowledge of OSI application like VTAM, FTAM, X.400, X.500, client-server applications, network file server.

Knowledge of TCP-IP and X.25 levels 2 & 3, concept of router based networking, products like router, bridge, repeater, gateway, modem.

Knowledge of UNIX networking concepts such as socket programming.

CA 301 ORGANIZATIONAL STRUCTURES AND PERSONNEL MANAGEMENT

Organizational structure

Classical theories of organization, functional approach, division of labour, lines of authority, span of control, authority and responsibility, efficiency of management

Behavioral theory of management, limitations of formal organization, human relation, group behavior, committee and group, decision making, motivation and responsiveness to stimuli.

Decision process approach, parts of organization system, development of corporate strategy, dynamics of decision, role of system.

Types of models - mathematical planning models, deterministic and probabilistic models.

Relevance of models - for understanding analysis and design, planning and forecasting, monitoring and control limitations.

Personnel management

Personnel function - It's evolution, objectives, principles, philosophies and policies, duties and responsibilities of the personnel manager, position of the personnel department in the organization. Line and staff relationship and the changing concept of personnel management in India.

Manpower planning - It's uses and benefits, problems and limitations, manpower inventory, manpower forecasting, job descriptions, manpower skills analysis and practices in the Indian industry.

Recruitment - Job specification, selection process, psychological testing, interviewing techniques, transfers, promotion and it's policies, induction placement and exit interview.

Training and development - It's objectives and policies, planning and organizing the training department, training manager and his job, on and off the job training, techniques, career planning, objective of performance appraisal and it's methods.

Relevant books -

1. Monappa Arun & Saiyadain M. S. Personnel Management TMH
2. Rudrabasavraj Dynamic personnel administration Himalaya Publishing House, B'bay
3. Torrington & Hall Personnel management - a new approach PII
4. Hellrigel Don, Solum, John W. & Woodman Organizational behavior West publishing Co. New York

CA 302 ADVANCED TOPICS IN DATABASE THEORY AND APPLICATION

Distributed databases : Introduction to distributed databases, networks, data distribution, object naming, distributed query processing, consistency, concurrency control, distributed commitment and recovery, deadlocks in distributed systems, security and protections, homogeneous and heterogeneous system.

Object databases : concept of object. Introduction to object approach and object databases.

Concept of ODBC(object database connectivity)

ORACLE :

SQL* PLUS : designing reports using SQL* PLUS

PL/SQL : Procedural language constructs in SQL, cursor movement, iterative control, conditional control.

SQL*Report Writer : Menu driven report writing tool, concepts of report writer objects, Process involved in various types of reports, sample master-detail and cross-tab reports.

Utilities : Backup and Recovery using export/import, loading flat file data into oracle via SQL* Loader

SQL*Forms 3.0 : The oracle 4GL, menu driven application building tools, various form characteristics and feature, concepts of application development, master detail relationships and pop-up windows.

Pro C : Elements of a Pro C program, defining queries, committing and rolling back work, error detection and recovery, dynamically defined statement.

Introduction to DBA : Oracle RDBMS concepts, file structure, table spaces and segments, user database concept, data dictionary, memory structure, process structure, SQL statement processing, transactional control.

Relevant Books :

1. Database System Concepts by Korth and Silberschutz. TMH
2. ORACLE 7.1 : Installation and User manual.

Relevant Books

1. computer networks by A.S. Tanenbaum.
2. Martin, J : Computer Networks and Distributed Processing, PHI
3. Comer, : Internetworking with TCP/IP : Principles, Protocol s. and architecture, PHI

CA-LAB V : ORACLE AND NETWORK PROGRAMMING

ORACLE

1. Designing a database & tables and manipulation of data with SQL*FORMS
2. querying the database with SQL and SQL*PLUS
3. defining, using and querying one table views
4. defining, using and querying multiple table views with JOIN and without JOIN
5. data manipulation through views
6. working in detail with SQL*Reportwriter
7. working in detail with SQL*Forms
8. working in detail with SQL*Menu
9. programming with ORACLE using PRO*C
10. working with indexes and clusters

NETWORK PROGRAMMING

1. Writing routine for printing across the LAN.
2. Writing transaction tracking system.
3. Writing routine in c/c++ for file sharing.
4. Writing routine in c/c++ for record locking.
5. Writing driver for printing to a shared printer using underlying operating system services. (main concerns are the mode, fonts or typeface pitch and other printer characteristics used for your report, the possible insertion of stray page breaks into the report by the network operating system.)
6. Writing routine for peer - level communication on a LAN (message passing) using NETBOIS , SPX/IPX, TCP/IP.
7. Writing Remote Program Execution Utility.
8. Writing Electronic Mail utility in c/c++.

CA LAB VI : UNIX, WINDOWS NT AND DESIGN AND ANALYSIS OF ALGORITHMS

UNIX

1. Writing payroll system using shell programming. (Data input, validation, information queries, information output, database update, system interface)
2. Writing interactive commands to search through your directories removing junk files. Make sure that command runs after 10 p.m. to reduce system load.
3. Write a shell program to look through the arguments on command line and process them if they are files.
4. Write an infinite loop to prompt the terminal user for file names to be removed and remove them. Use TRAP to exit gracefully when finished.
5. Write a shell program to test for arguments of the form -c, -d, -e and so forth. Set arguments by the same names (c, d, e, ...) to TRUE(1) or FALSE(0) depending on whether the argument exists on the command line.
6. Take any shell program and convert to shell function.
7. Create a reused catalogue using shell. As you create a catalogue, create a reusable shell component that comprise at least 10 % of the total catalogue.
8. Writing shell interface that would accept the file type, program name & source name and add the file to source code control system.
9. Creating a shell browser that will search by keyword.
10. Developing text editor using CURSES.H.
11. Practicals on utilities like AWK, NROFF, TROFF etc.

WINDOWS - NT

Practicals on WINDOWS - NT specified by the course instructor.

DESIGN AND ANALYSIS OF ALGORITHMS

1. Write recursive Pascal/C program for searching an element form a given array.
2. Write recursive Pascal/C program for finding maximum element form a given array.
3. Write recursive Pascal/C program for finding Binomial coefficient of two integers defined as $B(n,m) = B(n-1,m-1)+B(n-1,m)$, $B(n,n) = B(n,0)=1$.
4. Write Pascal/C program for creating min. heap using INSERT.
5. Write Pascal/C program for creating max. heap using INSERT.
6. Write Pascal/C program for creating min. heap using ADJUST/HEAPIFY.
7. Write Pascal/C program for creating max. heap using ADJUST/HEAPIFY.
8. Write recursive, iterative Pascal/C modules in a program for finding greatest common divisor of two numbers.
9. Write divide & conquer based Pascal/C program for finding maximum, minimum element form a given array.
10. Write divide & conquer based Pascal/C program for searching an element form a given array using binary search for $n = 1000, 2000, 3000$ find exact time of execution.
11. Write greedy based Pascal/C program for a solution of a knapsack instance.
12. Write divide & conquer based Pascal/C program for sorting elements of arbitrary array in ascending order using heap sort for $n = 1000, 2000, 3000$ find exact time of execution.
13. Write divide & conquer based Pascal/C program for sorting elements of arbitrary array in descending order using heap sort for $n = 1000, 2000, 5000$ find exact time of execution.
14. Write divide & conquer based Pascal/C program for sorting elements of arbitrary array in ascending order using merge sort for $n = 1000, 2000, 3000$ find exact time of execution.
15. Write divide & conquer based Pascal/C program for sorting elements of arbitrary array in descending order using merge sort for $n = 1000, 2000, 5000$ find exact time of execution.
16. Write divide & conquer based Pascal/C program for sorting elements of arbitrary array in ascending order using quick sort for $n = 1000, 2000, 3000$ find exact time of execution.
17. Write divide & conquer based Pascal/C program for sorting elements of arbitrary array in descending order using quick sort for $n = 1000, 2000, 5000$ find exact time of execution.
18. Write divide & conquer based Pascal/C program for multiplying two 2×2 matrix using Strassen's matrix multiplication algorithm.
19. Write Pascal/C program for all pair shortest path problem using dynamic programming.
20. Write Pascal/C program for obtaining optimal code for a given expression using CODE1.
21. Write Pascal/C program for obtaining optimal code for a given expression using CODE2.
22. Write Pascal/C program for obtaining all solutions of 8 Queens problem using backtracking.
23. Write Pascal/C program for obtaining only in equivalent solutions of 4 Queens problem using backtracking.
24. Write Pascal/C program for obtaining all solutions of 10 Queens problem using backtracking, estimate time required by the algorithm.
25. Write Pascal/C program for UNION, FIND algorithm.
26. Write iterative Pascal/C program for searching an element form a given array, using rules of removal of recursion.
27. Write iterative Pascal/C program for finding maximum element form a given array, using rules of removal of recursion.
28. Write iterative Pascal/C program for finding Binomial coefficient of two integers defined as $B(n,m) = B(n-1,m-1)+B(n-1,m)$, $B(n,n) = B(n,0)=1$, using rules of removal of recursion.
29. Write Pascal/C program for Graph coloring algorithm.

CA 401 COMPUTER GRAPHICS

Graphics hardware : Graphics input devices, graphic display devices and processors.

Raster algorithm for 2-D output primitives : Scan converting lines, circles and polygons. Polygon filling algorithms. Windowing and clipping (point, line and polygon clipping), attributes of the output primitives.

General transformation : Homogeneous coordinates, basic 2-D and 3-D transformation, composite transformations, modeling transformations, window to viewport transformations.

3-D viewing : General view specification, viewing transformation, mathematics of projections (parallel and perspective projection), view-volume specification, clipping in 3-D.

3-D object representation : Polygonal models, curve and surface representation (polynomial curves and surfaces, coons patches, hermit interpolation, Bazaier curves and surfaces). Fractals. Constructive solid geometric representation, boundary representation, sweep representation.

Color in computer graphics : chromatic and achromatic light, trichromatic theory, color models, color lookup tables, color quantization.

Image synthesis : illumination models, shading methods, ray tracing.

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

User interface design : logical input devices, interaction task, interaction modes, interaction techniques.

Relevant Books :

1. Computer graphics by Baker.
2. Theory and problems of computer graphics by Plastock and Kalley.

CA 402 PARALLEL COMPUTING

Introduction : Computational demand of modern science, advent of practical parallel processing, parallel processing terminologies : pipelining and data parallelism, control parallelism, scalability, The sieve of eratosthenes : control parallel approach, data parallel approach, data parallel approach with I/O.

PRAM Algorithms : PRAM model of parallel computation. PRAM algorithms : parallel reduction, prefix sums, list ranking, preorder tree traversal, merging two sorted list, graph coloring, reduce number of processors : problem defying fast solution on PRAM.

Processor Arrays, multiprocessors and multicomputers : processor organization : mesh networks, binary tree network, hypertree networks, pyramid networks, butterfly networks, hypercube networks, cube connected cycle networks, shuffle exchange network, de Bruijn network. Processor Arrays : Connection machine CM-200, multiprocessor : uniform memory access (UMA) multiprocessor, non uniform memory access (NUMA) multiprocessors. Multicomputers, Flynn's Taxonomy, Speedup, Scaled speedup, parallelizability.

Parallel programming languages : Programming parallel processors, overview of FORTRAN 90, C*, OCCAM, C-LINDA

Solving linear systems : Terminology, back substitution, odd-even reduction, Gaussian elimination, the Jacobi algorithm, Spare's linear systems, Gauss-Siedal algorithm, Jacobi SOR method, MultiGrid method, Conjugate gradient methods.

Parallel Sorting methods : Quicksort based algorithm, Enumeration sort.

Relevant Books :

1. Quinn M. J. : Parallel Computing : theory and practice. MGH
2. Lester B. P. : The art of parallel programming. PHI Eglewood Cliffs, N. J.
3. OCCAM reference manual, INMOS limited.

CA 403 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM DESIGN

Problem Solving : state space representation, heuristics, heuristic evaluation functions, problem reduction.

Search methods : generate and test, hill climbing, means-ends analysis, depth-first, breadth-first, best-first, exploiting domain constraints, dependency-directed backtracking, minimax, alpha-beta pruning, iterative deepening, A*, AO*.

General Issues in Knowledge Representation and Inference : adequacy, richness, granularity, ease of representation and use, modeling uncertainty, the Frame Problem, declarative and procedural representations, representational equivalence.

LOGIC : propositional and predicate logic; representation - atoms, connectives, literals, CNF, DNF and casual form, interpretation and model, satisfiability, resolution principle and unification.

Rules : working memory, rule base, conflict set, conflict resolution strategies (including specificity, recency, refractoriness), backward and forward chaining, meta-reules.

Structured Representations : semantic networks, frames, conceptual dependency, scripts, inheritance, default values, example systems, blackboards.

Truth Maintenance Systems.

Uncertainty Reasoning : probability theory, Bayesian networks, certainty, factor methods, basics of fuzzy logic, non-monotonic reasoning.

Neural networks.

Application Topics

Machine learning : explanation based learning, rule induction, ID3 algorithm, version spaces

Planning : blocks world, STRIPS, hierarchical planning, non-linear planning, Sussman anomaly,

Expert System : rule based systems, MYCIN model of uncertainty, knowledge engineering, rule base verification, other approaches such as model based reasoning

Natural Language Understanding : Syntactic processing semantic analysis, pragmatics, case grammars, parsing, ATN, RTN

Relevant Books

1. Artificial Intelligence by E Rich and K Knight, McGraw Hill / Kogakusha Students Edition 1991.

2. Artificial Intelligence (3rd edition) by PH Winston, Addison Wesley, 1992.

3. Introduction to Artificial Intelligence by E Charniak and D McDermott, Addison Wesley,

4. Rule based expert System : A Practical Introduction by M Sasikumar, S Ramani, S Muthu Raman, KSR Anjaneyulu and R Chandrasekar, Narosa Publishing HOUSE New Delhi and Addison-Wesley, Singapore 1993.

5. LISP (3rd Edition) by PH Winston and BKP Horn, Addison Wesley, 1989.

Introduction to Artificial Intelligence and Expert Systems by DW Patterson, Prentice-Hall 1990 (Eastern Economy Edition).-

CA 404 SOFTWARE ENGINEERING

Software engg. Principles : how is software engg an 'engineering' discipline?, information system characteristics, software development process models, life cycle concepts, software phases and deliverables, software development strategies.

Technical development : structured system analysis and design, requirements collections and specifications, data flow and logical data modeling Cost Benefit analysis, feasibility study Architectural and detailed design, process, data, network, control and user interface design, physical data design, dynamic modeling for real time systems

Software project management : principles of software project management, organizational and team structure, project planning, project initiation and termination, technical, quality, and management plans, project controls, cost estimation methods- function point and COCOMO, tools

Software quality management : quality control, quality assurance, quality standards, software metrics, verification and validation, testing, quality plans, tools

Configuration management

Software development methods and CASE : formal, semiformal and informal methods; data, function and event based modeling, some of the popular methodologies such as Yourdon's SAD, SSADM etc., CASE tools, CASE standards. Detail study of TURBO ANALYST.

Implementation : in 3GL environments, in 4GL environments, in Client-server environments, coding styles.

Documentation, Software maintenance.

Relevant Books

1. Software Engineering concepts by Fairley, TMH

2. Software Engineering by Pressman Ed.III . TMH

CA 405 MANAGEMENT INFORMATION SYSTEM AND DECISION SUPPORT SYSTEM

1. Meaning, nature, need, role, importance, evaluation of management through information system, relatedness of MIS with management activities, management function and decision making.
2. Concept of balanced MIS, effectiveness and efficiency criteria.
3. Development of MIS - methodology and tools/ techniques for systematic identification, evaluation, modification of MIS.
4. A study of major financial, production, manpower and marketing MIS.
5. Advanced MIS : Concept, need and problems in achieving advanced MIS.
6. Decision support system : Modeling of DSS, analysis and design of DSS. Strategy for DSS development, planning and implementation of DSS. Use of DSS.

Relevant Books :

1. Management information system by Davis and Olson. MGH
2. Information system for modern management by Merdick, Ross, Clagget. PHI
3. Management information system by Kanter. PHI
4. Analysis, design and implementation of Information system by Lucas. MGH
5. Analysis and design of information system by Senn MGH

CA LAB VII : PARALLEL PROGRAMMING AND ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM DESIGN

PARALLEL PROGRAMMING

Multipascal implementation for solving

1. Parallel reduction algorithm
2. Prefix sum algorithm
3. List ranking algorithm
4. Merging two files
5. Graph coloring problem
6. Gaussian elimination
7. Jacobi algorithm
8. Sparse linear system
9. Gauss Seidel method
10. Multigrid method
11. Sorting algorithm

ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM DESIGN

1. Implement Breadth-First Search algorithm in PROLOG/LISP language.
2. Implement Depth-First algorithm in PROLOG/LISP language.
3. Implement Heuristic Search algorithm in PROLOG/LISP language
4. Implement Generate-and-Test algorithm in PROLOG/LISP language
5. Implement Hill Climbing Search algorithm in PROLOG/LISP language
6. Implement Steepest-Ascent Hill Climbing Search algorithm PROLOG/LISP language
7. Implement Best -First Search algorithm in PROLOG/LISP language.
8. Implement A* algorithm in PROLOG/LISP language
9. Implement AO* algorithm in PROLOG/LISP language
10. Implement Constraint satisfaction algorithm in PROLOG/LISP language :
11. Implement Resolution algorithm in PROLOG/LISP language
12. Implement Breadth-First Search algorithm in PROLOG/LISP language
13. Case Study on Expert System.

CA LAB VIII : COMPUTER GRAPHICS AND CASE TOOLS

COMPUTER GRAPHICS

Implementation of following algorithms in C/C++

1. Line drawing algorithm
2. Circle drawing algorithm
3. Ellipse drawing algorithm
4. Polygon filling algorithm
5. Windowing and clipping algorithm (point, line & polygon clipping)
6. Composite 2-D transformation
7. 3-D curves and surface representation i.e. B-spline curves & surfaces, Polynomial curves & surfaces, Bezier curves and surfaces
8. 3-D geometric transformation (Rotation, scaling and reflection) and composite transformation
9. Determination of visible surfaces and lines
10. Combining all the modules to form a single graphics package.

CASE TOOLS

Practicals on CASE TOOLS specified by the course instructor.

CA 501 COMPILER CONSTRUCTION -

Automata theory, Regular Expressions, NFA, DFA, Minimize DFA, Transition table different phases of compilation

Theory of parsing, top down and bottom up parsing methods, LR parsers

Intermediate code generation, different types of intermediate codes

Code Optimization techniques.

Relevant Books :

1. Aho and Ullman, Principles of Compiler Construction.
2. BackHouse Principles of compiler construction
3. Gris Compiler Construction.

CA 502 SIMULATION AND MODELING

Definition of system, types of system - continuous and discrete, modeling process and definition of a model; computer workload and preparation of it's models; verification and validation modeling procedures; comparing modeling data with real system data, differential and partial differential model, combining discrete events and continuous models.

Simulation process, use of simulation, discrete and continuous simulation process; simulation of time sharing computer system

Simulation languages; a brief introduction to important discrete and continuous simulation languages; study and use of one language in detail

Use of database and AI techniques in the area of modeling and simulation.

Relevant Books :

1. Introduction to simulation by Payer. MGH
2. System simulation by Gordon. PHI
3. Computer simulation application by Reitman. Wiley
4. Computer aided modeling and simulation by Spriet W.A. Academic press.
5. Modeling and performance measurement of computer system by Barnes.
6. Simulation techniques for digital computers by N.S. Deo. PHI

CA 503 COMPUTER BASED OPTIMIZATION TECHNIQUES

1. Linear programming : mathematical model, assumptions of linear programming, principles of simplex method, revised simplex method, applications, duality, dual simplex method, sensitivity analysis.
2. Special types of linear programming problems : transportation and assignment problems.
3. Decision theory and games.
4. Sequencing and scheduling : PERT/CPM.

Relevant Books :

1. Operations research by Taha H.A. McMillan
2. Introduction to operation research by Gillett. MGH
3. Operation research by Ravindran Wiley Eastern
4. Introduction to operation research by Hiller and Liberman. Holden Day Inc.

CA 504 PRINCIPLES OF PROGRAMMING LANGUAGES

SECTION A (Programming Paradigms)

Object Oriented Programming : Objects, Classes, messages, inheritance, binding, multiple inheritance, polymorphism.

Functional Programming : Functional approach, refinement, functions and classes, SUGAR.

Declarative programming : Declarative semantics, procedural semantics, soundness and SLD resolution, computation rule, refutation procedures, cuts, negation and completion.

Procedural programming : a review.

SECTION B (Comparative Study of Programming Languages)

C++, LISP, PROLOG & C.

SECTION C (Design and Implementation of a new programming language)

Data types, sequence control structure, procedures and functions, storage management etc.

Relevant Books :

1. Pratt : Programming languages : Design and implementation. PHI
2. Tucker : Programming Languages MGH
3. Horowitz, Sahani : Programming Languages . Galgotia Publi.

CA 505 CURRENT COMPUTING TRENDS

The current softwares are to be taught .

CA LAB IX : VISUAL BASIC AND WINDOWS PROGRAMMING AND OPTIMIZATION TECHNIQUES

VISUAL BASIC

1. Understanding the concepts of visual programming.
2. Understanding the concepts of **object, forms & control classes**.
3. Designing an application illustrating the use of following.
 - All control classes (Command button, option button etc.)
4. Developing an application to demonstrate following
 - I] Manipulating objects on different forms.
 - II] Event model of Visual BASIC.
5. Developing a graphical editor.
6. Using menu designer.
7. Understanding use of Visual BASIC as front-end tool. (Concept of ODBC).
8. Manipulation of tabledef & querydef objects.

WINDOWS PROGRAMMING

1. Write windows program to display windows messages in a scrollable window.
2. Write a windows program which just passes all the messages to `DefWindowProc()` except one.
3. Explore the concept of device contexts by writing simple window program
4. Write simple window program for displaying text on window at center (use different fonts for text).
5. Write windows program obtains information about character and display all this in its window.
6. Write windows program which display scrollbar messages in a scrollable window
7. Study different windows keystroke messages and write windows program to display all keyboard character messages in a scrollable window.
8. Study different mouse messages and write window program to display it in a scrollable window.
9. Study different window activation messages and write window program to test their functions
10. Study concept of mouse capturing and write windows program to demonstrate mouse capturing.
11. Write windows program utility which allows you to view the hexadecimal display of any given file in a movable, resizable window also add common dialog box for opening file.
12. Study different predefined child window control classes and design a simple user interface using these control (Static, Button, Edit, List box, Scrollbar).
13. Write windows program to create windows menu (Menus, PopUpmenus) using the API.
14. To study use of menu template to create menus.
15. Write windows program for demonstrating printing under windows.
16. Write windows program which demonstrate the various method of font selection and their effects.
17. Write windows program for displaying windows device driver capabilities(Use Scrollbars.)
18. Write windows program which demonstrates use of following function.
 - I) `SetPixel()`
 - II) `LineTo(HDC, int, int)`
 - III) `Moveto(HDC, int, int)`
 - IV) `SetTextAlign`
 - V) `CreatePen(int, int, COLORREF)`
 - VI) `Rectangle`
 - VII) `RoundRect`
 - VIII) `FillRect`
 - IX) `InsetRect`
 - X) `FrameRect`
 - XI) `Ellipse`
 - XII) `Arc`
 - XIII) `Chord`
 - XIV) `Create Solid Brush`

OPTIMIZATION TECHNIQUES

Develop programs in C/C++ for the following

1. Graphical method to solve L.P.P.
2. Simplex algorithms
3. Revised simplex method
4. Dual simplex
5. Transportation problem
6. Assignment problem
7. Solving NxN game

CA LAB X : COMPILER CONSTRUCTION AND VISUAL C++

COMPILER CONSTRUCTION

1. Write a program to test whether or not a given string can be accepted by a given DFA
2. Write a program to convert NFA into DFA / minimize it.
3. Write a program for simple shift reduce parser using stack.
4. Write a program for recursive descent parser.
5. Write a program for LL parser.
6. Write a program for SLR parser.
7. Write a program for Operator Precedence Grammar.

VISUAL C++

1. Understanding the use of AppStudio as a prototyper
2. Understanding the use of common user interface element (such as common dialogues, file open dialogue, box, choosing document type (SDI/MDI))
3. Designing new classes using MFC
4. Understanding how document and view architecture works as well as their printing.
5. Drawing in the nonclient area of a window and understanding how to hook up messages to classes in MFC
6. Creating popup menu
7. Understanding concepts of window hooks
8. Understanding concepts of Dynamic Linking (DLL) and Static Linking
9. Developing application which allows you to do
 - Hook sounds to various windows system events, text buttons, and window action
 - Animate your icons
 - Animate your cursor
 - Create and edit your own icons, cursors and small bitmaps
 - Provide a popup program launcher(Create DLL for this application)
10. Understanding concepts of OLE and use OLE features for developing application
11. Understanding use of MFC for creating ODBC data sources.
12. Understanding the use of database features of MFC classes.

SEMESTER SIX :

Full time Six month Industrial Training.