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<td>Principles of Programming Languages</td>
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<td>Mathematical Foundations of Computer Science and Engineering</td>
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<td>Object Oriented Programming through Java</td>
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<td>Formal Languages and Automata Theory</td>
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2.1.1 Managerial Economics and Financial Analysis

Unit I
Introduction to Managerial Economics:
Introduction to Managerial Economics & Demand Analysis: Definition of Managerial Economics, Characteristics and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics
Demand Analysis: Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions.

Unit-II
Elasticity of Demand & Demand Forecasting: Definition -Types of Elasticity of demand - Measurement of price elasticity of demand: Total outlay method, Point method and Arc method- Significance of Elasticity of Demand.
Demand Forecasting: Meaning - Factors governing demand forecasting - Methods of demand forecasting (survey of buyers’ Intentions, Delphi method, Collective opinion, Analysis of Time series and Trend projections, Economic Indicators, Controlled experiments and Judgmental approach) - Forecasting demand for new products- Criteria of a good forecasting method.

Unit-III
Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs.-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

UNIT-IV
Unit V
Types of Industrial Organization & Introduction to business cycles: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.
Introduction to business cycles: Meaning-Phases of business cycles- Features of business cycles.

Unit VI

Unit VII

Unit VIII
Capital and Capital Budgeting: Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems)

Text Books:

References:
2. Suma damodaran- Managerial Economics, Oxford 2011
UNIT-I

Probability: Sample space and events – Probability – The axioms of probability – Some Elementary theorems - Conditional probability – Baye’s theorem.

UNIT-II

Random variables – Discrete and continuous distributions - Distribution function.

UNIT-III

Binomial, Poisson, normal distribution – related properties. Moment generating function, Moments of standard distributions – properties.

UNIT-IV

Population and samples. Sampling distribution of mean (with known and unknown variance), proportion, variances. - Sampling distribution of sums and differences. Point and interval estimators for means, variances, proportions.

UNIT-V

Statistical Hypothesis – Errors of Type I and Type II errors and calculation. One tail, two-tail tests. Testing hypothesis concerning means, proportions and their differences using Z-test.

UNIT-VI

Tests of hypothesis using Student’s t-test, F-test and χ² test. Test of independence of attributes - ANOVA for one-way and two-way classified data.

UNIT-VII


UNIT-VIII

Queuing Theory: Pure Birth and Death Process M/M/1 Model and Simple Problems.

TEXT BOOK


REFERENCE

2.1.3 MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE & ENGINEERING

UNIT I: Mathematical Logic:
Predicate calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free & Bound Variables, Inference theory for predicate calculus.

UNIT II: Number Theory & Induction:
Properties of integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat’s Theorem and Euler’s Theorem)
Mathematical Induction: Principle of Mathematical Induction, exercises

UNIT III: Set Theory:
Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion
Functions: Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions

UNIT IV: Graph Theory:
Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, (Problems and Theorems without proofs)

UNIT V: Graph Theory II:
Planar Graphs, Euler’s Formula, Graph Colouring and Covering, Chromatic Number,( Problems and Theorems without proofs)
Trees, Directed trees, Binary Trees, Decision Trees,

UNIT VI: Algebraic Structures:
Lattice: Properties, Lattices as Algebraic Systems, Algebraic Systems with one Binary Operation, Properties of Binary operations, Semi groups and Monoids: Homomorphism of Semi groups and Monoids, Groups: Abelian Group, Cosets, Subgroups (Definitions and Examples of all Structures)

UNIT VII: Combinatorics:
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UNIT VIII: Recurrence Relation:
Generating Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions
Recurrence Relations, Formulation as Recurrence Relations, Solving linear homogeneous recurrence Relations by substitution, generating functions and The Method of Characteristic Roots.
Solving Inhomogeneous Recurrence Relations

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, Tremblay, Manohar, TMH
2. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, Mott, Kandel, Baker, PHI

REFERENCE BOOKS:

1. Discrete Mathematics, S.Santha, Cengage
2. Discrete Mathematics with Applications, Thomas Koshy, Elsevier
3. Discrete Mathematics,2/e, JK Sharma ,Macmillan
UNIT I: Number Systems:
Binary, Octal, Decimal, Hexadecimal Number Systems. Conversion Of Numbers from One Radix to another Radix , r's Complement and (r-1)’s Complement Subtraction Of Unsigned Numbers, Problems, Signed Binary Numbers, Weighted and Non-weighted codes

UNIT II: Logic Gates and Boolean Algebra:

UNIT III: Gate - Level Minimization:

UNIT IV: Combinational Arithmetic Logic Circuits:

UNIT V: Combinational Logic Circuits:

UNIT VI: Programmable Logic Devices:
PLA, PAL, PROM. Realization of Switching Functions Using PROM, PAL and PLA. Comparison of PLA, PAL and PROM. Programming Tables of PLA, PAL and PROM.

UNIT VII: Introduction to Sequential Logic Circuits:

UNIT VIII: Registers and Counters:
Design of Registers, Buffer Register, Control Buffer Registers, Bidirectional Shift Registers, Universal Shift Register, Design of Ripple Counters, Synchronous Counters and Variable Modulus Counters, Ring Counter, Johnson Counter. Verilog Programming for above Circuits.

TEXT BOOKS :
1. Digital Design ,4/e, M.Morris Mano, Michael D Ciletti, PEA
2. Fundamentals of Logic Design, 5/e, Roth, Cengage
REFERENCE BOOKS:

2. Digital Logic Design, Leach, Malvino, Saha, TMH
3. Verilog HDL primer, Jaya Bhaskar, PEA
UNIT 1: Review of P & N type semiconductors:
Insulators, Semiconductors, and Metals classification using Energy Band Diagrams, Mobility and Conductivity, Electrons and holes in Intrinsic Semiconductors, Extrinsic Semiconductor, (P and N Type semiconductor)

Junction Diode Characteristics and Special Diodes:
Open circuited P N Junction, Forward and Reverse Bias, Current components in PN Diode, Diode Equation, Volt-Ampere Characteristic (Qualitative treatment only), Temperature Dependence on V – I characteristic, Step Graded Junction, Diffusion Capacitance and Diode Resistance (Static and Dynamic), Energy Band Diagram of PN Diode.

UNIT II: Special Diodes:
Special Diodes: Avalanche and Zener Break Down, Zener Characteristics, Tunnel Diode, Characteristics, Varactor Diode, LED, PIN Diode, Photo Diode

Rectifiers and Filters:
Half wave rectifier, ripple factor, full wave rectifier(with and without transformer), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, Simple circuit of a regulator using zener diode.

UNIT III: Transistor Characteristics:
Junction transistor, Transistor current components, Transistor as an amplifier, Characteristics of Transistor in Common Base and Common Emitter Configurations, Photo Transistor, Typical transistor junction voltage values

FET Characteristics:
JFET characteristics (Qualitative discussion), Small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), Symbols of MOSFET, Introduction to SCR and UJT and their characteristics

UNIT IV: Biasing and Thermal Stabilization:
Transistor Biasing and Thermal Stabilization: Operating point, Basic Stability, Collector to Base Bias, Self Bias, Stabilization against variations in V_{BE}, and β for the self bias circuit, Stabilization factors, Bias Compensation, Thermistor and Sensitor compensation, Compensation against variation in V_{BE}, I_{co}, Thermal runaway, Thermal stability

UNIT V: Small signal low frequency Transistor models & Single stage amplifiers:
Two port devices and the Hybrid model, Transistor Hybrid model, Determination of h-parameters from characteristics, Analysis of a Transistor Amplifier circuit using h- parameters, Comparison of Transistor Amplifier configurations, Miller’s Theorem

Simplified Common Emitter hybrid model, Common emitter amplifier with emitter resistance, Emitter follower, cascaded transistor amplifiers
FET small signal model, Low frequency common source and common drain amplifiers, FET as Voltage Variable Resistor, Biasing the FET

UNIT VI: Feedback Amplifiers and Oscillators:
Classification of Amplifiers, Feedback concept, Transfer Gain with feedback, General characteristics of negative feedback amplifiers, Effect of Feedback on input and output Resistances, Voltage series, voltage shunt, current series, and current shunt feedback amplifiers with discrete components circuits (Analysis is not required)

Conditions for oscillations. RC-phase shift oscillator with Transistor and FET, Hartley and Colpitts oscillators, Wein bridge oscillator
UNIT VII: Power Amplifiers:
Class A large signal Amplifiers, Second harmonic Distortions, Higher order harmonic Distortion, Transformer Coupled Audio power amplifier, Efficiency, Push-pull amplifiers, Class B Amplifiers, Class AB operation, Efficiency of Class B Amplifier

UNIT VIII: Tuned Amplifiers:
Introduction, Q-Factor, Small Signal Tuned Amplifier; Capacitance single tuned amplifier, Double Tuned Amplifiers, Staggered tuned amplifiers

TEXT BOOKS:
1. Electronic Devices and Circuits, J. Millman, C.C. Halkias, TMH
2. Electronic Devices and Circuits, K Satya Prasad, VGS

REFERENCE BOOKS:
1. Integrated Electronics, 2009, Jacob Millman, Chritos C. Halkies, TMH
2. Electronic Devices and Circuits, 2/e, Salivahanan, N.Suressh Kumar, A. Vallavaraj, TMH

**2.1.6. DATA STRUCTURES**

**UNIT I: Recursion and Linear Search:**
- Preliminaries of algorithm, Algorithm analysis and complexity
- Recursion: Definition, Design Methodology and Implementation of recursive algorithms
- Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion
- List Searches using Linear Search, Binary Search, Fibonacci Search, Analyzing search algorithms.

**UNIT II: Sorting Techniques:**
- Basic concepts, Sorting by: insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort) and merging (merge sort) Algorithms.

**UNIT III: Stacks and Queues:**

**UNIT IV: Linked Lists:**
- Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, merging two single linked lists into one list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list

**UNIT V: Trees:**
- Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree, Binary Tree Traversals, Creation of binary tree from in-order and pre/postorder traversals, Tree Travels using stack, Threaded Binary Trees.

**UNIT VI: Advanced concepts of Trees:**
- Binary search tree, Basic concepts, BST operations: insertion, deletion, balanced binary trees
- AVL Search Trees, basic concepts, operations: insertion, deletion.
- m-way search trees operations: insertion, deletion,
- B Trees, operations: insertion, deletion

**UNIT VII: Graphs:**
- Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms
- Graph Traversals (BFS & DFS), applications: Dijkstra’s shortest path, Transitive closure, Minimum Spanning Tree using Prim’s Algorithm, warshall’s Algorithm.

**UNIT VIII: Sets:**
- Definition, Representation of Sets using Linked list, operations of sets using linked lists, application of sets- Information storage using bit strings

**Abstract Data Type** Introduction to abstraction, Model for an Abstract Data Type, ADT Operations, ADT Data Structure, ADT Implementation of array, Linked list and stack.
JNTU WORLD

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TEXT BOOKS:
1. Data Structures, 2/e, Richard F, Gilberg, Forouzan, Cengage

REFERENCE BOOKS:
1. Data Structure with C, Seymour Lipschutz, TMH
2. Classic Data Structures, 2/e, Debasis Samanta, PHI, 2009
3. Fundamentals of Data Structure in C, 2/e, Horowitz, Sahni, Anderson Freed, University Press
2.1.7 Electronic Engineering Lab

**PART A : (Only for viva voce Examination)**

**ELECTRONIC WORKSHOP PRACTICE (in 6 lab sessions):**

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Lowpower JFETs, LEDs, LCDs, SCR, UJT, Linear and Digital ICs.
4. Study and operation of
   - Multimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - Study and Operation of CRO.

**PART B : (For Laboratory examination – Minimum of 10 experiments)**

1. PN Junction diode characteristics  
   A. Forward bias  
   B. Reverse bias. (cut-in voltage & Resistance calculations)
2. Zener diode characteristics and Zener as a regulator
3. Transistor CB characteristics (Input and Output) & h Parameter calculations
4. Transistor CE characteristics (Input and Output) & h Parameter calculations
5. Rectifier without filters (Full wave & Half wave)
6. Rectifier with filters (Full wave & Half wave)
7. FET characteristics
8. SCR Characteristics
9. UJT Characteristics
10. CE Amplifier
11. CC Amplifier (Emitter Follower).
13. RC Phase Shift Oscillator using Transistors
14. Class A Power Amplifier (Transformer less)
15. Wien Bridge Oscillator
16. RC Phase Shift Oscillator

**PART C:**

**Equipment required for Laboratories:**

1. Regulated Power supplies (RPS) - 0-30v
2. CROs - 0-20M Hz.
3. Function Generators - 0-1 M Hz.
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Micro Ammeters (Analog or Digital) - 0-20 µA, 0-50µA, 0-100µA, 0-200µA
8. Voltmeters (Analog or Digital) - 0-50V, 0-100V, 0-250V
9. Electronic Components - Resistors, Capacitors, BJTs, LCDs,SCRs, UJTs, FETs, LEDs, MOSFETs, diodes, transistors
Exercise 1:
Write recursive programme which computes the $n^{th}$ Fibonacci number, for appropriate values of $n$.
Analyze behavior of the programme Obtain the frequency count of the statement for various values of $n$.

Exercise 2:
Write recursive programme for the following
   a) Write recursive C programe for calculation of Factorial of an integer
   b) Write recursive C programme for calculation of GCD (n, m)
   c) Write recursive C programme for Towers of Hanoi : N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise 3:
   a) Write C programs that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
   b) Write C programs that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
   c) Write C programs that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a given list.

Exercise 4:
   a) Write C programs that implement Bubble sort, to sort a given list of integers in ascending order
   b) Write C programs that implement Quick sort, to sort a given list of integers in ascending order
   c) Write C programs that implement Insertion sort, to sort a given list of integers in ascending order

Exercise 5:
   Write C programs that implement heap sort, to sort a given list of integers in ascending order
   d) Write C programs that implement radix sort, to sort a given list of integers in ascending order
   e) Write C programs that implement merge sort, to sort a given list of integers in ascending order

Exercise 6:
   a) Write C programs that implement stack (its operations) using arrays
   b) Write C programs that implement stack (its operations) using Linked list

Exercise 7:
   a) Write a C program that uses Stack operations to Convert infix expression into postfix expression
   a) Write C programs that implement Queue (its operations) using arrays.
   b) Write C programs that implement Queue (its operations) using linked lists
Exercise 8:

a) Write a C program that uses functions to create a singly linked list
b) Write a C program that uses functions to perform insertion operation on a singly linked list
c) Write a C program that uses functions to perform deletion operation on a singly linked list

Exercise 9:

d) Adding two large integers which are represented in linked list fashion.

e) Write a C programme to reverse elements of a single linked list.
f) Write a C programme to store a polynomial expression in memory using linked list
g) Write a C programme to representation the given Sparse matrix using arrays.
h) Write a C programme to representation the given Sparse matrix using linked list

Exercise 10:

a) Write a C program to Create a Binary Tree of integers
b) Write a recursive C program, for Traversing a binary tree in preorder, inorder and postorder.
c) Write a non recursive C program, for Traversing a binary tree in preorder, inorder and postorder.
d) Program to check balance property of a tree.

Exercise 11:

a) Write a C program to Create a BST
b) Write a C programme to insert a note into a BST.
c) Write a C programme to delete a note from a BST.

Exercise 12:

a) Write a C programme to compute the shortest path of a graph using Dijkstra’s algorithm
b) Write a C programme to find the minimum spanning tree using Warshall’s Algorithm
UNIT I : Introduction to Software Engineering :
The evolving role of software, Changing Nature of Software, Software myths. (ref 1)

A Generic view of process : Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models. (ref 1)

UNIT II : Process Models :
The waterfall model, Incremental process models, Evolutionary process models, The Unified process. (ref 1)

Software Requirements : Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document. (ref 2)

UNIT III : Requirements Engineering Process :
Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. (ref 2)

System models : Context Models, Behavioral models, Data models, Object models, structured methods. (ref 2)

UNIT IV : Design Engineering :
Design process and Design quality, Design concepts, the design model. (ref 2)

Creating an architectural design : Software architecture, Data design, Architectural styles and patterns, Architectural Design. (ref 2)

UNIT V : Object-Oriented Design :
Objects and object classes, An Object-Oriented design process, Design evolution. (ref 2)

Performing User interface design : Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation. (ref 1)

UNIT VI : Testing Strategies :
A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging. (ref 1)

Product metrics : Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. (ref 1)

UNIT VII : Metrics for Process and Products :
Software Measurement, Metrics for software quality. (ref 1)

Risk management : Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan. (ref 1)

UNIT VIII : Quality Management :
Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards. (ref 2)

TEXT BOOKS:
1. Software Engineering, 7/e, Roger S.Pressman, TMH
2. Software Engineering, 8/e, Sommerville, Pearson.
REFERENCE BOOKS:

1. Software Engineering, A Precise approach, Pankaj Jalote, Wiley
2. Software Engineering principles and practice, W S Jawadekar, TMH
3. Software Engineering concepts, R Fairley, TMH
UNIT I: Introduction:
The Art of Language Design, Programming Language Spectrum, Why Study Programming Languages? Compilation and Interpretation, Programming Environments, Overview of Compilation

**Programming Language Syntax:** Specifying Syntax: Regular Expressions and Context-Free Grammars, Scanning, Parsing, Theoretical Foundations

UNIT II: Names, Scopes, and Bindings:
The Notion of Binding Time, Object Lifetime and Storage Management, Scope Rules, Implementing Scope, The Meaning of Names within a Scope, The Binding of Referencing Environments, Macro Expansion, Separate Compilation

UNIT III: Semantic Analysis:
The Role of the Semantic Analyzer, Attribute Grammars, Evaluating Attributes, Action Routines, Space Management for Attributes, Decorating a Syntax Tree

UNIT IV: Control Flow:
Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion, Non determinacy

UNIT V: Data Types:
Type Systems, Type Checking, Records (Structures) and Variants (Unions), Arrays, Strings, Sets, Pointers and Recursive Types, Lists, Files and Input/Output, Equality Testing and Assignment

UNIT VI: Subroutines and Control Abstraction:
Review of Stack Layout, Calling Sequences, Parameter Passing, Generic Subroutines and Modules, Exception Handling, Coroutines, Events

**Concurrency:** Concurrent Programming Fundamentals, Implementing Synchronization, Language-Level Mechanisms, Message Passing

Run-time Program Management: Late Binding of Machine Code, Inspection/Introspection

UNIT VII: Data Abstraction and Object Orientation:
Object-Oriented Programming, Encapsulation and Inheritance, Initialization and Finalization, Dynamic Method Binding, Multiple Inheritance.

UNIT VIII: Functional Languages:

**Logic Languages:** Logic Programming Concepts, Prolog, Theoretical Foundations, Logic Programming in Perspective

TEXT BOOKS:

1. Programming Language Pragmatics, 3/e, Michael Scott, Elsevier, Morgan Kaufmann, 2009
2. Concepts of Programming languages, Sebesta, 8/e, PEA

REFERENCE BOOKS:

1. Programming Languages Design and Implementation, 4/e Pratt, Zelkowitz, PHI
2. Programming Languages, Louden, 2/e, Cengage, 2003
3. Fundamentals of Programming languages, Horowitz, Galgotia
UNIT I: Basics of Object Oriented Programming (OOP):
Need for OO paradigm, A way of viewing world – Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms.

UNIT II: Java Basics:
Data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT III: Inheritance:
Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism, abstract classes.

UNIT IV: Packages and Interfaces:
Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT V: Exception handling and Multithreading:
Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT VI: Applets:
Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Applet to applet communication, secure applet

UNIT VII: Event Handling:
Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – boarder, grid, flow, card and grid bag.

UNIT VIII: Swings:

TEXT BOOKS:
1. Java: The complete reference, 7/e, Herbert schildt, TMH.
REFERENCE BOOKS:

1. Learn Object Oriented Programming using Java, Venkateswarlu, E V Prasad, S. Chand
2. Programming in Java2, Dr K SomaSundaram, JAICO Publishing house
UNIT I: Instruction Set Architectures:

UNIT II: Introduction to Computer Organization:

UNIT III: Register Transfer Languages:

UNIT IV: CPU Design:

UNIT V: Computer Arithmetic:
Unsigned Notation, Signed Notation, Binary Coded Decimal, Specialized Arithmetic Hardware, Floating Point Numbers

UNIT VI: Memory Organization
Hierarchical Memory Systems, Cache Memory, Virtual Memory, Beyond the Basics of Cache and Virtual Memory, Memory Management in a Pentium/Windows Personal Computer.

UNIT VII: Input/Output Organization:

UNIT VIII: Advanced computing:
Reduced Instruction Set Computing: RISC Rationale, RISC Instruction Sets, Instruction Pipelines and Register Windows, Instruction Pipeline Conflicts, RISC vs. CISC, Introduction to Parallel Processing, Parallelism in Uniprocessor Systems, Organization of Multiprocessor Systems, Communication in Multiprocessor Systems, Memory Organization in Multiprocessor Systems, Multiprocessor Operating Systems and Software.

TEXT BOOKS:
REFERENCE BOOKS:

UNIT I : Introduction:
Data base System Applications, data base System VS file System, View of Data, Data Abstraction, instances and Schemas, data Models, the ER Model, Relational Model, Other Models, Database Languages : DDL, DML, database Access for applications Programs, data base Users and Administrator, Transaction Management, data base System Structure, Storage Manager, the Query Processor

UNIT II : History of Data base Systems:
Data base design and ER diagrams, Beyond ER Design Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Concept Design with the ER Model, Conceptual Design for Large enterprises.

UNIT III : Introduction to the Relational Model:
Integrity Constraint Over relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views, Destroying/altering Tables and Views.

UNIT IV : Form of Basic SQL Query:
Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries Set, Comparison Operators, Aggregative Operators, NULL values, Comparison using Null values, Logical connectivity’s, AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Databases.

UNIT V : Schema Refinement:
Problems Caused by redundancy, Decompositions, Problem related to decomposition, reasoning about FDS, FIRST, SECOND, THIRD Normal forms, BCNF, Lossless join Decomposition, Dependency preserving Decomposition, Schema refinement in Data base Design, Multi valued Dependencies, FORTH Normal Form.

UNIT VI : Transaction Concept:

UNIT VII : Storage and Indexing:
Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning.

UNIT VIII : Tree Structured Indexing:
Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.
TEXT BOOKS:

1. Data base Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke, TMH
2. Data base System Concepts,5/e, Silberschatz, Korth, TMH

REFERENCE BOOKS:

1. Data base Management System, 5/e, Elmasri Navathe, PEA
2. Introduction to Database Systems, 8/e, C.J.Date, PEA
UNIT I : Fundamentals:
Set, Representation of set, Types of sets, Operations on sets, Relation, Representation of a relation, Properties of a relation, Basic terminology of trees and graphs, Principle of mathematical induction, Strings, Alphabets, Languages, Operations on strings and languages, Finite state machine, definitions, Finite automaton model, Acceptance of strings and languages, Deterministic finite automaton (DFA) and Non-deterministic finite automaton (NFA), Transition diagrams and Language recognizers.

UNIT II: Finite Automata:
Acceptance of languages, Equivalence of NFA and DFA, NFA to DFA conversion, NFA with ∈ - transitions, Significance, Conversion of NFA with ∈ - transitions to NFA without ∈ - transitions, Myhill-Nerode theorem, Minimization of finite automata, Equivalence between two DFA’s, Finite automata with output - Moore and Mealy machines, Equivalence between Moore and Mealy machines, conversion of Moore to Mealy and Mealy to Moore.

UNIT III: Regular Languages:
Regular sets, Regular expressions, Operations and applications of regular expressions, Identity rules, Conversion of a given regular expression into a finite automaton, Conversion of finite automata into a regular expression, Pumping lemma for regular sets, Closure properties of regular sets (proofs not required).

UNIT IV: Grammar Formalism:
Definition of a grammar, Language of a grammar, Types of grammars, Chomsky classification of languages, Regular grammars, Right linear and left linear grammars, Conversion from left linear to right linear grammars, Equivalence of regular grammar and finite automata, Inter conversion, Context sensitive grammars and languages, Linear bounded automata, Context free grammars and languages, Derivation trees, Leftmost and rightmost derivation of strings and Sentential forms.

UNIT V: Context Free Grammars:
Ambiguity, left recursion and left factoring in context free grammars, Minimization of context free grammars, Normal forms for context free grammars, Chomsky normal form, Greibach normal form, Pumping lemma for context free languages, Closure and decision properties of context free languages, Applications of context free languages.

UNIT VI: Pushdown Automata:
Pushdown automata, definition, model, Graphical notation, Instantaneous descriptions, Acceptance of context free languages, Acceptance by final state and acceptance by empty state and its equivalence, Equivalence of context free grammars and pushdown automata, Inter-conversion, Introduction to deterministic pushdown automata.

UNIT VII: Turing Machine:
Turing Machine, definition, model, Instantaneous descriptions, Representation of Turing machines, Design of Turing machines, Types of Turing machines, Computable functions, Unrestricted grammar, Recursive and recursively enumerable languages and Church’s hypothesis.

UNIT VIII: Computability Theory:
LR(0) grammar, Decidable and un-decidable problems, Universal Turing machine, Halting problem of a Turing machine, Un-decidability of post’s correspondence problem and modified post’s correspondence problem, Turing reducibility, Definition of classes P and NP problems, NP complete and NP hard problems.
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TEXT BOOKS:

1. Introduction to Automata Theory Languages & Computation, 3/e, Hopcroft, Ullman, PEA
2. Introduction to Theory of Computation, 2/e, Sipser, Thomson

REFERENCE BOOKS:

1. Theory of Computation, Rajesh Shukla, Cengage, 2010
2. Theory of Computer Science, Automata languages and computation, 2/e, Mishra, Chandra shekaran, PHI
2.2.7 Object Oriented Programming Lab

1. Use JDK 1.5 or above on any platform e.g. Windows or Unix.
2. Student is expected to complete any 16 programs.
3. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. Every subsequent value is the sum of the 2 values preceding it. Write A Java Program (WAJP) that uses both recursive and non-recursive functions to print the \( n \)th value of the Fibonacci sequence.
4. WAJP to demonstrate wrapper classes, and to fix the precision.
5. WAJP that prompts the user for an integer and then prints out all the prime numbers up to that Integer.
6. WAJP that checks whether a given string is a palindrome or not. Ex: MALAYALAM is a palindrome.
7. WAJP for sorting a given list of names in ascending order.
8. WAJP to check the compatibility for multiplication, if compatible multiply two matrices and find its transpose.
9. WAJP that illustrates how runtime polymorphism is achieved.
10. WAJP to create and demonstrate packages.
11. WAJP, using `StringTokenizer` class, which reads a line of integers and then displays each integer and the sum of all integers.
12. WAJP that reads on file name from the user then displays information about whether the file exists, whether the file is readable/writable, the type of file and the length of the file in bytes and display the content of the using `FileInputStream` class.
13. WAJP that displays the number of characters, lines and words in a text/text file.
14. Write an Applet that displays the content of a file.
15. WAJP that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the + - x / % operations. Add a text field to display the result.
16. WAJP for handling mouse events.
17. WAJP demonstrating the life cycle of a thread.
18. WAJP that correctly implements Producer-Consumer problem using the concept of Inter Thread Communication.
19. WAJP that lets users create Pie charts. Design your own user interface (with Swings & AWT).
20. WAJP that allows user to draw lines, rectangles and ovals.
21. WAJP that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle and the result produced by the server is the area of the circle.
22. WAJP to generate a set of random numbers between two numbers \( x_1 \) and \( x_2 \), and \( x_1 > 0 \).
23. WAJP to create an abstract class named Shape, that contains an empty method named `numberOfSides()`. Provide three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method `numberOfSides()`, that contains the number of sides in the given geometrical figure.
24. WAJP to implement a Queue, using user defined Exception Handling (also make use of throw, throws).
25. WAJP that creates 3 threads by extending Thread class. First thread displays “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third displays “Welcome” every 3 seconds. (Repeat the same by implementing Runnable)
26. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.
1. Execute a single line and group functions for a table.
2. Execute DCL and TCL Commands.
3. Create and manipulate various DB objects for a table.
4. Create views, partitions and locks for a particular DB.
5. Write PL/SQL procedure for an application using exception handling.
6. Write PL/SQL procedure for an application using cursors.
7. Write a DBMS program to prepare reports for an application using functions.
8. Write a PL/SQL block for transaction operations of a typical application using triggers.
9. Write a PL/SQL block for transaction operations of a typical application using package.
10. Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).
11. Create table for various relation
12. Implement the query in sql for a) insertion b) retrieval c) updation d) deletion
13. Creating Views
14. Writing Assertion
15. Writing Triggers
16. Implementing operation on relation using PL/SQL
17. Creating Forms
18. Generating Reports

Typical Applications – Banking, Electricity Billing, Library Operation, Pay roll, Insurance, Inventory etc.