PANJAB UNIVERSITY CHANDIGARH- 160014 (INDIA)

(Estted. under the Panjab University Act VII of 1947-enacted by the Govt. of India)

FACULTY OF SCIENCE

SYLLABI

FOR

MASTER OF COMPUTER APPLICATIONS (MCA)
(SEMESTER SYSTEM)

EXAMINATIONS 2020 – 2021.

i.e.
1st Semester, November/December, 2020
2nd Semester, May/June, 2021
3rd Semester, November/December, 2020
4th Semester, May/June, 2021
5th Semester, November/December, 2020
6th Semester, May/June, 2021

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APPLICABILITY OF REGULATIONS FOR THE TIME BEING IN FORCE

Notwithstanding the integrated nature of a course spread over more than one academic year, the regulations in force at the time a student joins a course shall hold good only for the examinations held during or at the end of the academic year. Nothing in these regulations shall be deemed to debar the University from amending the regulations subsequently and the amended regulations, if any, shall apply to all students whether old or new.

PANJAB UNIVERSITY, CHANDIGARH
Outlines of Tests, Syllabi and Courses of Reading for Master of Computer Applications (MCA)
(Three Year Degree Programme) for Session 2020 - 2021.

Paper Code	Paper Name	Theory & Practical Lectures	Univ. Exam. Marks	Int. Exam. Marks
FIRST YEAR				
	FIRST SEMESTER			
CS-78	Programming in C	4+4	80	20
CS-60	Computer Organization and Assembly Language	4+0	80	20
CS-61	Data Base Management Systems	4+0	80	20
CS-75	Mathematical Structures in Computer Science	4+0	80	20
CS-56	Linux Operating System	4+4	80	20
	SECOND SEMESTER			
CS-63	Data and File Structures(Using C)	4+4	80	20
CS-64	Object Oriented Programming (Through C++ And Java)	4+4	80	20
CS-48	Data Communication and Networks	4+0	80	20
CS-76	Computer Based Numerical and Statistical Methods	4+0	80	20
CS-07	Accounting and Financial Management	4+0	80	20
CS-81	MOOC			100
SECOND YEAR				
	THIRD SEMESTER			
CS-65	Software Engineering	4+0	80	20
CS-66	Operating Systems	4+0	80	20
CS-67	Analysis and Design of Algorithms	4+0	80	20
CS-77	ASP.NET Using C#	4+4	80	20
CS-69	Relational Data Base Management Systems	4+4	80	20
	FOURTH SEMESTER			
CS-79	Data Warehousing and Data Mining Techniques	4+0	80	20
CS-12	Interactive Computer Graphics	4+4	80	20
CS-37	Theory of Computations	4+0	80	20
CS-71	Artificial Intelligence (Using LISP)	4+0	80	20
CS-72	Advanced Java and Network Programming	4+4	80	20
THIRD YEAR				
	FIFTH SEMSTER			
CS-17	Computer Based Optimization Techniques	4+0	80	20
CS-57	Software Project Management	4+0	80	20
CS-58	Mobile Communication and Application Development	4+4	80	20
CS-59	Soft Computing Techniques using Neural Networks	4+4	80	20
CS-19	Seminar			
	Each student will be required to give seminar on selected topics. The seminars will carry 100 marks.			
	SIXTH SEMESTER			
CS-18	**PROJECT WORK**			
	The Project period will be of 16 to 20 weeks duration. The Project will involve development of application/system software in industries, commercial or scientific environment. It will carry 400 marks.		320	80

- **MOOC Courses available on the UGC Portal (SWAYAM) will be finalized at the start of the semester by Post Graduate Board of Studies in Computer Science and Applications.**

- **The evaluation of the MOOC Courses will be either in the online mode through the UGC Portal or in the offline mode by the Department of Computer Science & Applications.**

PRACTICAL EXAMINATIONS (SESSION 2020-21, 2021-22, 2022-23)
The Practical examination will be conducted for each of the following:

FIRST YEAR (1st and 2nd Semesters)		**SEMESTER**	**Prac. Exam. Marks**	**Int. Ass. Marks**
PR-11	Programming in C (Minor Project)	First	80	20
PR-12	Linux Operating System (Minor Project)	First	80	20
PR-03	C++ and Java Programming Language (Minor Project)	Second	80	20
PR-04	Data Structures (Minor Project)	Second	80	20
Each student is required to undergo two months Summer Training at the end of Second Semester. The Internal Assessment Marks for each practical will be based on Minor Project.				
SECOND YEAR (3rd and 4th Semesters)		**SEMESTER**	**Prac. Exam. Marks**	**Int. Ass. Marks**
PR-05	RDBMS (SQL Server/Oracle/My SQL) (Minor Project)	Third	80	20
PR-06	Programming in ASP.NET Using C# (Minor Project)	Third	80	20
PR-07	Computer Graphics and Algorithms Analysis (Minor Project)	Fourth	80	20
PR-08	Advanced Java and Network Programming (Minor Project)	Fourth	80	20
Each student is required to undergo two months Summer Training at the end of Fourth Semester. The Internal Assessment Marks for each practical will be based on Minor Project and Summer Training.				
THIRD YEAR (3rd and 4th Semesters)		**SEMESTER**	**Prac. Exam. Marks**	**Int. Ass. Marks**
PR-13	Mobile Application Development using Android (Minor Project)	Fifth	80	20
PR-14	Programming for Basic MATLAB & Soft Computing Techniques (Minor Project)	Fifth	80	20
The Internal Assessment Marks for each practical will be based on Minor Project.				

SYLLABUS AND COURSE OF READINGS

FIRST SEMESTER

Paper Title: PROGRAMMING in C

Paper Code: CS-78 Max. Marks : 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: The objective of this course is to assist students in developing the logic for solving a given problem using the procedure oriented language.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. **Problem Solving:**
Problem Identification, Analysis, Flowcharts, Decision tables, Pseudo codes and algorithms, Program coding, Program Testing and execution; Types of programming languages, Translators, Interpreters, Compilers, Assemblers and their comparison**.**

2. **Fundamentals of C language:**
History of C Language, Structure of a C program, Variables, Constants, Keywords, Data types, Operators, Expressions and their evaluation using rules of hierarchy, typecasting, Input/Output statements, Assignment statements, Control statements**:** if-else, switch, while, do-while, for, nested loops, break, continue, goto statements.

UNIT II

3. Functions: Declaration, Definition, function prototype, passing arguments: call by value, call by reference, Recursion and stack, Use of library functions, adding functions to the library, Functions with variable arguments; Storage classes: automatic, external and static variables.

4. Arrays: Defining and processing arrays, Passing array to a function, Using multi dimensional arrays, Solving matrices problems using arrays;

UNIT III

5. Strings and Pointers: String: declaration, Operations on strings, Two-dimensional array of characters; Pointer: declaration, Operations on pointers, Passing pointers to functions, , Arrays of pointers, Array of pointers to strings.

6. Structure and Union: Structures: Defining and processing, Passing structure to a function, Arrays of structures, Pointers and structures, Uses of structures; Unions: Defining and processing, Pointers and union, Union of structures, Uses of union.

UNIT IV

7. Files Handling: Concept of files, file opening modes, opening and closing of a file, reading from a file, writing onto a file, Error handling during I/O operations, Record I/O in Files.

8. **Miscellaneous:** Command line arguments, Enumerated data types, Renaming data types with typedef, Pre-processor directives, Using GCC for programming in C under Linux.

Suggested Readings:

1. Kanetkar ,Yashavant, 2016, Let Us C, BPB Publications.
2. Cooper, Mullish, 1987: The Spirit of C, An Introduction to Modern Programming, Jaico Publ. House, New Delhi.
3. Kenneth, A.: C Problem Solving and Programming, Prentice Hall International.
4. Kerninghan, B.W. &Ritchie, D.M.: The C Programming Language, Prentice Hall of International.
5. Gottfried, B.: Theory and Problems of Programming in C, Schaum Series.
6. Jones, A. /Kenith Harvow : C Programming with Problem Solving, Wiley India Pvt. Ltd.
7. Gookin, Dan : C Programming, Wiley India Pvt. Ltd.

Paper Title: COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE

Paper Code : CS-60 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives: The objective of the course is to provide students with a solid foundation in computer design. Examine the operation of the major building blocks of a computer system. To introduce students to the design and organization of modern digital computers by showing the relationship between hardware and software and focusing on the concepts that are the basis of the current computers such as microprocessors. Includes machine language, instruction set architecture, and control design, memory hierarchy, and Input / Output and communication. To introduce basic assembly language. Describe the instruction format/ set of a computer. Write simple assembly language programs.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Information Representation: Number Systems: binary, octal, decimal, hexadecimal numbers and their inter conversions; Complement's: (r-1)'s and (r)'s complement; Fixed-point and Floating-point representation of numbers; Error Detection and Correction codes: Parity Check, CRC, and Hamming Codes. Binary Logic: Digital logic gates, Boolean algebra, Boolean functions, truth tables, simplification of Boolean functions, K-maps for 2, 3 and 4 variables.

2. Basic Building Blocks:
Combinational logic design: half-adder, full adder, Encoder, Decoder, Multiplexer.
Sequential circuits -Concept, flip-flops (D, RS, JK, T, and Master-Slave); Registers: Buffer, Shift and Controlled shift registers; Counters: Binary, Ripple, Ring Counter.

UNIT II

3. Register Transfer and Micro-operations: Register Transfer Language, Bus and Memory Transfer, Logic and Shift micro-operations.

4. Computer Organization: Microcomputer Organization; Microprocessor Organization; Instruction codes, Instruction cycle, Instruction formats, Processing Unit Design: one, two and three- bus Organization.

UNIT III

5. Memory Organization:
Memory Hierarchy, Types of Memory: RAM and ROM Chips, Associative Memory, Cache Memory, Auxiliary Memory; Memory Address Map.

6. Input-Output Organization:
Input-output Interface, Memory-Mapped I/O; Interrupt, Interrupt Cycle, Types of Interrupt: Program interrupt, Priority Interrupts, Direct Memory Access (DMA).

UNIT IV

Assembly Language Programming:

7. Micro Processor Architecture: Microcomputer Architecture, Structure of 8086/8088 CPU, The Bus Interface Unit, Execution Unit (EU); Registers, Addressing modes, Instruction set for 8086/8088; Programmers model of a machine, Example of a typical 16 to 32 bit processor.

8.Introduction to Assembly Language: Machine vs Assembly Language, Assembler : One Pass and Two Pass Assembler, Assembly Language programs for : numeric manipulations and Simple string: String Reversal, Counting Vowels, Counting Characters, operations and sorting of a list using arrays.

Suggested Readings:

1. Mano, M.M., 1986: Computer System Architecture, Prentice Hall of India.
2. Mano, M.M: Digital Logic and Computer Design, Prentice Hall of India.
3. Indu Chhabra and Gursharan Singh: Insight into Microprocessors (Principles, Implementation and Technology), AP Publishers, New Delhi, India.
4. Tannenbaum, A.S.: Structured Computer Organization, Prentice Hall of India.
5. Assembler Manual for the Chosen Machine.
6. B. Brey: The Intel Microprocessors, Pearson Education.
7. Hayes: Computer Architecture and Organization, McGraw-Hill International Edition.
8. Sloan, M.E.: Computer Hardware and Organization, 2nd Edn. , Galgotia, Pvt. Ltd.
9. Malvino, Albert Paul: Digital Computer Electronics, 2nd Edn., Tata McGraw Hill Co.
10. Schaum Series: Introduction to Microprocessors.
11. Mathur, Aditya, P. : Introduction to Microprocessors, 2nd Edn., Tata McGraw-Hill Co.
12. Rafiquzzaman, Microprocessors & Microcomputers Based System Design, UBS.
13. Gupta, Vikas : Comdix Computer Hardware and Networking Course Kit, Wiley India Pvt. Ltd.
14. William, Jones B. : Assembly Language Programming for IBM PC Family, 3rd Edition, Wiley India Pvt. Ltd.
15. Duntmann, Jeff : Assembly Language Step by Step : Programming with DOS and Linux, 2nd Edition, Wiley India Pvt. Ltd.
16. Dandamundi, P. : Fundamentals of Computer Organization and Design, Wiley India Pvt. Ltd.

Paper Title: DATABASE MANAGEMENT SYSTEMS

Paper Code: CS-61 Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: The objective of this course is to teach the student concepts related to database, database design techniques, transaction management, crash recovery, backup and security of databases.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. **Basic Concepts:** Database, DBMS: Need, Characteristics, Database Users, 3-tier Architecture, Advantages over 2-tier, Components, Advantages, Disadvantages, Views of data-schemas and instances, Data independence, Conventional data models & systems.

2. **Data Models:** Data Associations, Representation of associations and relationships, Data models classification: File based System, Traditional data models - Hierarchical, Network, Relational Models. Entity- relationship model: Entities, Relationships, Representation of entities, attributes, Representation of relationship set, Generalization, Aggregation.

UNIT II

3. Storage and File Organization : Overview of physical storage media, RAID , Storage access; File organization, Operations on Files, Serial Files, Sequential Files , Index-Sequential Files, Direct Files .

4. The Relational Model: Relational Database: Attributes, Domains, Tuples, Relations and their schemes, relation representation, Keys, relationship, relational operations, Integrity constraints.

UNIT III

5. Relational Algebra and Relational Calculus: Relational Algebra: Operations- union, intersection, difference, Cartesian product, projection, selection, division and relational algebra queries; Relational Calculus: Tuple oriented and domain oriented relational calculus and its operations.

6. Transaction and Concurrency control: Concept of Transaction, ACID properties, Serializibility, States of transaction, Concurrency control : Locking techniques ,Time stamp based protocols, Granularity of data items, Deadlock .

UNIT IV

7. Crash Recovery and Backup: Failure classifications, storage structure, Recovery & Atomicity, Log base recovery, Recovery with concurrent transactions, Failure with loss of non-volatile storage, Database backup & recovery from catastrophic failure, Remote Backup System.

8. Security and privacy: Database security issues, Discretionary access control based on grant & revoking privilege, Mandatory access control and role based access control for multilevel security, Encryption & public key infrastructures.

Suggested Readings:

1. Introduction to database systems: C.J.Date
2. Database Management Systems : Bipin Desai
3. Database system concepts : Korth
4. Principles of Database Management: James Martin
5. Computer Database organization : James Martin
6. Fundamentals of Database Systems: Elmasri Navathe
7. Object-oriented modeling and design: Rumbaugh and Blaha
8. Object-oriented analysis and design: Grady Booch

Paper Title: MATHEMATICAL STRUCTURES IN COMPUTER SCIENCE

Paper Code: CS - 75 Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: To provide basic knowledge about mathematical structures required for various computer science courses.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT – I

1. **Mathematical Logic:**
Introduction, Conjunction, Disjunction & negation, Propositions and truth table, Tautologies and contradictions, Equivalence of formulas, Duality law, Normal forms: Disjunctive Normal form, Conjunctive Normal form, Predicate Calculus: Predicates, the statement function, variables and quantifiers, predicate formulas. Methods of proof (Inference Theory).

UNIT – II

3. **Ordered Sets, Latices, Boolean Algebra :**
Partially Ordered Sets, External elements of POSET, HASSE Diagrams of POSETS, Latices, Finite Boolean Algebra, Functions on Boolean algebra, Circuit Designs.

4. Introduction to Finite State Machine:
Introduction to Finite State Machine, Simplification of machine, Machine and regular languages.

UNIT – III

5. Graphs:
Incidence and Degree, Isomorphism, Connectedness, Walk, Path and Circuits, Shortest Path Algorithm between two Vertices, Eulerian graph, Directed graphs, Kuratowski's graphs; Detection of planarity.
6. **Trees:**
Properties of Trees, Rooted and Binary Trees; Directed Tree, Spanning Tree and tree traversals (Inorder, Preorder and Postorder)

UNIT – IV

7. **Functions:**
Composite functions & their range, domain, Functions for computer science like characteristic function, Hashing function, Growth of a function.

8. Recurrence Relations and Coding Theory :

Recursion, Recurrence Relation, Coding of binary Information & Error detection, Decoding & error correction.

Suggested Readings:

1. Kolman,Busby,Ross : discrete Mathematical Structure,PEARSON Education, 5th Edition.
2. Schaum Series: Theory and Problems of Essential Computer Mathematics, McGraw Hill,New York, 3rd Edition.
3. Sengadir,T. : Discrete Mathematics and Combinatorics, PEARSON Education.
4. Kenneth.H.Rosen: Discrete Mathematics and its Applications, Mc GRAW Hill, International Edition.
5. Deo, N. : Graph Theory with Applications to Engineering and Computer Science,PHI.
6. Clark, John &Hetlan: A First Look at Graph Theory, Allied Publishers Limited.

Paper Title: LINUX OPERATING SYSTEM
Paper Code: CS-56 Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: The objective of the course is to make students aware of the functioning of a multi-user operating system. This course will serve as a foundation for the higher level course in LINUX. The students are expected to learn the commands while doing practical and emphasis should be given to those switches/options and flags, which are most frequently used in real life.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. **Theoretical Concepts of LINUX Operating System:**

Basic Features of Operating System; File Structure; CPU Scheduling; memory management: Swapping, Demand paging; file system: ext2 and ext3 architecture, blocks and fragments, inodes directory structure;

2. Getting Started with LINUX:

User Names and Groups; Logging in; Changing your Password. Format of LINUX commands;

UNIT II

3. Characters with special meaning; LINUX Documentation; Files and Directories :

Current Directory, Access the directory contents, absolute and relative pathnames, some LINUX directories and files, Access file contents, file permissions, changing permission modes; Standard files, Standard output, Standard input, Standard Error, Filters and Pipelines, Processes: PID,PPID, Process creation, killing a process, stopping background process; LINUX vi Editor.

4. **Text Manipulation :**Inspecting Files; File Statistics; Searching for Patterns, Comparing Files; Operating on Files; Printing Files; Rearranging Files; Sorting Files; Splitting Files; Translating characters;

UNIT III

5. **Shell Programming :**

Programming in the Borne and the C-shell; wild cards, simple shell programs; shell variables; shell programming constructs; interactive shell scripts; Advanced features.

6. **System Administration:**

Definition, Booting the system, Maintaining user accounts, File System and Special Files, Backups and restoration, Role and functions of a system manager.

UNIT IV

7. System Calls : C as System Programming Language; I/O system calls – umask(); create(); open(); read(); write(); lseek(); dup(); link(); access(); chmod(); chown(); Process management system calls – fork(); getpid(); getppid(); exit(); wait(); sleep() ; Signal system calls – kill(); signal().

Suggested Readings :

1. Parker, Tim : Linux Unleashed, Latest Edition, Techmedia.
2. Tackett, J. : Special Edition using LINUX, PHI.
3. Norton, P. : Complete Guide to LINUX, Techmedia.
4. Komarinski, M. : LINUX System Administration Handbook, Prentice Hall.
5. Stones, Richard and Mathew Neil : Beginning Linux Programming, 3rd Edition, Wrox.
6. Nyus, Christopher, 2006 : Linux Bible, Wiley.
7. Graham, Steven : Linux Administration, Tata McGraw.
8. Jones, Tim : GNU/Linux Application Programming, Wiley India Pvt. Ltd.

SEMESTER II
Paper Title : DATA AND FILE STRUCTURES (USING C)

Paper Code : CS-63 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : The emphasis of this course is on the organization of information, the implementation of common data structures such as lists, stacks, queues, trees, and graphs.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. **Introduction to Data Structures:**
Concepts and definition of data types, Linear and non-linear data structures.

2. Array:

Representation of one and multidimensional arrays in memory, ADT, Operations: traversing, insertion, deletion, reversing, searching, sorting, merging two arrays; Matrix operations: addition, multiplication; Sparse matrices: ADT, representation; Applications of array : Polynomial evaluation and addition of two polynomial.

UNIT II

3. **Linked list:**

Introduction, sequential vs linked representation, Operations: Traversal, Creation, Insertion, Deletion, Reversing; Application of linked lists: Polynomial addition; Introduction to the operations of Circular linked lists and doubly linked lists; Fundamental concepts of dynamic memory allocation and garbage collection.

4. **Stacks And Queues :**

Sequential and linked representations, ADT, Stack Operations: Traversal, Pop, Push; Applications of stack: polish notation, infix to post fix, evaluating post fix expression; Queues: Sequential and linked representation , Queue operations : Traversal, insertion, deletion, Dequeue, Circular queues.

UNIT III

5. **Trees:**

Terminology, ADT, Types: Binary tree, Complete binary tree, Threaded Binary tree, Binary search tree, B-trees; Binary tree : properties, sequential and linked representation, Traversal Techniques: inorder, pre-order, post order; BST operations: traversal, searching, insertion, deletion.

6. **Sets and Graphs:**

Sets: representation, union and find algorithms; Graphs: ADT, types, sequential and linked representation; Operations: Insertion, deletion, traversal: DFS, BFS; Minimum cost spanning trees: Kruskal's and Prim's algorithm.

UNIT IV

7. **Searching and Sorting:**

Definition of recursion and its applications, Towers of Hanoi; Sorting Techniques: Bubble sort, Selection sort, Merger sort, Heap sort, Quick sort; Implementation of Linear and binary search techniques in C.

8. **File structures:**

Sequential file organization, variable length records and text files. Indexing structures: B-trees, ISAM, Hashing techniques for direct files.

Suggested Readings:

1. Horwitz, E., and Sahni, S., 2003: Fundamentals of data structures, Computer Science Press.
2. Wirth, Niclaus, 2002: Algorithms + Data structures = programs, Prentice Hall International.
3. Tremblay, 2002: An introduction to data structures with applications, Tata McGraw.
4. Aho, A. V., Hopcroft, and Ullman, J.E., 1982: Data structures and algorithms, Addison Wesley.
5. Tanenbaum, A. M. and Augenstein, M.J., 1985: Data structures using C, Prentice Hall International.
6. Lipschutz, Seymour, 1986: Theory & problems of data structures, Schaum Series.
7. Berman, A. Michael, 2002: Data structure via C++, Oxford University Press.
8. Deshpanday: C and data structures, Wiley India Pvt. Ltd.
9. Boldwins, Douglas: Algorithms and data structures: The science of computing, Wiley India Pvt. Ltd.
10. Jim Keogh/Davidson: Data Structures—Principles and fundamentals, Wiley India Pvt. Ltd.
11. Leendert: Algorithms and data structure in C++, Wiley India Pvt. Ltd.

Paper Title : OBJECT ORIENTED PROGRAMMING (THROUGH C++ AND JAVA)

Paper Code : CS-64 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : This course will expose you to the features in C++ and Java as well as help you design software using the object oriented paradigm of programming using C++ and Java.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction to Object Oriented Programming ,Characteristics of OOPs, Dynamic binding, Message Passing, Tokens, Expressions, Data Types, Variables, Operators, Control Statements, Arrays, string handling.

UNIT II

2. Classes, Objects, Constructors, Destructors, new and delete operators, Inheritance, Access modes, Methods Overloading, friend functions, Pass by value vs. Pass by Reference, Operator overloading, Dynamic Polymorphism: Virtual functions, pure virtual functions, abstract class; Exception Handling, File Handling, Templates.

UNIT III

3. Java – Introduction, JVM, Byte Code, Data Types, Variables, Arrays, Operators, Control Statements, Classes, Objects, Overloading Methods, Member Access and Inheritance, Method Overriding, using super and final, Defining a Package, Understanding CLASSPATH, Importing Packages, Interface and its implementations.

UNIT IV

4. Multithreaded Programming : Lifecycle of thread, Creating a thread, Implement runnable, Extending Thread, Thread Priorities; Using Synchronized Methods, Suspending, Resuming and Stopping Threads; Applet Resource Space : Applet lifecycle, Applet class, creating applets; AWT: Using AWT Controls, Layout Managers.

Suggested Readings:

1. Balaguruswamy, E.: Object Oriented Programming with C++, TMH.
2. Lafore, Robert: OOP in Turbo C++, Galgotia.
3. Strostrup: The C++ Programming Language, Addison Wesley.
4. Parsa, N.R.: OOPS with C++ from the Foundation, Wiley India Pvt. Ltd.
5. Gaddis, Tonny : Starting out with C++, 3rd Edition, Wiley India Pvt. Ltd.
6. Gaddis, Tonny: Starting out with Object Oriented Programming in C++, 3rd Edition, Wiley India Pvt. Ltd.
7. Al Steven: Al Steven's C++ Programming, 7th Edition, Wiley India Pvt. Ltd.
8. Nicolai: Object Oriented Programming in C++, Wiley India Pvt. Ltd.
9. Schildt, Herbert: The Complete Reference Java 2, TMH.
10. Balaguruswamy, E.: Programming with Java, TMH.

Paper Title : DATA COMMUNICATIONS AND NETWORKS

Paper Code : CS-48 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : As part of this course, students will be introduced to computer networks and data communication paradigms, about network models and standards, network protocols and their use, wireless technologies.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. **Introduction :**
Data Transmission concepts, transmission impairments, switching, modulation, multiplexing.
Network Hardware: LAN, MAN, WAN, Wireless networks, Internet-works.
Network Software: Layer, Protocols, interfaces and services.
Reference Models: OSI, TCP/IP and their comparison.

2. Physical Layer :
Transmission Media :
Magnetic, twisted pair, coaxial cable, fibre optics, wireless transmission (radio, microwave, infrared).

UNIT II

3. Introduction to ATM, ISDN, Cellular radio and communication satellites.

4. Data Link Layer :
Framing, Error control, Sliding window protocols (one bit, Go back n, selective repeat).
Examples of DLL Protocols–HDLC, PPP.
Medium Access Sub layer :
Channel Allocation, MAC protocols – ALOHA, CSMA protocols, Collision free protocols, Limited Contention Protocols, Wireless LAN protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison.

UNIT III

5. Network Layer:

Design issues, Routing algorithms (shortest path, flooding, flow based, distance vector, hierarchical, broadcast, multicast, for mobile hosts), Congestion control algorithms (Leaky bucket, Token bucket, Choke Packet, Load shedding), Internetworking, IP Protocol, ARP, RARP.

6. Network Trouble Shooting:

Using Ping, Traceroute, IP config, Netstat, nsloopup etc.

UNIT IV

7. **Transport Layer:**
Addressing, establishing and releasing connection, flow control, buffering, Internet Transport Protocol (TCP and UDP).

8. **Application Layer:**
Domain name system, E-mail, File transfer protocol, HTTP, HTTPS, World Wide Web.

Suggested Readings:

1. Tanenbaum, Andrew S., 2009: Computer Networks (4th Edition), PHI.
2. Forouzan, B. A., 2009: Data Communications and Networking, Fourth Edition, Tata McGraw Hill.
3. Douglas E. Comer, 2004: Internet Working with TCP/IP (Vol.1, 4th Edition), CPE.
4. Stallings, William 2008: Data and Computer Communications (8th Edition), PHI.
5. Nance, Bary, 1997: Introduction to Networking, PHI, 4th Edition.

Paper Title: COMPUTER BASED NUMERICAL AND STATISTICAL METHODS

Paper Code: CS - 76 Max. Marks: 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objectives: The course aims at discussing various significant and fundamental concepts to inculcate in the students an adequate understanding of the application of Numerical Algorithms and Statistical Methods.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

Prerequisite: Mathematical Foundation of Computer Science, Probability and Statistics.

UNIT I

Numeric Computation:
Computer Arithmetic: Error: Types of error, error propagation; Floating point numbers - Operations, Normalization and their consequences.

Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection, False-position, Newton-Raphson Methods, Convergence of solution.

UNIT II

Simultaneous Linear Equations: Solution of simultaneous Linear equation, Gauss elimination method and pivoting, ILL -conditioned equations and refinement of solution, Gauss-Siedel iterative method, Algorithms.

Numerical differentiation: Differentiating a function tabulated at equal and unequal intervals, Higher order derivates. **Numerical integration**: Newton Cotes Integration Formulae: Trapezoidal Rule, Simpson's 1/3rd and 3/8th rule. **Solutions of differential equations** : Euler's Method, Runga-Kutta 2nd and 4th order methods, Predictor corrector methods: Modified Euler's Method.

UNIT III

Interpolation and Approximation: Polynomial interpolation – Newton Lagranges, Difference tables, Newton's Methods of Interpolation: Newton's Forward Difference, Backward Difference and Divided Difference interpolation formulae.

Time Series and forecasting: Components of Time-Series, Method of moving averages, Forecasting models and methods.

UNIT IV

Statistical Computation :
Frequency Charts : Different Frequency charts.

Regression Analysis: Linear and Non-Linear Regression: Straight line, Polynomial and non-linear regression, Algorithms; Introduction to Multiple regression.

Tests of significance: Chi square test and F-test.

Suggested Readings:

1. Stoer, Bullrich, 1980: Computer Oriented Numerical Methods, Springer Verlag.
2. Krishnamurthy, E.V., Sen, S.K., 1984: Computer Based Numerical Algorithms, East West Press.
3. Affi, A.A., 1979: Statistical Analysis: A Computer Oriented Approach, Academic Press,Inc.
4. Scalzo, F., 1978: Elementary Computer Assisted Statistics, Van Nostrand Reinherd Co.Ltd.
5. Rajaraman, V., 1980: Computer Oriented Numerical Methods, 3rd Ed., Prentice Hall ofIndia.
6. Salaria, R.S., 1996: Numerical Methods: A Computer Oriented Approach, BPB Publ.
7. Wolfram, Stephan: Mathematica - A System of Doing Mathematics by Computers, Addison-Wesley, Publishing Company.
8. Wolfram, Stephan. : The Mathematica Book, 4th Edition, Cambridge University Press.
9. Dominick, Salbatore: Statistics and Econometrics, Schaum's Outline Series.

Paper Title : ACCOUNTING AND FINANCIAL MANAGEMENT
Paper Code : CS-07 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : To provide an overview of theoretical and practical concepts of Accounting.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. **Accounting:**
Principles, concepts and conventions, double entry system of accounting, introduction of basic books of accounts of sole proprietary concern, closing of books of accounts and preparation of trial balance.

2. **Final Accounts:**
Trading, profit and loss accounts and balance sheet of sole proprietary concern with normal closing entries, Introduction to manufacturing account, final accounts of partnership firms, limited company.

UNIT II

3. **Financial Management:** Meaning and role.

4. **Ratio Analysis:** Meaning, advantages, limitations, types of ratios and their usefulness.

5. **Fund Flow Statement:** Meaning of the terms–fund flow and fund working capital cycle, preparation and interpretation of the fund flow statement.

UNIT III

6. **Costing:** Nature, importance and basic principles.

7. **Marginal Costing:** Nature, scope and importance, Break-even analysis, its uses and limitations, construction of break even chart, practical applications of marginal costing.

8. **Standard Costing:** Nature and scope, Computational and analysis of variances with reference to material cost, labour cost and overhead cost, interpretation of the variances.

UNIT IV

9. **Budget and Budgetary Control:**
Nature and scope, importance, method of finalization of master budget and functional budgets.

10. **Introduction to Computerized Accounting System:**

Coding logic and codes required, master files, transaction files; introduction to documents used for data collection, processing of different files and outputs obtained (The concepts may be explained using available accounting package).

Suggested Readings:

1. Kellock, John: Elements of Accounting, Heinemann, 1978.
2. Rockely, L.E.: Finance for the Non-Accountant, 2nd Edition, Business Books (Pub.).
3. Levy and Sarnet: Principle of Financial Management, Prentice-Hall International.
4. Arnolel: Financial Accounting, Prentice Hall International (Paperback Edition).
5. Horngren and Sundem: Introduction to Financial Accounting, Prentice Hall International
6. Murthy, U.S., 1978: Management Finance, 2nd Edition, Vakils Fefers & Simons Ltd.
7. Van Home, James, C.: Financial Management & Policy, Prentice Inc.
8. Pandey, I.M., 1979: Financial Management, Vikas Publications.
9. Shah Parish P.: Financial Management, Wiley India Pvt. Ltd.

Paper Title: MOOC

Paper Code: CS - 81 Max. Marks: 50 Time: 3 Hrs.

THIRD SEMESTER

Paper Title: SOFTWARE ENGINEERING

Paper Code: CS-65 Max. Marks : 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objectives: The course aims to give students a theoretical foundation in Software Engineering and help them learn its principles and methods including emerging practices and support tools. It also familiarizes students with concepts of software testing and quality assurance and its various techniques.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction:
Software Engineering goals, SDLC, Software Process Models : Waterfall, Prototyping, Spiral; S/w Inspection, Preview and Inspection Procedures, Communication skills for Software Engineer. Software requirements, Definition, Software requirements specifications (SRS): Components & Structure of SRS.

2. Software Project Planning:
Objectives, Decomposition techniques: Problem based estimation(LOC, FP); Empirical Estimation Models: COCOMO model; Risk in estimation.

UNIT II

3. Software Design:
Objectives, Principles, Concepts, Design Process, Design Strategies, Design Methods: Structured design, Object oriented design, User-interface design; Structured Analysis and Design Tools : DFD, DD & Decision tables.

4. Quality Assurance:
Overview of Software Quality, Software Quality Attributes, Factors Affecting Software Quality, Building Software Quality Assurance Plan, Components of SQAP. Quality Management Principles, Essence of International Standards: ISO 9000 Quality Standard, SEI Capability Maturity Model.

UNIT III

5. Software Testing and Techniques:
Software Testing, Objectives of Software Testing, Software Testing Process, Static and Dynamic Analysis, Black-Box Testing & its Technique: Equivalence Class Partitioning, Boundary Value Analysis, Cause-Effect Graph, White-Box Testing & its Techniques: Basis Path Testing, Structural Testing, Logic Based Testing, Fault Based Testing.

6. Software Testing Strategies:
Characteristics, Types : Integration Testing, Functional Testing, Systems and Acceptance Testing, Object Oriented Testing; Debugging.

UNIT IV

7. Software Maintenance
Characteristics, Components of Software Maintenance Process, Types of software maintenance, Software maintenance process models, Reverse Engineering,.

8. System Configuration Management (SCM) :
Basic requirements for SCM System, SCM principles, Planning and Organizing for SCM, Benefits of SCM, Change Management, Version and Release Management.

Suggested Readings:
1. Pressman: Software Engineering, Tata McGraw Hill.
2. Sommerville, I., 1986: Software Engineering, Narosa Publ. House.
3. Mall,Rajib, 2009: Fundamentals of Software Engineering.
4. Jalote, Pankaj, 1995: An Integrated Approach to Software Engineering, Narosa Publ.
5. Fairley, R.E., 1985: Software Engineering Concepts, McGraw Hill.
6. Lewis, T.G., 1982: Software Engineering, McGraw Hill.
7. Meyers, G., 1979: The Art of Software Testing, Wiley-Inter-Science.
8. Hibbard, P.G.: Constructing Quality Software, North Holland Publication.
9. Shere, Kenneth, 1988: Software Engineering & Management, Prentice Hall.
10. Deutsch, Willis, 1989: Software Quality Engineering: A Total Technical and Management Approach, Prentice Hall.

Paper Title: OPERATING SYSTEMS
Paper Code: CS-66 Max. Marks : 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objectives: To understand the various concepts of Operating System like process management, synchronization, deadlocks, storage and memory management.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction to Operating System:

Introduction to operating system, its need and services; Operating system classification: Single user, Multi user, Simple batch processing, Multiprogramming, Multitasking, Parallel systems, Distributed system, Real time system;

2. Process Management:

Process: Process state, Process control block, Threads; Process scheduling: Scheduling queues, Schedulers, Context switch; Operations on process: Process creation and termination; Inter process communication: Shared memory systems, Message passing systems; Process scheduling: CPU-I/O burst cycle, CPU scheduler, Pre-emptive and non pre-emptive scheduling; Scheduling algorithms: FCFS, SJFS, RRS, Priority scheduling, Multilevel queue scheduling, Multilevel feedback queue scheduling.

UNIT II

3. Synchronization:

Critical section problem, Peterson's solution, Synchronization hardware, Semaphores: Mutual exclusion, Binary semaphores, Bounded concurrency, Producer-consumers, Reader-writers problem; Deadlocks & starvation, Problems of synchronization: Bounded buffer, Dining philosophers; Monitors.

4. Deadlocks:

System model, Deadlock characterization: Necessary conditions, Resource allocation graph, Method for handling deadlock; Deadlock prevention: Mutual exclusion, Hold and wait, No

preemption, Circular wait, Deadlock avoidance: Safe state, Resource allocation graph algorithm, Banker's algorithm; Deadlock detection, Recovery from deadlock.

UNIT III

5. Memory Management-I:

Static and dynamic memory allocation, Memory allocation to process: Stacks, Heap, Memory allocation model; Reuse of memory: Performing fresh allocations using a free list, Memory fragmentation, Merging free areas; Contiguous memory allocation: Fragmentation, Swapping;

6. Memory Management-II:

Paging: Hardware support, Protection, shared pages, Techniques for structuring of page table, Memory mapped files; Segmentation**,** Demand paging, Page replacement Algorithms: FIFO, Optimal, LRU, Counting based page replacement; Thrashing.

UNIT IV

7. Storage Management I:

File Concept: Attributes, Operations, Types, Structure; Access methods: Sequential and direct access, Index; Directory structure: Single level, Two Level, Tree Structured, acyclic Graph directories; File System mounting, File sharing, Protection: Types of access, access Control.

8. Storage Management II:

File system structure, File system implementation, Directory implementation, Allocation methods, Free space management, Disk scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK; Disk management, Swap space management, RAID.

Suggested Readings:

1. Peterson, James, L. and Silberschatz, A., 1985: Operating System Concepts, Wiley Publ. Comp.
2. Dhamdhere, D M: Operating Systems-A concept based approach, Mc Graw Hill.
3. Deitel, H.M., 1984: An Introduction to Operating System, Addison-Wesley Publ. Comp.
4. Milenkovic, M., 1987: Operating System – Concepts and Design, McGraw Hill International Editions.
5. Richie: Operating System, BPB.
6. Hansen Per Brineh, 1978: Operating System Principles, Prentice Hall India.
7. Madnick and Donovan: Operating System, McGraw Hill Book Co.
8. Joshi, R.C.: Operating Systems, Wiley India Pvt. Ltd.

Paper Title: ANALYSIS AND DESIGN OF ALGORITHMS

Paper Code: CS-67 Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: The objective of the module is to create skills in students to design and analyze algorithms.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. **Algorithms and Analysis :**

Introduction, Algorithms specification, Recursive algorithms, space and time complexity, Asymptotic Notation (O, _, and Θ, *o*) practical complexities, Best, average and worst case performance of algorithms, examples, Introduction to recurrence relations.

2. **Divide and Conquer:**

General method, Binary search, Merge sort, Quick sort, Selection problem, Strassen's matrix multiplication and analysis of these problems.

UNIT II

3. **Greedy Method:**

General Method, Knapsack problem, Job sequencing with deadlines, Minimum spanning Trees, Single source shortcut paths and analysis of these problems.

4. **Dynamic Programming :**

General method, Optimal binary search trees, 0/1 Knapsack, Travelling salesperson problem.

UNIT III

5. **Back Tracking :**

General method, 8 queen's problem, Graph coloring, Hamiltonian cycles and Analysis of these problems.

6. **Branch-And-Bound :**

Method, 0/1 Knapsack and Travelling Salesperson problems, Efficiency considerations.

UNIT IV

7. Lower-Bound Theory:

Introduction to Algebraic problems, Introduction to lower bounds, Comparison Trees, Techniques for Algebraic problems, Some Lower Bounds on Parallel Computation.

8. NP-hard and NP-complete problems:

Basic concepts, Statement of Cook's Theorem, Examples of NP-hard graph and NP-scheduling problems (job shop, identical processors), some simplified NP-hard problems (clique decision problem and chromatic number decision problem).

Suggested Readings:

1. Horowitz, Ellis and Sahni, Sartaj 2008: Fundamentals of Computer Algorithms, Galgotia Publications, 2nd Edition.
2. Aho, A.V., Hopcroft, J.E., Ullman, J.D., 2003: The Design and Analysis of Computer Algorithms, Addison-Wesley, First Edition.
3. Bentley, J.L.: Writing Efficient Programs, Prentice-Hall India, Eastern Economy Edition.
4. Goodman, S.E. & Hedetniemi, 2004: Introduction to the Design and Analysis of Algorithms, McGraw- Hill Book Comp.
5. Knuth, D. E., 1996: Fundamental of Algorithms: The Art of Computer Programming, Vol.-1, Naresh Publ. House.
6. Brassad, Gilles and Bartley, Paul 1996: Fundamentals of Algorithms, Prentice Hall of India.
7. Mark Allen Weiss: Data Structure and Algorithms Analysis in C++, Pearson Education.

Paper Title: ASP .NET Using C#

Paper Code: CS-77 **Max. Marks: 80 Time: 3 Hrs.**

Course Duration: 60 Lectures of one hour each.

Objectives: The objective of the course is to enable a student to develop web based applications in ASP.NET using C# programming language.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction to .NET environment:

The .NET strategy, the origins of the .NET technology, the .NET framework, the common language runtime, framework base classes, user and programs interface, visual studio .NET, .NET languages, benefits of the .NET approach.

2. Introduction to C#:

Overview of C#: History, Structure of C# Program, Namespaces, Using Aliases, Multiple Main Methods; Literals, Variables, Data Types: Value types, Reference types; Boxing and Unboxing; Operators and Expressions, Branching and Looping, Methods: Declaration, Method Parameters : value, ref, out and variable argument lists, Method Overloading; Arrays: Declaration, Initialisation, Overview of methods used in System.Array class; Strings : Creating mutable and immutable strings; Difference between C++ and C#, Difference between Java and C#.

UNIT II

3. C# programming concepts I :

Classes and Objects : Defining a class, Member Access Modifiers, Creating objects, Accessing class members and functions; Types of Constructors: Default, Parameterized, Copy, Static, Private; Working of Destructors, Constant and read only members, Overview of Properties : Read only and write only properties; Inheritance : Defining a base class and sub class, visibility control, defining subclass constructors, Types of inheritance, Overriding methods, Abstract classes and methods, Usage of Sealed; Implementing Dynamic Polymorphism;

4. C# programming concepts II :

Interfaces: Defining interface, Extending interface, implementing interface, explicit interface implementation; Delegates: Introduction, Steps for creating a delegate, Multicast Delegates, Covariance and Contra variance; Errors and Exceptions : Introduction, Types of Errors,

Exceptions, Syntax of exception handling code, multiple catch statements, Exception Hierarchy, general catch handler, using finally, Nested try block, throwing own exceptions, Checked and Unchecked operators; I/O: System.IO Namespace, Streams, TextWriter, TextReader, BinaryWriter, BinaryReader, FileStream;

UNIT III

5. Developing ASP.NET web applications I :

Understanding ASP.NET: Adding an ASP.NET webpage, web.config file, ASP.NET standard controls : Label, Textbox, Checkbox, radio button, button, link button, image button, Image, Image Map, Panel, Hyperlink ; Using Validation Controls : Overview, Required Field Validator, Range Validator, Compare Validator, Regular Expression Validator, Custom Validator, Validation Summary; Master Pages :Introduction and use, creating master pages , Creating default content, Using images and hyperlinks in master pages, Registering master pages in web configuration, Modifying master pages content;

6. Developing ASP.NET web applications II:

Creating and registering user controls in web.config file; Using Login Controls: Login control, Create User Wizard control, Login Status, Login Name , Change Password, Password Recovery, Login view; ASP.NET membership: Configuring authentication : windows, forms, .net passport ; Configuring authorization: By role, by location ,with images; Maintaining Application State : Introduction , Cookies: creation, reading, deletion, multivalued cookies; Session state: Session Object, Handling session events; Using Profiles;

UNIT IV

7. Accessing data with ADO .NET:

ADO.NET: Architecture, Components, Steps for creating Database Connectivity, Overview, usage and Implementation of: Data Reader, Data Adapter, Dataset; Viewing data using Data Grid View Control;

Suggested Readings:

1. Balagurusamy, E., 2004: Programming in C#, Tata McGraw-Hill (Unit I, II).
2. Walther, Stephen : ASP.NET 2.0 Unleashed SAMS, Pearson Education(Unit III)
3. Liberty, J., 2002: Programming C#, 2nd ed., O'Reilly .
4. Schildt, Herbert 2004: The Complete Reference: C#, Tata McGraw-Hill.
5. Robinson, 2002: Professional C#, 2nd Ed., Wrox Press.
6. Jason Beres: Sams Teach Yourself Visual studio.net 2003 in 21 days.
7. Watsel, Nagel, Pedersen, Reid, Skinne, White: Beginning Microsoft Visual C#2008, Wrox Publications.

Paper Title : RELATIONAL DATA BASE MANAGEMENT SYSTEMS

Paper Code: CS-69 Max. Marks : 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: The course aims at providing the students through insight on few DBMS principles and practices. Students will learn and implement the operations for making and using databases with help of SQL and PL/SQL.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Relational Design:

Relation scheme , Codd's Rules for RDBMS , Anomalies in a database, Functional Dependency : Dependencies and logical implications, Closure set, Testing if FD is in closure, Covers ,Non redundant and minimum cover, Canonical cover, functional dependencies and keys.

2. Normalization:

Normal forms- INF, 2NF, 3NF, BCNF, Difference between 3NF and BCNF, Multivalued dependencies and join dependencies, 4NF, 5NF, Difference between 4NF and 5NF**.**

UNIT II

3. SQL :

Introduction to SQL, Oracle server and oracle database, Oracle products, Oracle data types, Starting SQL *Plus, Querying database tables, Conditional retrieval of rows, Working with null values, Matching a pattern from a table, Ordering the result of a query, Aggregate Functions, Grouping the result of a query, ROLLUP operation: Getting sub totals, CUBE operation : Getting cross tabs, Command summary of SQL *Plus editor, Querying multiple tables : Equi Joins, Cartesian Joins, Outer Joins, Self Joins; SET Operators :Union, Intersect, Minus; Functions : Arithmetic functions, Character functions, Date functions, Group functions.

4. Data Manipulation and Control-I :

Data Definition Language (DDL), Creating Tables, Creating a Table with data from another table, Inserting Values into a Table, Updating Column(s) of a Table, Deleting Row(s) from a Table, Dropping a Column; VIEW : Manipulating the Base table, Rules of DML Statements on Join Views, Dropping a VIEW, Inline Views, Materialized Views.

UNIT III

5. Data Manipulation and Control-II :

Database security and privileges, GRANT command, REVOKE command, Application privileges management, Enhancing performance, Sequences, Maintaining database objects, COMMIT and ROLLBACK.

6. PL/SQL-I:

Introduction to PL/SQL, The Advantage of PL/SQL, PL/SQL block structure, PL/SQL Architecture, Fundamentals of PL/SQL, PL/SQL Data types, variables and constants, scope and visibility of a variable, assignments and expressions, operator precedence, referencing Non-PL/SQL variables, built-in-functions, conditional and iterative control, SQL within PL/SQL, writing PL/SQL code, composite data types.

UNIT IV

7**. PL/SQL-II:**

Cursor management in PL/SQL, Cursor manipulation, Implicit cursor attributes, Exception handling in PL/SQL; Predefined exceptions, User defined exceptions.

8. Advanced PL/SQL:

Subprograms in PL/SQL, advantages of subprograms, procedure, functions, actual versus formal parameters, argument modes, stored packages, advantages of packages, dropping a procedure, dropping a function, dropping a package, using stored function in SQL statements, database trigger, types of triggers, dropping triggers.

Suggested Readings:

1. Desai, B.C., 1993: An Introduction to Database Systems, Galgotia Publ. Private Ltd.
2. Date, C.J.: Data Base Systems, Vols. I & II, Narosa Publications.
3. Ivan Bayross : PL/SQL The Programming Language of ORACLE, (BPB Publication)
4. Mukhi, Vijay 1992: Mastering Oracle 6.0, BPB Publications.

FOURTH SEMESTER

Paper Title : DATA WAREHOUSING AND DATA MINING TECHNIQUES

Paper Code : CS-79 Max. Marks : 80 Time : 3 Hrs.

Course Duration : 60 Lectures of one hour each.

Objectives: This course will introduce concepts and techniques of data mining and data warehousing, including concepts, principle, architecture, design, implementation, application of data warehousing and data mining. Some systems for data warehousing and/or data mining will also be introduced. To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. **Introduction:**

Data Warehousing: Definition, Characteristics of a Data Warehouse, Data warehouse Usage, DBMS vs. Data warehouse

2. **Developing Data Warehouse:**

Data ware housing components, Steps and Crucial decisions for the design and construction of Data Warehouses, Three-tier Data warehouse architecture, Data Warehouse Implementation, Design, performance and technological considerations, Metadata.

UNIT II

3. **Developing Data Mart based Data warehouse**

Types of data marts, Metadata for a data mart, Data model for a data mart, Maintenance of a data mart, Software components for a data mart, Performance issues, Security in data mart.

4. **OLAP Systems**

Types of OLAP, Relational vs. Multidimensional OLAP, Data modeling: Star schema, Snowflake schema, OLAP tools.

UNIT III

5. **Data Mining:**

Introduction to data mining, Data mining process, Major issues and Application of Data mining, Data preprocessing: Data cleaning, Data integration and transformation and Data reduction; Tools for data mining.

6. Data Mining Techniques:

Association rules: Introduction, Market basket analysis, Frequent Pattern Mining algorithms: Apriori algorithm, Partition algorithm.

UNIT IV

7. **Classification and Prediction**:

Definition, Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Support Vector Machines, k-Nearest-Neighbour, Prediction: Linear and Non-Linear Regression

8. Clustering:

Definition, Types of data in cluster analysis, Clustering paradigms: K-Means and K-Medoids, Mining Sequence patterns: Generalized Sequential Patterns(GSP) mining algorithm, Hidden Marcov Model, Social Network Analysis.

Suggested Readings:

1. Inmon, W. H., 2002: Building the Data Warehouse, John Wiley.
2. Prabhu, C.S.R., 2010 : Data Warehousing, PHI.
3. Jiawei Han, Micheline Kamber, 2000: Data Mining: Concepts and Techniques, Morgan Koffman Elsvier.
4. Pujari, Arun K, 2013 : Data Mining Techniques, Universities Press.
5. Inmon, W.H., 1999: Managing the Data Warehouse, C. L. Gassey, John Wiley.
6. Mattison, 1999: Data Warehousing and Knowledge Management, Tata McGraw Hill.
7. Elmasri, Navathe, 2014 : Fundamentals of Database Systems.

Paper Title : INTERACTIVE COMPUTER GRAPHICS
Paper Code : CS-12 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : The aim is to introduce the students to key concepts of Computer Graphics like display devices, co-ordinate system, transformations, line and circle drawing, pointing, positioning, projections, etc.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. **Display Devices :**

Line and point plotting systems, Raster, vector, pixel and point plotters, Continual Refresh and storage displays, Digital frame buffer, Plasma panel displays, Display processors, Character generators, Colour-display techniques : shadow mask and penetration CRT, Colour look-up tables, hard-copy colour printers.

UNIT II

2. **Display Description:**

Screen co-ordinates, user co-ordinates, use of homogeneous coordinates, Display code generation, Graphical functions, the view algorithm, Two-dimensional transformation, Line-drawing, Circle drawing algorithms.

UNIT III

3. **Interactive Graphics:**

Pointing and positioning devices (cursor, light pen, digitizing tablet, the mouse, track balls), Interactive graphical techniques, Positioning, (Elastic or Rubber Band lines, Linking, zooming, panning, clipping, windowing, scissoring), Mouse Programming.

4. **3-D Graphics:**

Wire-frame, perspective display, perspective depth, Projective transformations, Hidden line and surface elimination (Back-face removal algorithm).

UNIT IV

5. **Turbo-C Graphic Language:**

Primitives (constants, actions, operators, variables), plotting and geometric transformations, display subroutines, Concept of Animation, Saving, Loading and Printing graphics images from/to disk, Animated algorithms for Sorting, Towers of Hanoi.

6. **Open GL:**

Primitives of the language and interface with C/C++.

7. **Programming Projects:**

Two Dimensional Transformations, 3-dimensional Transformations, Interactive Graphical Techniques, GUI, Turbo C (Graphics Routines) is to be used as the standard teaching tool.

Suggested Readings:

1. Giloi, W.K., 1978: Interactive Computer Graphics, Prentice-Hall.
2. Newman, W., Sproul, R.F., 1980: Principles of Interactive Computer Graphics, McGraw-Hill.
3. Rogers, D.F., 1985: Procedural Elements for Computer Graphics, McGraw-Hill.
4. Harrington, S., 1983: Computer Graphics: A Programming Approach, Tata McGraw-Hill.
5. Foley, J.D., Van Dam A., 1982: Fundamentals of Interactive Computer Graphics, Addison-Wesley.
6. Hearn, D., Baker, P.M., 1986: Computer Graphics, Prentice-Hall.
7. Tosijasu, L.K., 1983: Computer Graphics, Springer-Verlag.
8. Kelley Bootle: Mastering Turbo C. Galgotia.
9. Plastock, Roy, 1986: Theory & Problems of Computer Graphics, Schaum Series, Tata McGraw Hill.

Paper Title : THEORY OF COMPUTATIONS

Paper Code : CS-37 Max. Marks : 80 Time : 3 Hrs.

Course Duration : 60 Lectures of one hour each.

Objectives: The goal of this course is to provide students with an understanding of basic concepts of Theory of Computation.

Note :

(i) The Question paper will consist of four units.

(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.

(iii) The students are required to attempt one question from each unit and the compulsory question.

(iv) All questions carry equal marks.

UNIT I

1. Recursive Languages:

Recursive definition, Alphabets, Language, Regular expression, definitions of Finite state machine, Transition graphs, Deterministic & non-deterministic finite state machines, Regular grammar, Left-linear and right linear, Thomson's construction to convert regular Expression to NDFA & subset algorithm to convert NDFA to DFA. Minimization of DFA, Finite state machine with output (Moore and Meally Machine), Conversion of Moore machine to Meally machine & vice-versa.

UNIT II

2. Properties of Regular languages:

Conversion of DFA to regular expression, Pumping lemma, Properties and limitations of finite state machine, Decision properties of regular languages, Applications of finite automata.

3. **Context Free Grammar**:

Context free grammar, Writing context free grammar for problems, Derivation tree and ambiguity, Application of context free grammars, Chomsky and Greibach Normal form, Conversion of CFG to CNF and GNF. Properties of context free grammar, CYK algorithm.

UNIT III

4. PDA:

Push down stack machine, Design of deterministic and non-deterministic push-down stack, Parser design.

5. Turing Machine:

Turing machine definition and design of Turing Machine, Church-Turing Thesis, Variations of Turing Machines, combining Turing machine, Universal Turing Machine, Post Machine, Chomsky Hierarchy.

UNIT IV

6. Incommutability:

Halting problem, Turing enumerability, Turing acceptability and Turing decidabilities, Unsolvable problems about Turing machines.

7. Computation Complexity:

P, NP and NP Complete Problems.

Suggested Readings:

1. Lewis, Harry R. and Papadimitriou, Christos H.: Theory of Computation, Prentice Hall of India, 1996.
2. Hopcroft, John E. and Ullman, Jefrey D.: Introduction to Automata Theory, Languages and Computation, Addison-Wesley Publishing Company Inc.
3. Brady, J.M.: Theory of Computer Science, Wiley.
4. A.V. Aho, J.E. Hopcroft and J.D. Ullman, 'Introduction to Automata, Languages and Computations, Addison Wesley, 1980.
5. V.J. Rayward Smith, 'A First Course on Computability, Blackwell Scientific Publications, Oxford, 1986.
6. M.Davis and E.J. Weyuker 'Computability, Complexity and Languages' Academic Press, 1982.
7. D. Gries, 'Science of Programming', Springer Verlag, New York, 1981.
8. Dewire, Dawna Tranis: Client Server Computing, McGraw Hill.

Paper Title : ARTIFICIAL INTELLIGENCE (USING LISP)

Paper Code : CS-71 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : The objective of this course is to familiarize students with concepts of AI, its tools & technologies.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

Prerequisite: System Software, Operating System, Data and File Structure.

UNIT I

1. **Introduction to Artificial Intelligence (AI) and Problem Space:**

Introduction AI technique, Turing test, History and developments in AI, applications of AI, State space representation, production systems, systematic control strategies : Breadth first search and Depth first search, problem characteristics, product system characteristics, issues in the design of search programs.

2. **Heuristic Search Technologies:**

Introduction to heuristic search, Generate and test, Hill Climbing, Best First search, A*, Problem reduction, AO*, constraint satisfaction and Means-ends-analysis techniques.

UNIT II

3. **Knowledge representation:**

Information and knowledge, Knowledge acquisition and manipulation, Issues in knowledge representation, Knowledge representation methods - Propositional logic and first order predicate logic, Resolution principle, Horn's clauses, Features of language PROLOG, Semantic networks, Partitioned semantic nets, Frames, Scripts and conceptual dependencies.

4. **Game playing:**

MiniMax search procedure, reducing alternatives using Alpha-Beta pruning method examples.

UNIT III

5. **Expert systems :**
Introduction, examples, characteristics architecture, people involved and their role in building an expert systems, case studies of expert systems, MYCIN and DENDRAL; features of knowledge acquisition systems : MOLE and SALT.

6. **Natural Language understanding and processing:**

Introduction, Complexity of the problem, Chompsky hierarchy of grammars, Techniques for Syntactic processing, Semantic Analysis, Discourse and pragmatic processing

UNIT IV

7. **Tools and Technologies for AI:**

Introduction to AI language LISP : Symbolic expression, creating, appending and modifying lists, defining functions, Predicates, Conditionals, Recursion, Iteration, Printing and reading , Lambda expressions and higher order function, List storage.

Laboratory work:
1. Programming in LISP & PROLOG.
2. Hands on experience with expert system shell.

Suggested Readings:

1. Rich Elaine and Knight Kevin Shiva Shankar B Nair: Artificial Intelligence, Third Edition, Tata-McGraw Hill.
2. Winston, P.H. and Horn, B.K.P.: LISP, Pearson.
3. Rajasekharan, S. and Vijayalakshmi Pai, G. A.: Neural Networks, Fuzzy Logic and Genetic Algorithms, Prentice Hall of India.
4. Russel & Norvig: Artificial Intelligence, Pearson.
5. Patterson: Artificial Intelligence and Expert Systems, Pearson Education.

Paper Title : ADVANCED JAVA AND NETWORK PROGRAMMING

Paper Code : CS-72 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : To create enterprise application development skills among students using Advanced Java.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Review of Java Basic Features, Applets, AWT Controls, Event Handling, Multithreading, I/O files.

2. Swing : Features, components, swing vs AWT, swing containers, controls, using Dialogs, sliders,progress bars, tables, creating user interface using swing.

UNIT II

3. Java Database Connectivity : Connectivity model, Java.SQL package, JDBC Exception classes, Database connectivity, Data manipulation and navigation, creating database applications.

4. Java RMI : Distributed object technologies, RMI architecture, creating RMI applications.

UNIT III

5. Java Servlets : Servelets vs CGI, Servlet lifecycle, creating and running simple servlets.

6. Networking : Networking basics, Client/server model, Java and the Net, TCP/IP client sockets,TCP/IP server sockets, Inet Address, URL, Data grams, creating simple networking applications.

UNIT IV

7. Java Beans : Component architecture, Advantages of Beans, Bean Developer kit (BDK),JAR files, introspection, developing Beans, Using Bound properties, The Java Beans API, Introduction to EJB (Enterprise Java Beans),Types of EJB, Uses of EJB.

8. Java Server Pages : Introduction, JSP Architecture, JSP objects, developing simple Web Applications.

Suggested Readings :

1. Schildt , Herbert : The Complete Reference Java 2, , TMH.
2. Ivan Bayross : Web Enabled Commercial Application Development using Java 2.0, BPB.
3. Cornell , Gary and Horstmann Cay S. : Core Java, Vol I and Vol II, Sun Microsystems Press.
4. Keogh , James : J2EE : The Complete Reference.
5. Martin Bond, Debbie Law, Andy Longshaw, Dan Haywood, Peter Roxburgh**:** Sams: Teach Yourself J2EE in 21 days, Pearson.

FIFTH SEMESTER
Paper Title : COMPUTER BASED OPTIMIZATION TECHNIQUES

Paper Code : CS-17 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives: To introduce linear programming, dynamic programming and related Optimization Theories to solve real life / simulated problems.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I

1. Linear Programming - Mathematical model, assumptions of linear programming, principles of simplex method, Revised simplex method, Applications, Duality, Dual simplex method, sensitivity Analyses.

UNIT II

2. Special types of linear programming problems -Transportation and assignment problems.

3. Integer programming: Introduction, Branch and bound techniques, Binary linear Programming.

UNIT III

4. Assignment and Travelling salesman problems

5. Dynamic Programming, Deterministic and probabilistic dynamic programming.

UNIT IV

6. Queuing models: Application and characteristics of queuing models, Structure of basic queuing system.

7. PERT and CPM: Phases of project management, PERT and CPM computations.

8. Simulation: Definition: Types of simulation models; Phases of simulation; Applications of simulation; Inventory and queuing problems; Advantages and disadvantages.

Suggested Readings:

1. Hiller, F.S. & Liberman, G.J., 1974: Introduction to Operations Research, 2nd Edn. Holden Day Inc.London.
2. Tara, H.A., 1982: Operations Research, 3rd Edn., McMillan Publishing Company.
3. Beightler, C.S. & Phillips, D.T., 1979: Foundations of Optimisation, 2nd. Edn. Prentice-Hall.
4. McMillan Claude Jr.: Mathematical Programming, 2nd. Edn., Wiley Series.
5. Srinath, L.S.: Linear Programming, East-West, New Delhi.
6. Churchman, C.W. & Arnchoff, E.L.: Introduction to Operations Research, John Wiley and Sons.
7. Gillett, B.G., 1976: Introduction to Operation Research - A Computer Oriented Algorithmic Approach, McGraw-Hill Book Comp.
8. Hillier, F.S. & Liberman, G.T., 1967: Introduction to Operation Research, Holden Day Inc.
9. Rao, S. S., 1978: Introduction to Optimization : Theory & Applications, Wiley Eastern.

Paper Title: SOFTWARE PROJECT MANAGEMENT

Paper Code : CS-57 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objective: To familiarize the students with Project management, Project Planning and Scheduling, Advanced DSS, ERP and Software metrics.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I

1. Project Management: Introduction to project and project management, problems with software projects, Project management knowledge area and framework, Stages of project : feasibility study :cost-benefit analysis , Planning, project execution, project and product life cycle ; Project stakeholders : All parties of project, role of project manager ; Exploration of open source software tools for project management .

2. Checkpoints and Processes of Project: Major milestones, Minor milestones, Periodic status assessments, Project processes: Initiating processes, Planning processes, Control processes, Executing processes, Closing processes, Process Groups, Process interactions.

UNIT II

3. Project Planning : Integration management : Introduction, Project plan development, Plan execution ; Scope management : Introduction, methods for selecting projects, project charter, scope statement, work breakdown structure ; Stepwise project planning :Overview , Main steps in project planning.

4. Project Scheduling: Time Management: Importance of project schedules, Schedules and activities, Sequencing and scheduling activity; Project network diagrams: Network planning models, Duration estimating and schedule development, Critical path analysis, Program evaluation and review Techniques.

UNIT III

5.Technical Metrics for Software: Software process and project metrics: Size oriented metrics, Function-oriented metrics, Extended function point metrics, A Framework for technical software metrics, Metrics for requirement specification quality, Metrics for analysis, Metrics for design, Metrics for source code, Metrics for testing, Metrics for maintenance.

6. **Technical Metrics for Object-Oriented Systems:** Intent of object-oriented metrics, Characteristics of object-oriented metrics, Metrics for OO design model, Class-oriented metrics, Operation-oriented metrics, Metrics for object-oriented testing, Metrics for object-oriented projects.

UNIT IV

7. Introduction to ERP: Overview, Benefits, Technologies related to ERP, ERP packages, Business process re-engineering, Implementation life cycle of ERP, Training : Team training, End user training; Post implementation (maintenance mode), Implementation in large-scale organization, Applications of ERP in functional areas: Marketing, Personnel, Financial & Production.

8. DSS: Decision structure, Decision support trends, DSS components, Using DSS: What-if analysis, sensitivity analysis, Goal seeking analysis, Optimization analysis, Executive information systems, Enterprise portals and decision support, knowledge management systems.

Suggested Readings:

1. James A O'Brien, George M Maracas, Ramesh Behl: Management Information Systems, Mc Graw Hill.
2. Walker Royce: Pearson Education, 2005: Software Project Management.
3. A Guide to the Project Management Body of Knowledge (PMBOK), Project Management Institute, PA, (2004).
4. Harold Kerzner, Frank P. Saladis, Project Management Workbook and PMP/CAPM Exam Study Guide , Wiley Publishers (2006)
5. Claudia M. Baca, Patti, PMP: Project Management Professional Workbook, Sybex, Workbook (2003).
6. Joel Henry, Pearson Education: Software Project Management.
7. Pankaj Jalote, Pearson Education, 2005: Software Project Management.

PAPER: MOBILE COMMUNICATION AND APPLICATION DEVELOPMENT

Paper Code : CS-58 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objective: The course will familiarize the students with basic concepts about mobile communication, its architecture, protocols, mobile databases and operating systems. It will also enable them to develop mobile applications using Android.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I

1. Mobile communication: Definition, Guided Transmission, Unguided Transmission; Mobile computing architecture, Mobile Devices, Mobile System Networks: Cellular, WLAN, Ad-hoc networks; GSM: Services and System Architecture, Radio Interfaces, Localization, Calling, Handover, Security; CDMA: Architecture, Spread Spectrum, Coding Methods ; GPRS: Introduction ,system Architecture; Introduction to EDGE

UNIT II

2. Mobile database: Database hoarding techniques, Data Caching, Client Server computing: 2 tier and 3 tier client server architecture; Transactional models, Query processing, Data Recovery process; Data Dissemination; Communication Asymmetry, Classification of Data delivery mechanism: Push based, pull based, Hybrid; Selective tuning and indexing techniques, Mobile Application Languages, Mobile Operating system: Symbian, Android, iOS, Windows.

UNIT III

3. Android Application Development: Android Architecture, Getting started with Android, Mastering Android Development tools: Using Android Documentation, Working with Android Emulator; Building simple Android Applications: Using the Application Context, Working with Activities, Using callback methods, Working with intents, Dialogs, Fragments, Logging application information;

UNIT IV

4. Android Application Development: Managing Application Resources: Working with Simple Resource values, Draw able Resources, Layouts, Files; Configuring the Android Manifest file and basic application Settings, registering activities, Designating the launch activity, Managing Application permissions, Designing an application framework.

Suggested Readings:

1. Kamal, Raj,Mobile Computing ,Oxford Higher Education.
2. Jochen Schiller, "Mobile Communications", PHI/Pearson Education, Second Edition.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, New York, 2003.
4. Reto Meier,Professional Android 2 Application Development ,Wrox Publications.
5. Hazysztof Wesolowshi, "Mobile Communication Systems", John Wiley and Sons Ltd.
6. Shane Conder, Lauren Darcey: Sams Teach Yourself Android™ Application Development in 24 Hours.

Paper Title : SOFT COMPUTING TECHNIQUES USING NEURAL NETWORKS
Paper Code : CS-59 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives: To get the knowledge and exposure for Advanced AI Techniques to solve the problem lying in fuzzy environment.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of **nine** questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I

Fundamentals:

1. **Introduction to Soft Computing:** Basic soft computing techniques: Neural networks, Fuzzy logic, Genetic algorithms; Hybrid systems, Application to soft computing.

2. **Basics of Neural Networks:** Characteristics of neural networks; Comparison between Artificial & Biological Neural Networks, Basic Building Blocks of artificial neural network; Connections; Learning methods, Activation functions; Neural network architectures.

UNIT II

Neural Network Learning Models:

3. **Supervised Learning Networks :** Introduction to supervised learning, Architecture and training algorithms for perception network and back propagation networks

4. **Unsupervised Learning Networks:** Introduction to unsupervised learning, Architecture and training algorithms for Kohonen self-organizing maps and adaptive resonance theory networks (ART1, ART2).

5. **Hopfield Networks:** Introduction, Architecture and training algorithm for discrete Hopfield nets.

UNIT III

Fuzzy Logic:

6. **Fuzzy Logic:** Introduction and Application to Fuzzy logic, Classical sets, Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Techniques, Membership functions: Features & Methods of membership value assignment, Defuzzification methods.

7. **Fuzzy Logic Control Systems:** Architecture and Operation of Fuzzy Logic Control (FLC) systems, FLC System Models, Applications of FLC Systems.

UNIT IV

Genetic Algorithms:

8. Introduction to genetic algorithms; Biological background, Genetic algorithms versus traditional algorithms. Basic terminologies in genetic algorithm: Genes, fitness and populations.
9. General Genetic Algorithm; Operations in genetic Algorithm: Selection, Crossover and Mutation, Applications of Genetic Algorithm.

Suggested Readings:

1. S.N. Sivanandam and S.N. Deepa: Principles of Soft Computing, Second Edition, John Wiley.
2. Karray and Silva: Soft Computing and Intelligent Systems Design, Pearson Education.
3. Gallant Stephen: Neural Network Learning and Expert System, MIT Press.
4. S. Rajasekaran and Pai: Neural Networks, Fuzzy Logic, and Genetic Algorithms, PHI.
5. Rao and Rao: C++ Neural Networks & Fuzzy Logic, BPB.
6. S.N. Siranandam, S. Sumathi and S.N. Deepa : Introduction to Neural Networks using MATLAB, McGraw Hill, 2014.

SIXTH SEMESTER

GUIDELINES FOR SUBMISSION OF PROJECT REPORT (CS-18)

The report should consist of the following :

- Cover page including Project title, Name of the student, Name of the Department and Names of the Project Guides (both External and Internal).
- Acknowledgements.
- Certificates from company and department duly signed by external guide, chairman and internal guide.
- Contents with page numbers.
- Introduction (includes background and application or importance of the project).
- Objectives.
- System Analysis.

System Feasibility Study :

- Software requirement specifications.
- Design with system flowcharts and input/output design.
- Implementation and Testing
  - Hardware and software used.
  - Listing of well commented programs with result/output or detailed algorithms with input and output.

Further Scope of the Project :

- Bibliography.
- Appendices (any other information related to project).

Each student should observe the following norms while submitting the synopsis/thesis for the Project : -

(a) Use both sides of the paper instead of only single side.
(b) Use one and half interline spacing in the text (instead of double space).
(c) Stop using a blank sheet before the page, carrying figure or table.
(d) Try to insert figure/table in the text page itself (instead of using a fresh page for it, each time).

Students must consult/inform the internal guides regarding the progress of their work at least once in 20 days. It is the duty of the student to be in touch with his/her internal guide. The student must prepare 5 copies of the report including one copy for self. The remaining four are to be submitted before 31st May every year as per the following :

1. Main Library, 2. Department Library, 3. Internal Guide, 4. Company

One softcopy of the work is to be submitted to the concerned head of the dept./institution along with the report. The student must present his/her work in 15 minutes mainly focusing on his/her contribution with the help of slides followed by demonstration of the practical work done. The Project Viva will be completed before 15th June every year. Exact dates will be informed before 31st May every year.

Project Viva will be conducted by an external examiner, internal examiner and the internal guide

CS-19 Seminar **Max. Marks: 100**

Each student will be required to give seminar on selected topic and submit the report.

SEMINARS TOPICS

1. Artificial Neural Networks.
2. Tele Immersion-The future of Internet telecommunication.
3. Biometric Identification & Authentication.
4. Network Intrusion Detection System.
5. Natural Language Processing.
6. Genetic Programming.
7. Honey pots & Honey net.
8. Ubiquitous Computing.
9. Virtual Network Computing.
10. MANET.
11. Cryptography.
12. Grid Computing.
13. Mobile Computing.
14. Cloud Computing
15. J2EE
16. Bio-informatics.
17. Digital Watermarking.
18. Software Agents(Mobile Agents, Intelligent Agents).
19. Information Security(Security, Cryptography, Digital Signatures etc.).
20. Security protocol for sensor networks.
21. Nano-technology Assembler Design And Nano-Communication.
22. Robotic Surgery.
23. Any other topic related to recent developments.