UNIVERSITY OF PUNE

Syllabus for Masters Degree in Computer Management
M.C.M.

[M.C.M. Part I From Academic Year 2008-2009,
M.C.M. Part II From Academic Year 2009-2010]

(I)   INTRODUCTION

1.   The name of the programme shall be Masters' Degree in Computer Management
      (M.C.M.)
2.   The knowledge and skills required to plan, design and build complex application
      software systems are highly valued in all industry sectors including business,
      health, education and the services. The basic objective of the Masters' Degree in
      Computer Management (M.C.M.) is to provide to the country a steady stream of
      competent young men and women with the necessary knowledge, skills and
      foundations for acquiring a wide range of rewarding careers into the rapidly
      expanding world of Information Technology.
3.   The Job Opportunities are :
      a. Many graduates begin their careers as junior programmers and, after some
          experience, are promoted to senior programmers, systems analysts,
          programmer/analysts, software testers posts. Others seek entrepreneurial roles
          in the computer world as independent business owners, software authors,
          consultants, or suppliers of systems and equipment. Career opportunities exist
          in such areas as management, software and hardware sales, technical writing,
          training others on computers, consulting, software development and technical
          support.
      b. Application areas include transaction processing (such as order processing,
          airline, railway reservations, banking systems), accounting functions, sales
          analysis, games, forecasting, simulation, database management, decision
          support data communications, and e-commerce.

4.   a. The first two semesters of the programme is a mix of computer-related and
      general business courses.   The computer-related courses use computers to
      introduce standard techniques of programming; the use of software packages
      systems analysis and design. The general business courses include the functional
      areas of management like the study of marketing management, financial
      management, operations management and general management. The course
      would emphasize the study and creation of business applications, rather than mere
      programming.   Considering the current environment, fundamental concepts
      related to web-based applications are introduced.

      b. In semesters III and IV, students are exposed to system development in the
      information processing environment, with special emphasis on Management
      Information Systems and Computer Resource Management.

5. **Duration**: The M.C.M. program will be full-time two years Masters Degree in Computer Management.

6. The new curriculum would focus on imparting skills, necessary for developing a career in the field of business applications of computer, in emerging global scenario which emphasizes e-business in all sectors of the economy.

7. The institute should organize placement program for the MCM students, by interacting with the industries and software consultancy houses in and around the region in which the educational institution is located.

8. **Intake:** In each class, not more than 60 students will be admitted.

(II) ELIGIBILITY FOR ADMISSION
Graduates possessing any faculty of any statutory University shall be eligible for admission to the M.C.M. course.

(III) NUMBER OF LECTURES AND PRACTICALS :
Lectures and practicals should be conducted as per the scheme of lectures and practicals.

(IV) PRACTICAL TRAINING AND PROJECT WORK:
Towards the end of the second year of study, a student will be examined in the course "Project Work".
a. Project Work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to monitor the progress of individual student.
b. Student should take guidance from an internal guide and prepare a Project report on "Project Work" in 2 copies to be submitted to the Director of the Institute by 31st March. Wherever possible, a separate file containing source-code listings should also be submitted.
c. The Project Work should be of such a nature that it could prove useful or be relevant from the commercial / management angle.
d. The project report will be duly assessed by the Internal guide of the subject and marks will be communicated by the Director to the University after receiving the Seat numbers from the University along with marks of the internal credit for theory and practical to be communicated for all other courses.
e. The project report should be prepared in a format prescribed by the University which also specifies the contents and the method of presentation.
f. The project work will carry 80 marks for Internal assessment and 120 marks for external viva. The external viva shall be conducted by a minimum of two external examiners.
g. Project Work can be carried out in the Institute or outside with prior permission of the Institute.

h. The external viva-voce examination for Project Work would be held in March/April of the second year of study, by a panel of two external examiners.

(IV) ASSESSMENT

The final total assessment of the candidates is made in terms of an Internal assessment and an external assessment for each course.

For each paper, 30% marks will be based on internal assessment and 70% marks for semester end examination (external assessment), unless otherwise stated.

The division of the 30% marks allotted to internal assessment of theory papers is on the basis of tutorial work and written test of 15 marks, seminars and presentations 10 marks and attendance 5 marks.

The internal marks will be communicated to the University at the end of each semester, but before the semester end examinations. These marks will be considered for the declaration of the results.

(V) EXAMINATION

Examinations shall be conducted at the end of each semester i.e. during April/May and also in October/November.

(VI) STANDARD OF PASSING

a. Every candidate must secure 40% marks in each head of passing.
b. The passing marks for external examination will thus be 28 out of 70 and for internal examination 12 out of 30 and aggregate marks taking both together will be 40 marks.
c. Reassessment of Internal marks :
In case of those students who have secured less than passing percentage of marks in internal i.e. less than 40%, the institute will administer a separate internal test. The results of which may be conveyed to the University as the Revised Internal Marks.
In case the result of the internal test as above, results in lower marks than the original, the original figure of the marks will prevail. In short, the rule is higher of the two figures of the marks.
However, the institute will not administer any internal test, for any subject for those candidates who have already scored 40% or more marks in the internal examination.

(VIII) BACKLOG

Two semesters backlog can be carried to the third semester.

(IX) CLASS

There shall be numerical marking for each question. At the time of declaration of the result, the marks obtained by a candidate are converted into classes as shown below:

The class will be awarded on the basis of aggregate marks scored by the student (i.e. out of 2200),provided he/she has passed in both the internal/external examinations of all the subjects in M.C.M. Part I and Part II.

CLASS	TOTAL MARKS
First Class with Distinction	1540 and above
First Class	1320 to 1539
Higher Second Class	1210 to 1319
Second Class	1100 to 1209
Pass Class	880 to 1099
Fail	879 and below

(X) MEDIUM OF INSTRUCTION

The medium of instruction will be English.

(XI) REVISION OF SYLLABUS

As the computer technology is changing very fast, revision of the syllabus should be considered every 3 years.

(XII) TEACHING AND PRACTICALS SCHEME

Each Session will be of 1 and 1/2 Hrs. (Includes Lecture & Practical)
For a Year : 28 Weeks Teaching , 12 Weeks Vacation , 12 Weeks PL & Exam

Semester I

Subject Code	Subject Name	Mark	Type	Sessions Lectures
101	C Programming	100	C	40
102	Fundamentals of Information Technology	100	C	40
103	Software Engineering and Business Process	100	C	40
104	PPM and OB	100	C	38
105	Web Programming and E-Commerce	100	C	40
106	Practical	50	FI	

Semester II

Subject code	Subject Name	Mark	Type	Sessions Lectures
201	Data structure and Algorithms	100	C	40
202	DBMS	100	C	40
203	Oracle	100	C	43
204	Basic Java	100	C	60
205	Core Ruby	100	C	38
206	Object Oriented Designing	100	C	40
207	Practical	50	FI	

Note : Student can opt for any one subject out of 204 & 205

Semester III

Subject code	Subject Name	Mark	Type	Sessions Lectures
301	Linux	100	C	40
302	Business Application	100	C	40
303	Advance Java	100	C	40
304	Advance Ruby	100	C	40
305	VB.NET	100	C	40
306	Software Project Management	100	C	40
307	Practical	50	FI	

Note : Student can opt for any one subject out of 303 & 304

Semester IV

Subject code	Subject Name	Mark	Type	Sessions Lectures
401	** Mobile Computing	100	C	40
402	**ASP.NET	100	C	40
403	**Information Security	100	C	40
404	**Cyber Law	100	C	40
405	**Multimedia and Web Designing	100	C	40
406	**Soft Skills	100	C	40
407	**Quality Control and Software Testing	100	C	40
408	**Network Technologies	100	C	35
409	Project	100	C	
410	Project	100	C	
411	Practical	50	FI	

(C) : Compulsory, subject to be evaluated by the University
(FI) : Fully Internal to be evaluated by the Institute.
** : Elective subjects

- Student can choose any **three** subjects of 401 to 408 from the above mentioned Elective which is discreetly offered by the Institute.
- Practical will be included in IT papers
- No separate practical exams will be conducted
- Case studies should be taken for non-IT papers
- In all Total 72 hours practical to be taken per semester.

Note :
In the subjects given below, the number shown in bracket on the right side indicate number of sessions. This is just to give the teacher a guideline to teach the topic. Please note, the number of session may change.

'C' PROGRAMMING – [101]

Note :
ANSI C to be followed strictly
Structured programming techniques to be followed
Programs to be coded in 'C' should be preferably from Commerce / management fields.

1) C Fundamentals: **(3)**
C Character Set, Identifiers and Keywords under ANSI C. Data Types, Constants: int, float, double, char. Qualifiers: long, short, unsigned and signed. Escape sequences (like \n,\b etc.).   Arithmetic Expressions and different built-in Operators. Pre-processor directives (like #include, #define), concept of header files, Symbolic constants, Comments, sizeof, steps involved in compilation of C Program. Concept of typedef for renaming a built-in data type.

2) Flow Charts and Decision Table   **(2)**
Flow Diagram, Flow Chart symbols and their use, System flowcharts, program flowcharts, outline flowcharts, detail flowcharts, flowcharts and signs of communications, flow lines, process decisions, connectors, terminals, flowcharts for simple programs-problems.
Decision tables, condition stub, condition entry, action stub, action entry, decision rule, limited entry decision tables, extended entry decision table, mixed entry decision tables, comparison between flowcharts and decision tables.

3) Built-in operators and functions.   **(2)**
Console based I/O and related built-in I/O functions: printf(), scanf(); getch(), getchar(), putchar(), gets(), puts().

4) Decision and Case Control Structure   **(2)**
if statement; if-else construct; use of logical operators and Compound Relational Tests; Nested if statements; The else if construct; the relational operators; the conditional expression (ternary) operator. The Switch Statement with or without break, concept of a case label, goto statement, concept of a goto label, comparison between goto and case labels.

5) Loop Control Structure   **(2)**
Concept of Loop, loops supported by 'C', concept of top tested and bottom tested loops, the for loop statement; Nested for Loop ; for loop variants; the while loop statement; simple and nested while loop, Increment/decrement operators; Use of   Break and Continue; the do-while loop, comparison between for, while and do while loops.

6) Storage Classes   **(1)**
Automatic, Register, Static (local and global),External. Scope rules.

7) Arrays (4)

Concept of a collection, types of collections supported by 'C', Array collection and its features, concept of indexing, index variable, index type, positional value of a member of array collection, concept of dimension and size of an array, 'C' syntax for declaration of array, name of the array and its type, Referring individual elements, Entering data into an array, reading data from an array concept of Array initialization and list of initializers, size option, Bounds checking, the concept of two dimension arrays and related syntax, similarities between dimension and nesting.

8) Character Strings (2)

What are strings, standard library string functions like strlen(),strcat(), strcpy(), strcmp(), similarity between string and 1-D array of char.

9) Functions (4)

Concept of a subprogram, the interface of a subprogram, role of a interface, Arguments of a subprogram, kinds of subprograms supported by C, return statement as an interface, local variables; Default Return type and the type void; Passing values between functions through interfaces; Declaration of function type; iterative and recursive subprograms, Recursion; concept of call by value, call by reference, return and their underlying implementation should be explained, similarities and differences between Function & Macros, concept of nested macros and their use, recursion as a special nested call.

10) Pointers (4)

Concept of Pointers, Pointer as an address variable, concept of a pointer data type and its syntax, built-in address operator, Pointers to existing variables of different data types and their uses, use of indirection operator, the name of the array as a pointer variable, Pointers and Arrays, Pointers arithmetic, use of unary operators (++, --), One Dimension Arrays and Pointer, concept of array of pointers and simple use, command line arguments for the main, pointer as a return type of a function.

11) Structures (3)

Structure as a homogeneous and heterogeneous collection, possible applications, syntax of declaring structure, Initializing structures, structure variables, accessing structure elements using member operator, Arrays of Structures, and array as member of structure, conceptual difference between array and structure collection, Functions and Structures, nested structures, concept of anonymous structures and their use, Concept of self referential structure, pointer as member of structure and pointer to structure use of member selector operator(->), comparison between indirection (*) operator and member selector operator (->), structure as an argument to function and return type of a function.

12) Unions (2)

Concept of Union collection, Syntax of declaration and its use, comparison of Array, Structure and Union, array of unions and union as a member of structure, structure as a member of union and array as member of union, concept of memory saving and union, union as a generic data type, concept of anonymous union.

13) Console based I/O **(2)**
use of console as a file environment, use of keyboard and VDU as I/O files: Use of stdin, stdout, stdprn and stderr as built-in file pointers for console environment, use of printf(), scanf() as fprintf() and fscanf(), use of fflush().

14) File based I/O **(3)**
Concept of a file, text files in 'C', concept of a predefined FILE pointer and its definition as given in header file stdio.h, meanings of different members of the structure representing FILE, Disk I/O Functions: High level file I/O or standard functions- fopen(), putc(), getc(), fclose(), fgets(),fputs(),feof(), simple file based programs showing the working of different members of FILE structure.

15) Dynamic Memory Allocation and Memory functions **(1)**
Concept of dynamic environment as run time environment, concept of dynamic memory management, use of built-in dynamic memory management tools of 'C' viz. malloc(), free(), simple programs using malloc() and free()

16) Bitwise Operator **(2)**
Concept of modifying the value using bit shifting, built-in bit shift operators left bit shift operator(<<) and right bit shift operator (>>) their uses, limitations of bitwise operators, use of bitwise relational operators.

17) Other features and Miscellaneous functions **(1)**
Use of atof(), atoi(), atol(), toupper(), tolower(), isalnum(), isalpha(), isdigit(),exit().

Books:

- Let us C by Yashwant Kanetkar
- C Programming by Balgurusamy
- Turbo C/C++ - The Complete Reference by H. Schildt.
- Programming in C by S. Kochan.
- Born to code in C by H. Schildt.
- The Art of C   by H. Schildt.
- C Programming by Kerninghan and Ritchie - 2nd Edition.
- Programming in ANSI C by Agarwal
- C Programming with Problem Solving by Jacqueline A Jones, Keith Harrow

FUNDAMENTALS OF INFORMATION TECHNOLOGY [102]

1) Introduction (4)
Characteristics of Computers, Computer Generations, Types of Computers,
Digital Block Diagram and different units, Input, Output, Storage and process Devices

2) Number Systems (5)
Non Positional Number System, Positional Number System (Binary, Octal,
Hexadecimal Number Systems) Conversion of One Number System to Another
BCD, EBCDIC, ASCII

3)Memory Managements (4)
Primary Storages, Storage Capacity : Bit, Byte, MB, KB, GB, TB
RAM, ROM, PROM, EPROM, Cache Memory, function of Cache Memory
Secondary Storages: Punch Card, Magnetic Tape, Magnetic Disk, Floppy
Disc, CD, DVD, Hard Disk, Pen Drive

4) Operating System (12)
Definition and Functions, Evolution of Operating System
Types of Operating System, Difference between Windows and Open source Operating
System, Batch Processing, Spooling, Multiprocessing, Multiprogramming, Time-
Sharing, On-Line Processing, Real-Time Processing, High Level Language, Low Level
Language, Language Converter: Compiler, Interpreter, Assembler

5) Networking (8)
Introduction, LAN, WAN, MAN, Intranet, Internet, Internet Topologies
OSI Model (Seven layers), Communication Media

6) Practical Approach (7)
Computer Assembly, Handling Boot Setup, Installation of Operating System
and Server Connecting your client to server, User and Workgroup Handling

Books
- Computer Fundamentals : P.K. Sinha
- Computer Fundamental : Ram B
- Computer Fundamental : Oka Milind M
- Computer Fundamental : Rajaraman

SOFTWARE ENGINEERING AND BUSINESS PROCESS – [103]

Note :
- Methodology must be case study oriented through out the syllabus.
- Faculty must design different cases and ask students to make presentations may be in groups and do proper assessment.

1) System Concept   **(2)**
   Definitions, Integrated Systems, Sub-systems, Modules,
   Characteristics / Objectives / types of Systems.

2) Various Phases of Software Development Life Cycle (SDLC)   **(2)**

3) Role of Software Engineer / Analysts / Users in the   **(2)**
   various phases of Systems Development Life Cycle.

4) Different Approaches to Software Development   **(4)**
   Waterfall Model , Spiral Model, Prototyping, RAD, Object Oriented, 4GL

5) Structured Systems Analysis Tools and Techniques   **(2)**
   Fact Finding tools and techniques
   Functional Decomposition Diagram (FDD)

6) Application System Modeling   **(8)**
   Data Modeling through ER Model
   Process modeling through Data Flow Diagrams (Logical / Physical)
   Concepts of Object Oriented Modeling through State Transition
   Diagrams

7) Database Design Methods   **(6)**
   Mapping ER Diagram to arrive at the Relational Database
   Data Normalization techniques,   Controlled De-normalization

8) Logic representation techniques   **(2)**
   Decision Trees
   Decision Tables
   Structured English

9) UML tools and techniques for web-based/object oriented Applications   **(3)**
   Class hierarchy Diagram, Use-Case Diagram, Sequence Diagram

10) User Interfaces Design   **(4)**
   Menu, Forms, Reports, Messages, Screens

11) Data Codification Schemes, Designing Code-less systems   **(1)**

12) Standards of Source Code Development,   **(2)**
    Structured Programming.

13) Introduction to Computer Aided Software Engineering (CASE) tools,   **(2)**
    Concept of Reverse Engineering.

Books :

- Analysis and Design of Information Systems 2e by Senn
- Software Engineering Practitioner's Approach by Roger Pressman
- Introduction to System Analysis & Design by Hawryszkiewycz.
- Systems Analysis and Design by Elias Awad
- Introducing Systems Analysis and Design by Lee
- Systems Analysis & Design by Perry Edwards (McGraw Hill)
- Systems Analysis, Design & Introduction to Software Engineering(SADSE)
   by Parthasarthy S, Khalkar B W

PRINCIPLES AND PRACTICES OF MANAGEMENT AND ORGANISATIONAL BEHAVIOR   [104]

Note :
The topics in Units 3, 4 , 5 and 6 should be covered with the help of at least one exercise each. All topics in Organisation Behavior should be covered with the help of role plays, case studies , simulation , games etc.

Section 1: Essence of Management
1) Management   (4)
The need, scope
Meaning and definition
The process of management
Managerial levels/Hierarchy
Managerial functions- Planning, Organising, Staffing, Directing, Controlling
Managerial skills - Technical ,Conceptual, Human Resource
Types of mangers - Functional, Specialist, Generalist
Line and staff managers

2) Evolution of Management Thought   (4)
Historical perspective
Classical theories - Taylor , Fayol
Behavioral
H.R. approach
Behavioral Science approach
Management Science approach
Systems approach – with reference to management, Organisation and MIS Contingency approach

3) Managerial Decision making   (4)
Introduction
Decision making environment
Open system, Closed system, Decision making under certainty, Decision making under uncertainty, Decision making under risk
Decision types / models
Structured decisions, Unstructured decisions, Programmable decisions
Non programmable decisions , Classical model, Administrative model
Decision making styles
Autocratic, Participative, Consultative
Decision making tools
Herbert Simon's model
Principle of Rationality / Bounded Rationality

Section II : Organisation and Organisation Behavior

1) Organisation (4)

Introduction - definition

Need for organisation

Process of organising

Organisational structure

Functional organization, Product organization, Territorial organization, Customer segmentation, Matrix organisation

2) Organisational Behavior (2)

Definition / concepts, Need / importance / relevance, An overview

3) Individual Behavior and Understanding Self (4)

Ego state, Transactional Analysis, Johari window , Motivation

4) Group and Group Dynamics (4)

5) Team Building (4)

6) Leadership (3)

7) Conflict Management (3)

8) Theory X Y and Z (2)

Books :
- Principles and Practices of Management by Koontz & O'eonneal
- Management Today Principles and Practices by Burton & Thakur
- Management Principles & Functions by Ivancevich & Gibson , Donnelly
- Organisational Behavior   by Stephen Robbins
- Organisational Behavior   by Keith Davis
- Organisational Behavior   by Fred Luthans
- Organisational Behavior   by Dr. K. Ashwatthapa

WEB PROGRAMMING AND E-COMMERCE [105]

Note:
Students will be encouraged to consider real life situations and should be asked to discuss a security issue. Students will be provided significant freedom of choice with respect to strategies and techniques, thus promoting creativity. The course on Information Systems Security is a complementary course to this and must be made compulsory in the same semester where this course is offered to students.

1) Introduction to Electronic Commerce/Overview of Electronic commerce (5)
Definition of Electronic Commerce/what is Electronic Commerce
Impact of Electronic Commerce on the Value Chain
The eCommerce framework
Anatomy of eCommerce applications
Consumer and organization applications of eCommerce

2) The Internet as the back-bone for Electronic Commerce (5)
Internet Terminology
History of Internet development
Internet Governance in the net-centric digital economy
Overview of Internet Applications
Electronic Commerce and the Word Wide Web
Architectural Framework for Electronic Commerce\WWW as the architecture
 Technology behind the Worldwide Web

3) Electronic Commerce Marketing concepts (4)
Online consumer behavior
Online Marketing, Direct Marketing
Consumer Psychology considerations in electronic commerce
Privacy considerations
Online Profile building of consumer

4) Building an electronic commerce website (3)
Up time/Down time considerations
Web site accessibility considerations etc.

5) The role of Internet Service Providers (ISPs) in electronic (3)
Commerce (Local ISPs, National ISPs, regional ISPs)
connectivity options

**6) Network Security and Firewalls, Encryption, Cryptography (3)
 & Authentication**

7) Electronic Payment Systems (3)
The PCI-DSS (Payment Card Industry – Data Security Standard

8) Electronic Commerce and EDI (Electronic Data Interchange) (3)

9) Role of Software Agents in Electronic Commerce   **(3)**
· History of Software Agents
· Characteristics and Properties of Software Agents

10) Internet Protocol Suite   **(2)**

11) Mobile and Wireless Computing Fundamentals   **(2)**

12) Legal Issues in Electronic Commerce   **(2)**
Global contracts
Domain name registration and cyber squatting crimes
Negative campaigning
Deeply linked sites

13) Auditing Electronic Commerce Applications   **(2)**

Books :
Note : Recommended Usage type: Ref = Reference Book and Txt = Text Book
- Frontiers of Electronic Commerce (Txt) Kalakota Ravi & Whinston Andrew B. Pearson Education Asia [Low Priced, Edition]
- E-commerce (Txt) Kenneth C. Laudon and Carol G. Traver ISBN 81-297-0112-X
- Electronic Commerce: Security, Risk Management and Control (Ref) Marilyn Greenstein And Todd M. Feinman (Irwin- McGraw-Hill) ISBN 0-07-116319-0
- Electronic Commerce Technology (Ref) Schneider, Gary, and James Perry Thomson Learning (ISBN 0-7600-1179-6)
- The E-business R Evolution Ref Daniel Armor (Pearson Education India) ISBN 981-405-826-2
- Indian Laws of eBusiness Rajesh Talwar
- Mobile and Wireless Design Essentials (Ref) Martyn Mallick (Wiley-dreamtech India Pvt. Ltd.) ISBN 81-265-0354-8
- Principles of Mobile Computing (Ref) Uwe Hansmann, Lothar Merk, Martin S. Nicklous et al   (Springer) Sold by Wileydreamtech India Pvt.Ltd. ISBN 81-7722-468-9
- Handbook of Research on Mobile Business Technical, Methodological, and Social Perspectives Edited by Dr.Bhuvan Unhelkar (IDEA Group, USA, Publication) ISBN: 1-59140-817-2
- Mobile Commerce : (Ref) Paul Opportunities, Applications, and Technologies of Wireless Business (Cambridge University Press) ISBN 0-521-79756-X

Practical [106]

The practical sessions and assignments would be based on the topics covered in the subject - 101.

SEMESTER II

DATA STRUCTURES AND ALGORITHMS [201]

Note :
All coding is to be done in ANSI 'C'. Emphasis should be laid on the algorithmic features of various data structures.

1) Data Structure Concepts :   (1)
Definition of Data Structure, precondition, Examples of data structures. Kinds of data structures, logical Implementation and Application levels of data structures. Node and Representative node of data structure, Empty data structure. Mathematical Structure, hardware Structure and Storage structure. Abstract Data Type (ADT) vis-à-vis data structure.

2) Algorithm Concepts :   **(1)**
Algorithm, Concept of a well posed problem, Definition of Algorithm. Recursive and iterative algorithms, Objectives of algorithms. Quality of an algorithm, Space complexity and Time complexity of algorithm, Frequency Analysis and Problem complexity.

3) Arrays :   **(3)**
Characteristics of an array. Definition of an Array, Positional value of a member, Base address of array, Indexing of an array, Index variable, Index type. Implementation of 1-D arrays, Row and Column Major implementations of 2-D, 3-D and n-D arrays. Simple examples illustrating address computations. Feature restricting the number of array implementations to two.

4) Stacks :   (6)
Stack as a data structure, Relationship component (LIFO) in stacks. Representative node for stack, uses of stack. Static and Dynamic stack. PUSH and POP operations for stack. ANSI 'C' implementations of PUSH and POP operations for stacks implemented as array and linked list. Algorithm for comparing static and dynamic stacks. Polish and reverse Polish notations. ANSI 'C' implantations of PUSH and POP operations for stacks implemented as array and linked list. Algorithm for comparing static and dynamic stacks. Polish and Reverse Polish Notations. ANSI "C' implantation of stack based algorithms for (a) Validating an expression for any mismatch of brackets, braces and parenthesis, (b) Converting an infix form to postfix form, (c) Conversion of an infix form to its prefix form, (d) Evaluation of a postfix form and (e) Evaluation of a prefix form. Simulation of recursion using stacks, stacks and nested calls.

5) Queues :   (5)
Queue as data structure, Relationship component (FIFO) Queue. Representative nodes (Front and Rear) for queue. Classification of queue as Linear Queue, (b) Circular Queue (c) Priority Queue. ANSI 'C' Implementations of algorithms for (a) Adding a node in queue, (b) Deleting a Node form queue Finding size of queue and (d) printing a queue, for linear And circular queues expressed as array and list. Dangling Pointer and Dynamic

Queue. List implementation of PRIORITY QUEUE, Priority queue as a sorted list. ANSI 'C' algorithm for converting a dynamic stack into a dynamic queue and vice-versa, Concept of Double Ended Queue -DEQUE, Input Restricted DEQue (IRD), Output Restricted DEQUE (ORD). Comparison of add node and delete node operations on different linear non recursive data structures viz. Stack, Queue, DEQUE, IRD and ORD, use of queue in multi user OS like UNIX

6) Linked Lists : (6)
Concept of a Linked List as a run time equivalent of array. List versus array. Classification of a node as Atomic and List node. Internal pointer and External Pointer. Head and Tail of a list. NULL list, Length of a list. Classification of lists based on the number of internal pointers in a list node - Single and Double lists. Classification of lists based on the kind of collection - Linear list and Circular list. Linear Single List (LSL), Circular Single List (CSL), Linear Double List (LDL) and Circular Double List (CDL). ANSI 'C' algorithms for (a) Adding a node in a list, (b) Deleting a node from a list, (c) Finding length of a list and (d) Printing of a list for LSL, CSL, LDL and CDL. ANSI 'C' algorithms for (a) Sorting a LSL, (b) Creating a sorted LSL and (c) Merging of two sorted LSL. Use of LSL as a SET. Abstract representation of a list using bracket notation. Simple Linked List. Generalised Linked List with simple examples. Simple and Generalised sublists. Shared List, Shared list vis-à-vis sublist. Recursive list, Recursive list as circular and non-circular list, Recursive list as a shared list. Concept of Multilist List, Uses of Multilist Lists. ANSI 'C' algorithms for (a) Converting LSL to CSL and vice-versa and (b) LDL to CDL and vice-versa.

7) Trees : (6)
Concept of a Tree and Subtree. Tree as a recursive data structure. Representative node of tree (Root). Concept of a n-ary tree and Binary tree. Definitions of n-ary and 2-ary trees. 2-ary tree as Binary Tree, NULL tree. Definitions of Root, Father Node, Subtree, Left Subtree, Right Subtree, Son Node, Youngest Son Node, Brother Nodes, Ancestor Node, Descendent Node, Left Descendent Node, External Node, Weight of a tree, Level of a node, Height/Depth of a Tree. AVL Trees. Balance of a node, Weight Balanced Trees. Strictly Binary Tree, Complete Binary Tree of depth "d". Features of a complete binary tree. Almost complete binary tree of depth "d". Derivation of expression relating number of nodes of a complete binary tree with the depth of complete binary tree. Concept of an Ordered Tree. Binary Search Tree (BST), ANSI 'C' implementations of algorithms for (a) Adding a node in BST, (b) Deleting a node from BST, (c) Finding total number of nodes in a BST, (d) Finding total number of leaf nodes in a BST, (e) finding total number of nonleaf nodes in a BST. Concept of Tree Traversal - Inorder, Preorder and Postorder traversals of BST. ANSI 'C' implementations of algorithms for inorder, preorder and postorder tree traversals. "C" Algorithm for printing tree nodes in descending order. ANSI 'C' algorithms for (a) Creating a copy of any given BST and (b) Creating mirror image of any given BST. Representation of a simple BST as an array. Binary tree node and double list node. 'C' algorithms for (a) Level order traversal of a BST using linear queue and (b) Nonrecursive inorder traversal of any BST using stack. Concept of a Thread, Threaded binary trees, Left Threaded and Right Threaded binary

search trees. Creation and inorder traversal algorithms for right threaded binary trees. Applications of trees in spell check software and publishing industry. Technique for converting a n-ary tree into a 2-ary tree. Huffman Algorithm, Symbol and Frequency Count of symbol. Huffman Tree, Features of a Huffman tree.

8) Sorting Algorithms :   **(2)**
ANSI 'C' implementations for Bubble Sort, Insertion Sort, Quick Sort and Heap Sort for both ascending and descending order sorting.

9) Search Algorithms :   **(1)**
ANSI 'C' implementations of algorithms for Linear Search and Binary Search.

10) Symbol Tables :   **(2)**
Definition of a Symbol Table, Applications of Symbol Tables, Objectives of maintaining a symbol table. Static symbol table, Dynamic symbol table. Criterion for the selection of a storage pattern for symbol tables, AVL trees as built in symbol tables, Inherent advantages and disadvantages of built in symbol tables. User defined symbol Table, Concept of 1-D array as a user defined symbol table. Key of a symbol, Bucket, Bucket size, Key to address function - Hashing Function. HASH TABLE, Synonyms, Home address of a symbol, Collision, Bucket Overflow, Static and Dynamic techniques for extending bucket size for storing synonyms. Disadvantages of static technique. Chaining of synonyms through dynamic technique, Use of unsorted and sorted linear linked lists of keys in chaining. Disadvantage of using lists in chaining. Ideal Hash Table, Ideal Hashing Function - MINIMAL. Ideal user defined symbol table as a combination of 1-D array and AVL trees. ANSI 'C' implementation of simple hashing functions (a) Division Method, (b) Folding and (c) mid squaring.

11) Graphs :   **(7)**
Concepts of Point/vertex and Edge/arc, Adjacent vertices. Sets of vertices and edges. Definition of a graph of "n" vertices, Directed and Undirected edges and their representations. Directed and Undirected graphs and their representations, DIGRAPH and directed graph. Definitions of Incidence of a graph, Adjacent vertices, Multigraph, Adjacent to, Adjacent from, Degree of a vertex, Indegree of a vertex in directed graph, Outdegree of a vertex, Total degree of a vertex in DIGRAPH, Maximum number of edges for undirected graph of "n" vertices, Complete Graph, Maximum number of edges in a DIGRAPH of "n" vertices, Complete DIGRAPH, Subgraph, path, and Adjacent vertices, Connected vertices, Connected graph, Connected vis-à-vis complete graph, Strongly Connected Graph, Strongly connected graph vis-à-vis complete DIGRAPH, Simple path, cycle, Cyclic graph, Acyclic graph, Directed Acyclic Graph - DAG. Description of tree as a graph. Adjacency matrix and adjacency list representations for directed and undirected graphs. Conclusions of graph features from its matrix and list forms. Reverse adjacency lists for DIGHAPH. Adjacency Multilist List representations of undirected and directed graphs. Concept of a Graph Search. Breadth First Search (BFS) and Depth First Search (DFS) for a graph. ANSI 'C' implementations of Breadth First Search and Depth First Search algorithms. Relationships between tree traversal algorithms and tree search algorithms. Concepts of a Weighted Edge and Weighted

Graph. Representations of undirected and directed weighted graphs. Cost Matrix for weighted graph. Weighted Adjacency matrix for weighted graph. Concept of a network, fields of applications of GRAPH.

Books :
- Data Structures Using "C" by Tanenbaum.
- Data Structures and Program Design in "C" by Robert L. Kruse.
- Fundamentals of Data Structures by Horowitz and Sahani.
- Data Structures : An Advanced Appraoch Using 'C' by Esakov and Weises.
- Data Structures and 'C' Programming by Cristopher J. Vanwyk.

DATA BASE MANAGEMENT SYSTEM [202]

1) Introduction (2)

History : Advantages and limitations of DBMS; Users of DBMS, Software Modules in DBMS; Architecture of DBMS.

2) Modeling Techniques (7)

Different Types of Models, Introduction to ERD.

3) Hierarchical Database (1)

Introduction.

4) Network Database

Introduction (1)

5) Relational Algebra (3)

Select, Project, Union, Intersection, Difference, Cartesian Product, Simple Join. Queries to be solved based on the above.

6) Relational Database (4)

Introduction; Codd's 12 Rules; Concept of Domain, Tuple, cardinality; Comparison between HDB-NDB-RDB

7) Normalisation (4)

Advantages and disadvantages of Normalisation; 1NF-2NF-3NF-rules with examples; Anomalies.

8) Integrity Constraints (4)

Entity-Domain-Referential integrity rules; Assertion and Triggers concept.

9) Recovery Mechanisms (3)

Recovery from various problems of volatile and non-volatile storage devices; Concept-properties-states of Transaction; Introduction to mechanisms such as - Log, Checkpoint and Shadow Paging.

10) Concurrency Controls (3)

Problems of concurrent Transactions; Control Mechanisms such as - Locks, Time-Stamps, Optimistic Scheduling and MVT.

11) Distributed Databases (2)

Concepts, Data Distributions Techniques.

12) Data Warehousing and Data Mining **(3)**

Concept, Architecture, Various tools in Data Warehousing, Tools in Data Mining, Difference between Data mining and normal query.

13) SQL commands. **(3)**

List of SQL commands to be covered
Create/drop a Database
Create /Modify/Alter/Drop Table
DML Commands
Insert
Update
Delete
Select
Aggregate Function
Max
Min
Avg
Count
Sum
GROUP BY
ORDER BY
HAVING

Books :
- Introduction To Database Systems By C.J.Date
- Data Base System Concept by Korth.
- Data Management Systems by Alexis Leon, Mathew Leon
- Principals of Database Management by James Martin.
- Computer Database Organization by James Martin.
- Relational database design for Micro Computers applications by Prentice Hall (Jackson)
- Introduction to Data Management Systems by Atul Kahate
- Fundamentals of Database Systems by Elmasri, Navathe

ORACLE [203]

1) **Queries**   **(3)**
   Select with all options
   Operators
   Arithmetic
   Comparison
   Logical (in, between, like, all, %, _, any, exists, is null, and ,or, not, Distinct)
   Order by clause

2) **SQL Functions**   **(4)**
   Date
        Sys_date , next_day, Add_months, last_day, months_between,
   Numeric
        round, trunc, abs, ceil, cos, exp, floor
   Character
        initcap, lower, upper, ltrim, rtrim, translate, length, lpad, rpad, replace
   Conversion
        to_char, to_date, to_number
   Miscellaneous
        Uid, User, nvl, vsize, decode, rownum
   Group function
        avg, max, min, sum, count, with Group by and Having Clause
   Nested functions

3) **Joins**   **(2)**
   Simple join
   Equi join
   Non equi join
   Self join
   Outer join
   Set operators (Union, union all, intersect, minus)

4) **Sub queries and Corelated query**   **(2)**

5) **DML statements (Insert, Update, Delete with where clause)**   **(2)**

6) **TCL (Commit, Rollback, Savepoint)**   **(1)**

7) **Locks in Oracle**   **(1)**

8) **DDL Statements**   **(1)**

9) Data types (1)

Character
  Char,Varchar/varchar2, Long
Number
  Number (p) - fixed point, Number (p,s) - floating point
Date
Raw
Long raw
Introduction to LOB data types (CLOB,BLOB, BFILE)

10) Table (2)

Create, Alter, Drop, Truncate, Rename
Constraints (Primary key, Foreign Key, Unique Key, Check, Default, Not Null, On delete, Cascade)
Column level and Table level constraints

11) Oracle Objects (2)

Views, Sequences, Synonyms, Index (Define, Alter and Drop)

12) Introduction to Object Oriented Concepts (2)

Object type and Methods

13) Introduction to Oracle Architecture (1)

14) Introduction to Report writing using SQL (1)

(Ttitle, Btitle, skip, set, pause, column, sql, pno, Break on, compute sum, set server output on.)

15) Creating Users and assigning privileges (1)

16) PL / SQL (9)

Introduction to PL/SQL
Advantages of PL/SQL
PL/SQL Character Set
Data types -Character, Raw, rowid, boolean, binary, integer, number, Variable, constant
PL/SQL blocks
  Attribute - % type, % rowtype
  operators function comparison, numeric, character, date
  control structure
  sequential   - goto
Error handling
  concept of exception
  pre defined exceptions -no_data_found, cursor_allready_open, dup_val_on_index, storage_error, program_error,zero_divide,

invalid_cursor, login_denied, invalid_number, too_many_rows,
dbms_output, user_defined exceptions

Cursor

Explicit & implicit Cursor, Cursor for loop, Parametric cursor, Declaring
cursor variables, Constrained and unconstrained cursor variables, Opening
a cursor variable from a query, Closing cursor variables, Restrictions using
cursor variables

Composite Data types

Record, Declaration, refer, record assignment
Table declaration, table attributes (count, delete, exists, first, last, next,
prior)

17) Database Triggers (2)
Types of Triggers
Enabling, disabling
Predicates- inserting, updating, deleting

18) Procedures and Functions (2)
Definition, Implementation and Execution

19) Packages (2)

20) Introduction to Oracle 9i (2)

Books :
- SQL – The complete Reference   by Groff James & Weinberg Paul.
- SQL for Professionals by Kishore Swapna & Naik Rajesh
- SQL from the ground up by Pyofinch Mary
- SQL Unleashed by Ladanyi Hans
- Oracle 7 by Ivan Byross
- Understanding SQL by Gruber Martin
- Teach yourself SQL in 14 days by Morgan Bryan & Perkins Jeff
- Oracle PL/SQL Programming by Scott Urman
- Teach yourself PL/SQL in 21 days by Lucus Tom

Basic JAVA [204]

Note :
   The practical should cover minimum 100 programs.
   The practical term work should be done by the student. The print out of the programs
      should be kept in Term work file.

1) Introduction to JAVA   (2)
   History of Java
   Features of Java
   JDK Environment
   The Java Virtual Machine
   Garbage Collection

2) Programming Concepts of Basic Java   (6)
   Identifiers and Keywords
   Data Types in Java
   Java coding Conventions
   Expressions in Java
   Control structures, decision making statements
   Arrays and its methods

3) Objects and Classes   (10)
   Object Fundamentals
   Pass by value
   'this' reference
   Data hiding and encapsulation
   Overloading
   Overriding
   Constructors
   Finalization
   Subclasses (Inheritance)
   Relationship between super class object and subclass object
   implicit subclass object to super class object Conversion
   Dynamic method dispatch

4) Language Features   (10)
   scope rules
   static data, static methods, static blocks
   all modifiers of class, method, data members and variable
   Abstract Classes
   Interfaces
   Inner classes
   Wrapper Classes
   packages
   Package access

importing packages and classes
user define packages

5) Exception Handling **(3)**
Types of Exceptions
try, catch, finally, throws keywords
creating your own exception
exceptions and Inheritance

6) Multithreading **(5)**
Multithreading Concept
Thread Life Cycle
Creating multithreading Application
Thread Priorities
Thread synchronization

7) Abstract Window Toolkit **(12)**
Components and Graphics
Containers, Frames and Panels
Layout Managers
        -Border Layout
        -Flow Layout
        -Grid Layout
        - Card Layout
AWT all Components
Event Delegation Model
        -Event Source and Handlers
        -Event Categories, Listeners, adapters
        -Anonymous Classes
Applets
        -Applet Life Cycle
        -Applet Context
        -Inter applet communication

8) Java utility Packages , Classes, Interfaces **(6)**
        Hash Table
        Vector
        Priorities
        Math
        Random
        System
        String
        String Buffer
        Map
        Enumeration

9) Streams and File IO   **(6)**

  -Files and Stream
  -Stream classes
  -Reader Writer classes
  -File class Tests and Utilities
   -Serialization and de serialization

Books :

- Core JAVA 2 Vol -1, 2 by Cay S Horstmann Gary Cornell , The Sun Micro Systems Press, New Delhi
- Java by Example 1.2 by Jerry R Jackson Alan L., McClellan
- Just Java by Peter Van der Liden, The Sun Micro Systems Press, New Delhi
- Not Just Java by Peter Van der Liden, The Sun Micro Systems Press, New Delhi
- OOP with Java An ultimate Tutorial by Jaffry A Borror, The Sun Micro Systems Press, New Delhi
- Programming with java, A Primer by E. Balguruswamy, The Sun Micro Systems Press, New Delhi
- Java How to Program by Deitel and Deitel, Prentice Hall Upper Saddle River, New Jersy 07458 (US)

CORE RUBY [205]

1) **Fundamentals** (3)
What is Ruby; Ruby download and installation; irb and SciTE; Free format; Case sensitive; Comments; Statement delimiters; Documentation; Operators (with precedence and associatively rules); Ruby editors; .rb file; Concept of an object and that everything is an object in Ruby; Object class and its methods; Usage of puts, gets methods; Ruby conventions; Garbage collection

2) **Variables and Constants** (2)
Name characters; Variables – local, instance, class, global; Constants naming, rules and concept of scope operator **::**; Naming conventions; Dynamically typed; Usage of method type

3) **Numbers** (1)
Concept and usage with Class Numeric, Float, Integer, Fixnum and Bignum

4) **Strings** (4)
String literals using single- and double-quotes and their differences; Usage of #{expression}; Conversions using .to_i, .to_f, .to_s; Usage of <<; Concept of symbols; Class String methods like chomp, reverse, length, upcase, downcase, swapcase, capitalize, strip, length, index, slice, upcase!, downcase!, swapcase! and capitalize!.

5) **Random Numbers** (1)
rand method

6) **Arrays** (2)
Concept; Class Array methods like delete, sort, length and each using do end

7) **Concept of Ranges and Hashes** (2)

8) **Constructs** (1)
if else end elsif; while end; case when end

9) **Regular Expressions** (2)
Simple examples

10) **Methods** (3)
Writing own methods using def end; class and instance methods (with getter and setter); return and concept of value returned by last statement in a method; variable number of parameters using *

11) **Code Blocks** (3)
Using do end and { }; Usage of yield method; Concept of Proc
and it's method call; lambda

14) File I/O (3)
 File class and its method open

15) Writing a class (4)
Standard class Class; initialize; new methods; Access modifiers private
and protected; Usage of attr_reader, attr_writer, attr_accessor;
Concept of inheritance and using <; Using super

16) Concept of Duck Typing (1)

17) Modules (1)
Examples of writing a module; Usage of require and include; Concept of mix-ins

18) Exception handling (2)
Exception class and its hierarchy; begin rescue ensure end;

19)Concept of Unit Testing (2)

20) Standard Classes and Modules (3)
Usage of Dir, Time, Thread, Range, IO, Module, GC, Kernel, Math - usage

Books:
- Programming Ruby by Dave Thomas
- Learn to Program by Chris Pine
- Ruby For Rails by David Black
- Beginning Ruby by Peter Cooper

OBJECT ORIENTED DESIGNING [206]

1) Introduction (2)
Two views of software Developments: SSAD and OOAD.
Why Object –Orientation?

2) The Object Paradigm (3)
Object and classes
Abstraction and encapsulation
Methods and Message
Interfaces, Inheritance and Polymorphism
Access Control - The Business case for OO Developments

3) Object Oriented Methodologies (6)
Some of the object Oriented Methodology:-
     Object Oriented Design -Booch
     Object Modeling Techniques - Rumbaugh
     Object – Oriented Analysis - Codd Yourdon
     Object – Oriented Software engineering – Ivar Jacobson
     Unified Approach
Diagramming and Notational Techniques using the UML
     UML Notation
     Analysis Diagramming Techniques.
     Introduction to all (ten) Diagram
     Design Diagramming Techniques
     Generalization / Specialization.
     Aggregation and composition
     Association , Cardinality, Navigability, Icons, relationships and adornments.

4) Object-Oriented Systems Development Process (4)
Rational Unified Process
-    Four Major phases:- Inception , Elaboration, Construction, Transition
     Requirements Engineering
     Problem analysis.
     Understanding Stockholders need
     Type of requirements.
     Use-case Model: Writing Requirements

5) Analysis (8)
Behavioral Analysis
Domain Analysis or Business Object Analysis
Use-case Driven Object Oriented analysis - The UML approach.
     Develop use-case Model
     Use-case Description
     Documentation
     Activity Diagram

Identify the classes.

        Introduction to different approaches for identifying classes
        "Noun Phrase" approach OR
        "Conman Class Pattern" approach
        "CRC" approach
        Use case Driven Approach.

Containment and Composition
Aggregation
Inheritance, Sub Types and IS-A Hierarchies.
Association and Link Relationships.
Diagramming System Events.

6) Design Phases   (6)

Translating Analysis Concept into Design.
Optimizing classes and Objects:
    The Multi-tiered Architecture View
Mapping System functions to objects.
Object-to-Object Visibility.
Collaboration Diagram
Sequential Diagram
Specification Class Diagram
Specifying Object Interfaces.
Designing the Data Access layer.
Design User Interface layer
Designing System Interfaces, Controls and Security.

7) Design Refinement   (2)

Designing for Extensibility
Design for reusability.
Portioning class space
Checking Completeness and correctness.

8) Persistent Object and Database Issues   (3)

The Codd Data Management Domain.
Object Persistence
Object-oriented Database Management System
Object- Oriented verses Relational Database.
Mapping object to Relational Data structure.

9) Testing   (2)

Introduction to Testing Strategies.
Impact of Object Orientation on Testing.
Testing Business Process.
Design Matrix
Discovering reusable pattern.

10) Patterns **(2)**
Benefits of patterns.
Concept of Pattern & Anti pattern.

Books :
- Object Oriented Analysis and Design with Applications by Grady Booch., Benjamin / Cummings , 1994.
- Object – Oriented Modeling and Design by J Rumbaugh, M Blaha, W .Premerlani
- Principles of Object- Oriented Software Development by Anton Eliens , Addison Wesley.
- Object Oriented System Development by Ali Bahrami McGRAW-HILL International Edition.
- Object-Oriented Software Engineering by Ivar Jacobson Pearson Education INC
- Applying UML And Pattern – by Craig Larman , Pearson Education INC
- UML Distilled by Martin Flowler Pearson Education INC
- The Unified Modeling Language User Guide by Grady Booch, James Rumbaugh, Ivar Jacobson-Pearson Education INC
- The Unified Modeling Language Reference Guide by Grady Booch, James Rumbaugh, Ivar Jacobson-Pearson Education INC
- Design Object- Oriented Software by Rebecea Wrifs- Brock. Brian Wilkerson, Lauren Wiener
- Object Oriented Analysis and Design by Bennett , Simon McGraw Hill.
- Designing Flexible Object Oriented System with UML by Charless Richter, Techmedia
- Instant UML – Muller – Apress LP
- UML Instant – Thomas A Pendar – Wiley Publication
- UML in Nutshell

Practical [207]

The practical sessions and assignments would be based on the topics covered in the subjects – 201,202,203,204/205.

SEMESTER III

LINUX PROGRAMMING [301]

1) LINUX OPERATING SYSTEMS   **(10)**

Linux Operating System Concepts and Architecture
Overview of the Linux Kernel, User Space, Kernel Space,
Processes and Daemons, Process Control
Overview of Linux Administration
Linux File system, User, Group and Resource Management
Configuration Files Overview
File system Permissions, Access Permissions and Security,
Common File system Commands,
Recursion Option in Commands , Find, Grep, Cat,
More, Less and Sort Commands
Installation, Partitioning and Disk Management, Disk Naming,
Planning the Disk Partitioning Scheme, Disk Management Practices,
Installing and Selecting Software, Selecting Services for Startup, Configuration
Utilities, Updating Software and Package Management
System Startup, Shutdown and Reboot
System Boot Process Runlevels, Rc.d and init.d Directories,
Startup Scripts, PS Command Options,Top, and Nice/renice
Inetd/Xinetd Superdeamon, Restarting Services After Configuration Changes
Terminating Process, Init Command, Shutdown Command
Data Backup, Restore and Disaster Recovery
Backup Considerations, Backup Types, Backup Utilities and Methods
Scripting Backup, Restoring Data, Booting with Rescue Disk

2) Apache Web Server   **(8)**

Linux distribution Apache Installation
Starting and stopping Web Server
Apache Configuration files
Apache Directives
   Server Configuration
   Directory level configuration: ht access and <Directory>
   Access Control
   URL Pathnames
   MIME types
   CGI files
   Automatic directory Indexing
   Authentication
   Log files
Virtual Hosting
   IP Address Virtual Host
   Name Based Virtual Host
   Dynamic Virtual Hosting

Server Side includes
Apache GUI Configuration Tools - comanche and linuxconf
 Web Server Security -SSL
Apache Web Server Configuration files

3) MYSQL Database server   (10)

Installation
   precompiled packages
   post installed configuration
   post installed troubleshooting
MySQL Administration
Commands
   myisamchk
   mysql
   mysqladmin
   mysqlbug
   mysqlimport
   mysqlshow
Creating users and granting them permissions
Creating databases
Data types
Creating a table
Graphical tools

4) PHP Pragramming   (12)

 Obtaining, Installing and Configuring PHP
 Obtaining PHP Source Code
 Installing PHP from Binary Packages
 PHP and Security Considerations
 PHP Configuration Parameters and the php.ini File
 Language Options ,Register Globals and Security
 Resource Limits Parameters, Error Handling and Logging Parameters Data Handling
 Parameters , Paths and Directories,
 Dynamic Extensions, Checking Install with phpinfo Function.
Introduction
 HTML/XHTML and HTTP Basics Review
 PHP and the Web Server Architecture Model
 Overview of PHP Capabilities
 CGI vs. Shared Object Model
 PHP HTML Embedding Tags and Syntax
 Simple PHP Script Example
 PHP and HTTP Environment Variables
PHP Language Core
 Variables, Constants and Data Types, and Operators
 Decision Making , Flow Control and Loops

Arrays and Array Operations , Two-Dimensional and Multi-dimensional Arrays, Strings
and String Operations
Functions, Function Declaration and Parameter Passing
Outputting Data Include and Require Statements
File and Directory Access Operations
Error Handling and Reporting Considerations

Processing HTML Form Input from the User
Creating a Dynamic HTML Form with PHP
Login and Authenticating Users
Using GET, POST, SESSION, and COOKIE variables
Session Management and Variables
Working with Cookies, Sending Email
Object-oriented PHP: Classes and Constructors
Database Operations with PHP
Built-in Database Functions, Connecting to a MySQL Database
Selecting a Database, Building and Sending the Query to Database Engine, Retrieving
Results Retrieving, Updating and Inserting Data
Sample Database Routines and Code Segments, Logging Database Operations for
Troubleshooting

Books :

- The Complete reference Linux" peterson" Tata McGraw Hill.
- Beginning Linux Programmig- Wrox Press
- Begninning PHP, Apache, MySQL Web Development
- Teach Yourself MySQL in 21 days - Techmedia

BUSINESS APPLICATIONS [302]

1) Sales and Distribution (**6**)

        Sales Budgeting – Market segments / Customers / Products
        Customers Enquiry and preparation of Quotation
        Customer Order processing – from Order acknowledgement to dispatch and
            invoicing
        Pending Customer orders – follow up
        Sales Analysis
        Network of Sales outlet – Distributed Databases
While explaining this application consider an organisation manufacturing
multiple products with sales outlets spread across the country.

2) Manufacturing (**10**)

        BOM processing with product configuration
        MPS
        Capacity Requirements Planning for Equipment, Manpower and Time
        MRP
        Production Planning – work order management – EOQ, EBQ
        Shop floor control – calculation of labour efficiency, productivity and
            equipement down – time analysis
        Material procurement – Indenting, Purchasing, Vendor analysis, supplier's
            Bill passig and receipt of material.
        Stock accounting and control – raw material, work-in-process and Finished
            goods
        Job / Product / WIP costing – Standard, FIFO, LIFO, Avg, Wtd. Avg
        Sub-contracting of work to outside vendors

3) Financial Accounting (**12**)

        Accounting – General Ledger
        Balance Sheet, P&L , Schedules
        Trial Balance
        Journals / Day books
        Ratio / Expense analysis
        Account Receivable
        Account Payables

4) Human Resource (**12**)

        Employee Database
        Recruitment
        Employee appraisal
        Employee training
        Leave accounting
        Payroll
                Salary calculation and reporting
                Income Tax calculation and reporting

Loan accounting
PF and gratuity
Bonus, Ex-gratia, Incentive, Superannuation
Arrears calculation

Books :
- MIS   by W.S. Jawadekar
- MIS   by Jerome Kanter
- MIS   by Gordon B. Davis
- MIS   by Laudon and Laudon
- Marketing Management by Philip Kotler
- Fundamentals of Financial management by Prasanna Chandra
- Personnel managament by C. B. Mammoria
- Human Resource and Personnel Management by K Aswathapa
- Production and Operations Management by Mayer
- Modern Production Management by R V Badi

ADVANCE JAVA [303]

1) NetWorking **(5)**

Networking basics, Socket, port, Proxy servers, Internet addressing and URL, java.net – networking classes and interfaces, Implementing TCP/IP based Server and Client. Classes to be covered Socket, ServerSocket, IPAddress, URL connections; Programs on chatting 1-1 & 1-M (Threading)

2) JDBC **(5)**

Types of JDBC Drivers, Writing JDBC applications using select, insert, delete, update; Types of Statement objects (Statement, PreparedStatement and CallableStatement); ResultSet, ResultsetMetaData; Inserting and updating records, Connection Pooling.

3) RMI **(1)**

Introduction of RMI & Architecture (No programming is expected)

4) Java Beans **(1)**

Introduction to Java Bean
Rules for writing a Simple Bean

5) Java Naming Directory Interface API **(1)**

Java Naming Directory Interface concept

6) Servlets **(12)**

Student should know how to configure TOMCAT; directory structure for a web Application; Servlet API Overview; Writing and running Simple Servlet. Servlet Life Cycle, GenericServlet and HttpServlet, ServletConfig & ServletContext; Writing servlet to Handle Get and Post Methods, Reading user request data; Writing thread safe servlets, Http Tunneling, Concept of cookie, Reading and writing cookies; Need of Session Management. Types of Session management; Using HttpSession Object ; Servlet & JDBC

7) JSP **(12)**

Why JSP? JSP Directives, writing simple JSP page; Scripting Elements; JSP Actions: JSP & Java Beans; JSP Actions: include, forward and plugin, Managing sessions using JSP; JSP & Databases;
Error Handling in JSP; Writing custom tags; **JSTL –** c, x, frmt, sql, fn, Expression Language, Implicit objects – (request, response, pageContext, session, application), Comments; Java Beans and JSP; Different scopes in a JSP page; Using JDBC in JSP; Study and Development of a Web Application and an Assignment. Tags c:out, c:set, c:if, c:catch, c:choose, c:when, c:otherwise, c:redirect, c:forEach, fmt:parseDate, fn:escapeXml, sql:query, sql:update

8) Introduction to Struts **(3)**

(A Web Application Framework) – struts-config.xml; Understanding MVC architecture; ActionServlet, ActionForm, ActionMapping, Action classes.

Books :
- Core Java Volume-I, Horstman and Cornell, Pearson Education
- Core Java Volume-II, Horstman and Cornell, Pearson Education
- Inside Servlets – Dustin R. Callway- Pearson Education
- Developing Java Servlets – James Goodwill. Techmedia.
- JSP Professional – Wrox Press
- Java Server Programming – Volume I and II – Wrox Press
- Java Tutorial Continued - Campione, Walrath, Humal and Tutrial Team –Addison Wesley
- The Complete Reference J2EE – Jim Keogh – Tata McGRAW Hill
- SCWCD Exam Study kit – Hanumant Deshmukh
- O'Reilly Book on Servlet and JSP

ADVANCE RUBY [304]

1) Socket Programming (8)
    Usage of TCPServer and TCPSocket Classes for Date and Time
    Basic Networking
    Port
    Internet Addresses
    Sockets
    Socket classes
    The Date Time Server and Client

2) Ruby/Tk (6)
    Simple Ruby/Tk applications; Logger class

3) Web Services (6)
    Introduction

4) Ruby with MySQL (6)
    Introduction

5) SMTP class (3)

6) An introduction (1)

7) Ruby on Rails (10)
    An introduction

Books:
    Programming Ruby by Dave Thomas
    Learn to Program by Chris Pine
    Ruby For Rails by David Black
    Beginning Ruby by Peter Cooper

VB.NET [305]

1) Introduction to VB.NET   **(4)**
Event Driven Programming
.NET as better Programming Platform
.NET Framework
NET Architecture
The Just-In-Time Compiler
 .NET Framework class library introduction

2) VB.NET Development Environment   **(2)**
Creating Applications
Building Projects
Using simple components
Running VB.NET applications

3) Mastering VB Language   **(3)**
Data, Operators, Conditionals and Loops.
Procedures, Error Handling, Classes and Objects.

4) Windows Applications in VB.NET   **(7)**
Windows Forms
Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons.
List Boxes, Combo Boxes. Picture Boxes, Scrollbars, Splitters, Timer
Menus, Built-in Dialogs
Image List, Tree Views, List Views, Toolbars, Status Bar and Progress bars.

5) Object Oriented Programming in VB.NET   **(6)**
Class and Object
Properties, methods and events.
Constructors and Destructors
Method overloading
Inheritance
Access modifiers : Public, Private, Protected, Friend.
Overloading and Overriding.
Interfaces.
Polymorphism.

6) File handling   **(4)**
File handling using FileStream, StreamWriter, StreamReader, BinaryReader,
BinaryWriter classes.
File and Directory Classes

7) Databases in VB .NET   **(8)**
Database : Connections, Data adapters, and datasets, Data Reader,
Connection to database with server explorer

Multiple Table Connection
Data binding with controls like Text Boxes, List Boxes, Data grid etc.
Navigating data source
Data Grid View, Data form wizard
Data validation
Connection Objects, Command Objects, Data Adapters, Dataset Class

8) Crystal Report   **(6)**
Connection to Database, Table, Queries, Building Report, Modifying Report,
Formatting Fields and Object
Header, Footer, Details, Group Header, Group footer, Summery
Working with formula fields, Parameter fields, Group, Special fields
Working with Multiple Tables, SQL in Crystal Report, Report Temples,

Books
- Programming Microsoft Visual Basic.NET – Francesco Balena
- The Complete Reference -Visual Basic .NET – Jefrey R. Shapiro
- Murach's VB.NET database programming with ADO.NET -Anne Prince and Doug Lowe
- The Visual Basic.NET COACH
- Visual Basic .NET 2003 in 21 Days. – Steven Holzner, SAMS Publications.
- Mastering Crystal Report - BPB Publication
- Crystal Report – The Complete Reference :- Tata McGraw Hill

SOFTWARE PROJECT MANAGEMENT [306]

Note :
- Methodology must be case study oriented through out the syllabus.
- Faculty must design different cases and ask students to solve them(may be in groups) and do the proper assessment

1) Software Project Management   **(3)**
Concepts, Umbrella Activities under Software Project Management.

2) Software Project Planning tools and techniques   **(6)**
Work breakdown Structure
Milestones, Software Sizing, Rayleigh curve etc.
Cost Estimation techniques like COCOMO, Function Point Analysis and other Cost Estimation methods. Time Estimation Tools like CPM/PERT, Gantt charts and other methods, COCOMO for time estimation etc. (Use of MS-PROJECT is recommended).

3) Software Project Maintenance   **(6)**
Types, steps, Resource planning and estimation, Re-engineering the software products, Documentation standards, Version Control and Software Configuration Management.

4) Software Quality Management   **(6)**
QC and QA, V & V Planning, tools and techniques (reviews, inspections, walkthroughs etc.), Software Quality parameters with their definitions, Introduction to ISO and CMM.

5) Software Testing   **(3)**
Techniques, test plans, Introduction to manual testing and Automated testing tools.

6) User Acceptance Testing   **(3)**
Implementation Planning, Steps, methods, Documentation etc.

7) Software Risk Management – concepts, need, steps   **(3)**

8) IT Management Functions   **(2)**
Resource Management, Overview of various functions, Requirements planning, sizing, benchmarking, documentation etc.

9) Software and Hardware Acquisition Plan and standards   **(2)**

10) IT-HR Management   **(2)**
Selection, retention, training, career path planning, various practices and controls necessary in HR Management.

11) IT-Operations Management **(2)**

   Scheduling, roles and responsibilities, procedures, practices, standards etc.

12) Performance Evaluation methods for Hardware, Software & Personnel. **(2)**

Books :
- Software Project Management by Edwin Bennatan
- Software Engineering by Roger S Pressman
- Software Engineering by Martin L Shooman
- TQM for Computer Software by Dunn and Ullman
- Management of Information Technology by Pravin Mulay.
- Software Project Management in Practice by Pankaj Jalote
- Software Project Management A concise study by S A Kelkar

Practical [307]

The practical sessions and assignments would be based on the topics covered in the subjects – 301,303/304,305

MOBILE COMPUTING [401]

1) Introduction   **(8)**
Medium access control - Telecommunication systems - Satellite systems - Broadcast systems.

2) Standards   **(8)**
Wireless LAN - IEEE 802.11 - HIPERLAN - Bluetooth.

3) Adhoc Networks   **(8)**
Characteristics - Performance issues - Routing in mobile hosts.

4) Network issues   **(8)**
Mobile IP - DHCP - Mobile transport layer - Indirect TCP - Snooping TCP - Mobile TCP - Transmission / timeout freezing - Selective retransmission - Transaction oriented TCP.

5) Application issues   **(8)**
Wireless application protocol - Dynamic DNS - File systems - Synchronization protocol - Context-aware applications - Security - Analysis of existing wireless network .

Books :
- J. Schiller, Mobile Communications, Addison Wesley,2000.
- http://www.bluetooth.com/
- William C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley,1993.

PROGRAM AND DESIGN WITH ASP.NET [402]

1) Upgrading ASP to ASP.NET   **(2)**
    ASP vs. ASP.NET
    Upgrading HTML Pages to ASP.NET
    Upgrading ASP Pages to ASP.NET

2) Creating Web Forms Applications   **(4)**
    Creating an ASP.NET Web Application Project
    Responding to Events
    Where Does Processing Occur?
    Namespace Fundamentals
    Maintaining State Information

3) Creating a User Interface   **(5)**
    Using Controls
    Validating Data
    Navigating Between Forms
    Navigation Between Pages

4) Data Binding   **(3)**
    Bind Data to the UI
    Transform and Filter Data

5) Storing and Retrieving Data with ADO.NET   **(7)**
    Accessing Data with ADO.NET
    Using Data Sets on Web Forms
    Processing Transactions

6) Catching and Correcting Errors   **(4)**
    Using Exception Handling
    Using Error Pages
    Logging Exceptions

7) Web Services   **(4)**
    Creating Web Services
    Discovering Web Services
    Instantiating and Invoking Web Services

8) Testing Web Applications   **(3)**
    Creating Tests
    Running Tests
    Debugging

9) Building and Deploying Web Applications **(4)**

      Building a Web Application

      Deploying a Web Application

      Creating an Installation Program

10) Maintaining Security **(4)**

      Authenticating and Authorizing Users

      Using Windows Authentication

      Using Forms Authentication

Books

- Mastering ASP.Net - BPB Publication
- ASP.net – The Complete Reference- Tata McGraw Hill
- Active Server Pages 3.0 (in 21 days) - by Techmedia
- Beginning Active Server Pages 3.0 - by Wrox Press

INFORMATION SECURITY [403]

1) Global information systems and their evolution, basics of information systems, role of the Internet and the World Wide Web **(5)**

2) Understanding about the threats to information systems security Building blocks of InfoSec, How Organizations manage security of their information systems **(5)**

3) Information security risk analysis fundamentals Importance of physical security and biometrics controls for protecting information systems assets **(4)**

4) Security considerations for the mobile work force **(2)**

5) Network security perspectives, networking and digital communications (overview only), security of wireless networks. **(4)**

6) Cryptographic techniques and Encryption, Intrusion Detection Systems and Firewalls, security of virtual private networks **(3)**

7) Security issues in application development with emphasis on integration of enterprise applications, database security, operating security and security of electronic mailing systems **(3)**

8) Security models and frameworks and standards through introduction to the ISO 27001, SSE-CMM (systems security engineering – capability maturity model), COBIT (Control Objectives for Information and related technologies) and the Sarbanes-Oxley Act (SOX) and SAS 70 (statement on auditing standards) **(5)**

9) Privacy Fundamentals, business practices' impact on data privacy, technological impact on data privacy, privacy issues in web services and applications based on web services **(3)**

10) Information security best practices – staffing, audits, disaster recovery planning and business continuity planning and asset Management **(3)**

11) Ethical issues and intellectual property concerns for information security professionals – copy right, data protection etc. matters **(3)**

Note :
Students will be encouraged to consider real life situations involving information systems security. Students will be provided significant freedom of choice to choose their assignments. Colleges are encouraged to develop rapport with external agencies/vendors to arrange demos of security products. The course on Electronic Commerce is a complementary course to this and must be made compulsory in the same semester where this course is offered to students.

Books :

- Information Systems Security Management by Nina S. Godbole (Wiley   India Pvt.Ltd.)
- Security Engineering by Ross Anderson
- Information Security Management Handbook by Harold Tpton & Micki Krause (Auerbach Publications) 0-8493-1997-8/03
- Network Security Essentials: Applications and Standards W. Stallings (Pearson Education) ISBN 0-13-016093-8
- Security Planning & Disaster Recovery by Eric Maiwald and William Sieglein (Tata McGraw-Hill) ISBN 0-07-049555-6
- Security Patterns: Integrating Security and Systems Engineering by Markus Schumacher, Eduardo Fernandez- Buglioni, Duane Hyberston et al (Wiley India Pvt. Ltd.) ISBN 81-265-0800-0
- eSecurity and You by Sandeep Oberoi (Tata McGraw-Hill) ISBN 0-07-040311-2

CYBER LAW [404]

1) Access Control **(8)**
Operating system Access Controls, Group and Roles, Access Control lists, Unix Operating System Security, Windows NT, Capabilities, Added Features in Windows 2000, Granularity, Sandboxing and Proof-carrying code, Hardware protection, Other technical Attacks.

2) Cryptography & PKI **(5)**
Symmetric Cryptography, Asymmetric Cryptography, Keys, Hash Functions, Digital Signatures.

3) Distributed Systems **(3)**
Concurrency, Fault Tolerance and Fault Recovery, Naming.

4) Multilevel and Multilateral Security **(3)**
Multilevel Security, Multilateral Security

5) Electronic Banking **(2)**
Banking and Bookkeeping.

6) Monitoring Systems **(3)**
Introduction, Alarms, Prepayment Masters.

7) Biometrics **(3)**
Physiological biometric techniques, behavioral biometric techniques,
New biometric techniques, biometric systems.

8) Incident Response **(3)**
Incident Response, Prerequistes to planning an IRT.

9) Network attack and Defence **(4)**
Most Common Attacks, Scripts Kiddies and Packaged Defence.

10) Management Issues : Organisational Issues, **(2)**

11) Protecting E-commerce Systems – Introduction **(2)**

12) Hacking – Introduction **(2)**
. At least two Case Studies on each topic.

Books
- Cyber Laws – Singh Yatindra
- Cyber Crime – Bansal S K
- Cyber law , E-commerce & M-Commerce – Ahmand Tabrez
- Handbook of Cyber and E-commerce laws – Bakshi P M & Suri R K

MULTIMEDIA AND WEB DESIGNING [405]

Multimedia

1) **About Multimedia** (1)

2) **Fundamental concepts in Text and Image** (5)
   Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

3) **Fundamental concepts in video and digital audio** (5)
   Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

4) **Multimedia data compression** (5)
   Lossless compression algorithm- Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm uantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotreef Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

Web Designing

1) **Introduction to WWW, Web publishing, Web Hosting** (1)

2) **HTML** (3)
   tags, lists, tables, Frames, layers , using images in web pages and DHTML

3) **VB script** (5)
   Introduction in VB Script
   Data types, operators, control structures, functions and strings.

4) **JavaScript** (5)
   Introduction to java script.
   Operators, identifiers, control structures, functions arrays and error handling.

5) **ASP** (5)
   Introduction to ASP
   Writing simple ASP Pages, request and response objects, file inclusion, Tracking users, Application and Session object, sessions, error handling.

6) XML **(5)**

Introduction to XML , XML and CSS, using XML data source object, XML namespaces , writing simple Style Sheets using XSLT.

Books

- Mastering HTML- CYBEX Publication
- Complete Refrence VB Script and Java Script – Tata McGraw Hill
- ASP.Net Black Book - Dreamtech Publication
- Professional XML - Wrox Publication
- Mastering E-Business Infrastructure (Multimedia Systems and Applications) - Wrox Publication

SOFT SKILLS [406]

1) Self Development and Assessment   **(15)**
Self-Assessment
Self-Awareness,
Perception and Attitudes
Values and Belief System
Personal Goal Setting
Career Planning,
Self-Esteem,
Building of Self-Confidence

2) Components of communication, Principles of communication,   **(15)**
barriers, listening skills, Verbal Communication
Planning, Preparation, Delivery,
Feedback and Assessment of activities like
- Public speaking
- Group Discussion
- Oral Presentation skills,
- Perfect Interview
- Listening and observation skills, Body language
- Use of Presentation graphics
- Use of Presentation aids, Study of communication.

3) Written Communication   **(18)**
Technical Writing–Technical Reports
Project Proposals,
Brochures,
Newsletters,
Technical Articles
Technical Manuals
Official/Business Correspondence
- Business letters
- Memos
- Progress report, Minutes of meeting, Event reporting,
- Use of style, Grammar and Vocabulary for effective technical writing,
- Use of : Tools, Guidelines for technical writing, Publishing

4) Ethics and Etiquettes   **(06)**
Business Ethics
Etiquettes in social as well as Office settings
Email etiquettes
Telephone Etiquettes
Engineering ethics and ethics as an IT professional, Civic Sense.

5) Other Skills   **(08)**

      Managing time

      Meditation

      Understanding roles of Engineer and their Responsibility

      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, creativity.

References for students for self-improvement by self-study

Topic 1 : Any good book like

1. You Can Win – Shiv Khera – Macmillan Books – 2003 Revised Edition
2. 7 Habits of Highly effective people – Stephen Covey
3. Business Communication ? Asha Kaul
4. Business Communication - M. Balasubramanyam

Topic 2 and 3

1. John Collin, "Perfect Presentation", Video Arts MARSHAL
2. Jenny Rogers " Effective Interviews", Video Arts MARSHAL
3. Raman Sharma, " Technical Communications", OXFORD
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", TAG McGraw Hill ISBN 0-07-044555-9
6. Video 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 0-40221-3

Topic 4 and 5

1. Tim Hindle, "Reducing Stress", Essential Manager series Dk Publishing
2. Sheila Cameron, "Business student Handbook", Pitman Publishing
3. Dr. R. L. Bhatia, " Managing time for competitive edge"
4. Lorayne Lucas "Memory Book"
5. Robert Heller, "Effective leadership", Essential Manager series Dk Publishing
9. Newstrom Keith Davis," Organizational Behavior", Tata McGraw-Hill, 0-07-460358-2

It is proposed that expert from industry be invited to conduct lectures and workshops to understand the industry soft-skill requirement.

Guidelines for term-work
List Of Possible Assignments:
1. Write a personal essay and or resume or statement of purpose which may include:
   - Who am I (family background, past achievements, past activities of significance)
   - Strength and weakness (how to tackle them) (SWOT analysis)
   - Personal Short-term Goals, long term goals and action plan to achieve them
   - Self assessment on soft-skills
2. Student could review and present to a group from the following ideas
   - Book review
   - Biographical Sketch
   - Any topic such as an inspirational story/personal values/beliefs/current topic
   - Ethics and etiquettes and social responsibilities as professional.
3 Student will present to a group from the following ideas
   - Multimedia based oral presentation on any topic of choice (Business/Technical)
   - Public speaking exercise in the form of debate or elocution on any topic of choice
4 Student will undergo two activities related to verbal/non-verbal skills from following
   - Appearing for mock personal interviews
   - Participating in group discussion on current affairs/Social Issue/ethics and etiquettes
   - Participating in games, role-playing exercises to highlight nonverbal skills.
5 Student will submit one technical document from the following:
   - Project proposal
   - Product brochure
   - Literature survey on any one topic
   - User Manual
   - Technical Help
6 Student will submit one business document from the following
   - A representative official correspondence
   - Minutes of meeting
   - Work progress report

7 Students will participate in one or two activities from following:
   -Team games for team building
   -Situational games fro role playing as leaders, members
   -Organizing mock events
   -Conducting meetings
8 Faculty may arrange one or more sessions from following :
   -Yoga and mediation
   -Stress management, relaxation exercises and fitness exercises
   -Time management and personal planning sessions
   -Improving memory skills
   -Improving leadership skills
   -Improving English conversation skills

-Reading comprehension skills & notes taking skills
9. Students' own SWOT Analysis
   Students are expected to keep a personal record of any six activities that they conduct in the soft skill laboratory in the form of a journal. All students need note to do the same assignments. Institute having a freedom within the framework to customize set of activities to be followed.

Assessment Guidelines for term-work assessment
1. Written Communications 20 marks
   - Students could submit for example
   - Personal resume, essay
   - Technical document or business document
2. Spoken communication 20 marks
   - One elocution event of say 8-10 minutes individually
   - One group discussion or group presentation event
3. Overall participation in soft skills based lab activities 10 marks
   - Attendance and enthusiasm
   - Participation and contribution in event management, organizing
   - Group games, group exercises, interpersonal skills observed
   - 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)

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 exercises. (2 sessions).
4. Group discussions could be done for groups of 5-8 students at a time for half 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)

QUALITY CONTROL AND SOFTWARE TESTING [407]

Note :

The relationship of software testing to quality is examined with an emphasis on testing techniques and the role of testing in the validation of system requirements. International Testing certifications such as the CSTE (Certified Software Test Engineer) from the QAI (Quality Assurance Institute) can be considered as the benchmark reference for this paper. However, this is optional. QAI may allow students without experience to write the CSTE certification exam – for that refer to www.softwarecertifications.org. (accessed 12th April 2008)

For understanding the CSTE pre-requisites, visits this link from the above mentioned site: http://www.softwarecertifications.org/qai_cste.htm (accessed 12th April 2008)

For online access to CSTE-CBOK (Common Body of Knowledge), visit this link http://www.softwarecertifications.org/cstebok/cstebok.htm (accessed 12th April 2008)

Assumptions: this course is deeply linked with the
[1] Software Quality Assurance paper and the
[2] Paper that introduces students to the SDLC (systems development life cycle)
[3] Software Project Management Fundamentals

The assumption is that through either of those two courses, students are introduced to the topic of Configuration Management and Change Management.

Another assumption is that paper [1] paper [2] and paper [3] are taught either in the same semester as this paper or have already was completed before students take up this paper.

1) Testing Fundamentals **(4)**

 QA (Quality Assurance) vis-à-vis QC (Quality Control)
 V model of software testing and the testing work flow
 Testing Techniques and Levels of Testing
 Static versus Dynamic testing
 Deliverables/artefacts generated from the testing phase of software project
 Role of the Software Tester vis-a-via the project team

2) Testing Methods & Techniques **(6)**

 Unit Testing
 Integration Testing
 Functional and System testing
  Stress Testing
  Performance Testing
  Usability Testing
 Non-functional testing
 System Testing
 Acceptance Testing
 Regression Testing

Beta Testing
Black Box versus White Box Testing

3) Verification techniques such as the (code) Inspection, Walk-Through, Peer Reviews **(2)**

4) Understanding the Test Environment. This includes understanding the following components of the testing environment: **(5)**
. organization's policies & procedures
. culture, attitudes, rewards, test processes
. Stakeholders in software testing phase
. management's support of software testing, as well as any test labs developed for the purpose of testing software and multiple operating environments
test tools, methods for developing and improving test processes

5) Test Design and Documentation **(3)**
Deriving effective test cases from requirements
Bi-directional Traceability of test artifacts
Handling test artefacts as 'living documents'

6) Understanding Testing Tools and Configuration Management Tools **(2)**

7) Understanding Testing approaches to different Types of Software Systems and applications **(5)**
Testing COTS (Commercial Off-the-Shelf Software)
Web-based applications/Electronic Commerce applications
Testing Data-Warehouse products
Object-oriented systems
Wirless/Mobile Computing applications
Testing for Security
Testing software components of third party
Foreign Language testing
Web-site testing

8) Developing Risk based approach to testing and understanding how Software test plans get developed **(4)**
Identifying business risks and risk contributors
Learning to identify software risks
Understanding Testing risks
Test scoping and Effort Estimating
Understanding Test Schedule

9) Managing software testing projects and testing teams **(2)**
Test planning, scheduling and budgeting
Managing testing staff/resources

10) Introduction to Defect Management   **(2)**
      Defects, Errors and Bugs
      Defect Tracking
      Defect Reporting
      Defect Metrics

11) Introduction to Test Metrics and Measurements   **(2)**

12) Understanding Agile Testing and Xtreme Testing as approach to testing   **(1)**

13) Introduction to the TMM (Testing Maturity Model)   **(1)**

14) IEEE standards   **(1)**

NETWORK TECHNOLOGY [408]

1) Basic Theory **(5)**

    Types of Networks
    Peer-Peer Networks
    Client/Server Networks
    Host Terminal Network
    Wireless Network
    Wi-Fi Network
    Virtual Private Network
    Internet
    Intranet

2) Protocols **(5)**

    Network Protocols
        TCP/IP (IP4 & IP6)
        SPX/IPX
        NETBEUI
        Tunneling Protocols PPTP, L2TP,IP,SEC
Application Protocols
        FTP,TELNET,HTTP,HTTPS
Mail Protocols
        SMTP,POP,IMAP
Frame Formats & Standards
      Ethernet 802.2,802.3
      Wireless 802.11a,802.11g

3) Network Components **(3)**

        Connectivity Components

- Connectors RG45, Cables CAT 5, CAT 5E, CAT 6
- Ethernet Cards, HUBS, Switches, Routers Modems
- Dial-up Modem , ISDN Modem
- DSL(Cable) Modem
- Using Ethernet Card for Accessing Internet

4) Topologies (Bus, Star, Ring and Wireless loop) **(2)**

5) Microsoft Network Technology **(10)**
a. Features of Microsoft Windows Server 2003
        Server Roles
        File and print server
        Web server and Mail server Web application services
        Terminal server
        Remote access and virtual private network(VPN) server
        Directory services, Domain Name system(DNS), Dynamic Host Configuration
            Protocol(DHCP) server, and Windows Internet Naming Service(WINS)
b. Services

- Clustering Services
- Network load Balancing
- Security
- Common Language Runtime
- Internet Information Services(IIS 6.0)
- File and Print Services
- Active Directory
- Microsoft Software Update Services
- Storage Management
- Terminal Service
- Enterprise UDDI service
- Windows Media Services
- Microsoft .NET Framework
- Automated Deployment Service
- Windows Rights Management Service(RMS)
- Windows SharePoint Service

c. Features of various types of Servers

Standard Server
Ente``rprise Server
Data Center Server
Web Server
Small Business Server

d. Installation   (10)
- Installing 2003 Server
- Server Application Installation
- Installing and Configuring terminal Server
- Remote Installation Services
- Implementing Active Directory and domain
- Implementing Group Policy
- Implementing Web services using IS
- Implementing Remote Access Services RADIUS Server
- Implementing Windows 2003 VPN
- Configuring Printer
- Configuring Backup
- Adding users to groups
- Configuring Firewall
- Configuring DHCP Server
    Building small office and home network using WIN XP and WIN 2000
- Installing .NET Frame on Clients

6) LINUX Network Technology (10)

a. Concepts
      Linux File System and structure
      Default directories
      Network services
            http,https,ftp,nfs,BOOTTP,DHCP

b. Basic commands
      User Management
      File Management
      Process Management
      Printer and Device Management
      Network Management
      Package Management

c. Installation (10)
      Installing Linux server from CDs
      Installation Types
      Installation Class
      Preparing Partitions
      Selecting Packages
      Creating Book Disk
      Installing from Network
      Installation Server
      Selecting Installation source
      Configuring x-windows
      Configuring apache web server
      Configuring DCHP server
      Configuring firewalls
      Installing and configuring packages
      Preparing Remote book thin client for Linux(pxes)
      (for Linux RedHat Fedora 3 is to be used)

Books :
- Introduction to Networking Rechard McMohan Tata McGraw Hill Publication
- Computer Network Fundamentals and application – R S Rajesh Vikas Publication
- Unleashed Windows 2003 Server – Todd Brown & Chris Miller Techmedia SAMS Publication
- Microsoft Windows 2000 Professional – Paul Cassel Techmedia SAMS Publication
- Fedora 3 Bible – Christopher Negus Wiley Dreamtech Publication

      Websites : www.microsoft.com/server/2003/
                  www.redhat.com/fedora3/

PROJECT [409 & 410]

A project report has to be submitted as per the rules described in (IV). Some additional guidelines regarding the Project Report are:

Number of Copies:
The student should submit two hard-bound copies of the Project Report.

Acceptance/Rejection of Project Report:
The student must submit a Synopsis of the project report to the Institute for approval. The Director holds the right to accept the project or suggest modifications for resubmission. Only on acceptance of draft project report, the student should make the final copies.

Format of the Project Report:
The student must adhere strictly to the following format for the submission of the Project Report.

a. Paper:
The Report shall be typed on white paper, A4 size or continuous computer stationary bond, for the final submission. The Report to be submitted to the University of Pune must be original and subsequent copies may be photocopied on any paper.

b. Typing:
The typing shall be of standard letter size, double spaced and on one side of the paper only, using black ribbons and black carbons.

c. Margins:
The typing must be done in the following margins :
Left -----   35mm,   Right -----   20mm
Top -----   35mm,   Bottom -----   20mm

d. Binding:
The Report shall be rexin bound in black. Plastic and spiral bound Project Reports not be accepted.

e. Front Cover:
The front cover should contain the following details :

TOP   : The title in block capitals of 6mm to 15mm letters.
CENTRE: Full name in block capitals of 6mm to 10mm letters.
BOTTOM: Name of the University, Year of submission - all in block capitals of 6mm to 10mm letters on separate lines with proper spacing and centering.

f. Blank Sheets:
At the beginning and end of the report, two white black bound papers should be provided, one for the purpose of binding and other to be left blank.

The Guidelines regarding the documentation and scope of project are mentioned here below:

Practical [411]

The practical sessions and /or assignments would be based on the topics covered in the elective subjects.

<div align="center">**COMMERCIAL SYSTEM PROJECTS**</div>

Project Report should be submitted in following format for Commercial Application Projects viz.
Payroll, Sales, Purchase, Inventory, Book Shop, Examination system etc. Where VB, Access, Oracle, ASP and Java is used.

2 Blank Pages at beginning
Title Page
Certificate from Company
Certificate from Guide
Acknowledgement
Index with printed Page Numbers
CHAPTER 1 : INTRODUCTION
1.1 Company Profile
1.2 Existing System and Need for System
1.3 Scope of Work
1.4 Operating Environment – Hardware and Software
CHAPTER 2 : PROPOSED SYSTEM
2.1 Proposed System
2.2 Objectives of System
2.3 User Requirements
CHAPTER 3 : ANALYSIS & DESIGN
3.1 Data Flow Diagram (DFD)
3.2 Functional Decomposition Diagram (FDD)
3.3 Entity Relationship Diagram (ERD)
3.4 Data Dictionary
3.5 Table Design
3.6 Code Design
3.7 Menu Tree
3.8 Menu Screens
3.9 Input Screens
3.10 Report Formats
3.11 Test Procedures and Implementation
CHAPTER 4 : USER MANUAL
4.1 User Manual
4.2 Operations Manual / Menu Explanation
4.3 Forms and Report Specifications
Drawbacks and Limitations
Proposed Enhancements
Conclusion
Bibliography
ANNEXURES :

ANNEXURE 1 : INPUT FORMS WITH DATA
ANNEXURE 2 : OUTPUT REPORTS WITH DATA

ANNEXURE 3 : SAMPLE CODE

2 Blank Pages at the end.

TECHNICAL PROJECTS

Project report should be submitted in following format for project using OOAD,Embedded System, WAP and other technologies and Web Deployed Systems where C, C++, J2EE, .NET, OOAD and JAVA, SDK's, API's are used.

2 Blank Pages at beginning
Title Page
Certificate from Company
Certificate from Guide
Acknowledgement
Index with printed Page Numbers
CHAPTER 1 : INTRODUCTION
1.1 Company Profile
1.2 Existing System and Need for System
1.3 Scope of Work
1.4 Operating Environment – Hardware and Software
1.5 Detail Description of Technology Used
CHAPTER 2 : PROPOSED SYSTEM
2.1 Proposed System
2.2 Objectives of System
2.3 User Requirements
CHAPTER 3 : ANALYSIS & DESIGN
3.1 Object Diagram
3.2 Class Diagram
3.3 Use Case Diagrams
3.4 Module Hierarchy Diagram
3.5 Component Diagram
3.6 Deployment Diagram (in case of Web Deployment)
3.7 Module Specifications
3.8 Interface Diagram (in case of WAP and Embedded Systems)
3.9 Web Site Map Diagram (in case of Web Site)
3.10 User Interface Design (Screens etc.)
3.11 Table specifications (in case back end is a database)
3.12 Test Procedures and Implementation
CHAPTER 4 : USER MANUAL
4.1 User Manual
4.2 Operations Manual / Menu Explanation
4.3 Program Specifications / Flow Charts
Drawbacks and Limitations
Proposed Enhancements
Conclusion
Bibliography

ANNEXURES :
ANNEXURE 1 : USER INTERFACE SCREENS
ANNEXURE 2 : OUTPUT REPORTS WITH DATA (if any)
ANNEXURE 3 : SAMPLE PROGRAM CODE (which will prove sufficient
development is done by the student)
2 Blank Pages at the end.