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II B.Tech. CSE. I.Sem & II Sem.

II Year I Sem		**P**	**C**	**II Year II Sem**		**P**	**C**
S.No.	**Subject**	**P**	**C**	**S.No.**	**Subject**	**P**	**C**
1	Managerial Economics and Financial Analysis	**4**	**4**	1	Software Engineering	**4**	**4**
2	Probability & Statistics	**4**	**4**	2	Principles of Programming Languages	**4**	**4**
3	Mathematical Foundations of Computer Science and Engineering	**4**	**4**	3	Object Oriented Programming through Ja	**4**	**4**
4	Digital Logic Design	**4**	**4**	4	Computer Organization	**4**	**4**
5	Electronic Engineering	**4**	**4**	5	Data Base Management Systems	**4**	**4**
6	Data Structures	**4**	**4**	6	Formal Languages and Automata Theory	**4**	**4**
7	Electronic Engineering Lab	**3**	**2**	7	Object Oriented Programming Lab	**3**	**2**
8	Data Structures Lab	**3**	**2**	8	Data Base Management Systems Lab	**3**	**2**
9	Professional Communicational skills	**2**	**0**	9	Professional Communicational skills	**2**	**2**
Total Credits			**28**	**Total Credits**			**30**

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II B.Tech. CSE. I.Sem & II Sem.

2.1.1Managerial 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

Theory of Production and Cost Analysis: Production Function- Isoquants and Isocosts, MRTS, Law of variable proportions- Law of returns to scale- Least Cost Combination of Inputs, Cobb-Douglas Production function - Economies of Scale.

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

Introduction to Markets, Managerial Theories of the Firm & Pricing Policies: Market structures**:** Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly Managerial theories of the firm - Marris and Williamson's models.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

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II B.Tech. CSE. I.Sem & II Sem.

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

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments)- Limitations of Financial Statements.

Unit VII

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

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:

1. **J.V.Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011
2. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011

References:

1. A R Aryasri **-** Managerial Economics and Financial Analysis, TMH 2011
2. Suma damodaran- Managerial Economics, Oxford 2011
3. S.A. Siddiqui & A.S. Siddiqui, Mangerial Economice and Financial Analysis, New Age International Publishers, 2011.

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II B.Tech. CSE. I.Sem & II Sem.

2.1.2 PROBABILITY AND STATISTICS

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 χ^2 test.. Test of independence of attributes - ANOVA for one-way and two-way classified data.

UNIT-VII

Statistical Quality Control methods – Methods for preparing control charts – Problems using x-bar, p, R charts and attribute charts – Simple Correlation and Regression.

UNIT-VIII

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

TEXT BOOK

1. Probability and Statistics for Engineers, Miller and John E. Freund, Prentice Hall of India.
2. Probability and Statistics, D. K. Murugeson & P. Guru Swamy, Anuradha Publishers.

REFERENCE

1. Probability, Statistics and Random processes. T. Veerrajan, Tata Mc.Graw Hill, India.
2. Probability, Statistics and Queuing theory applications for Computer Sciences 2 ed, Trivedi, John Wiley.

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II B.Tech. CSE. I.Sem & II Sem.

2.1.3 MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE & ENGINEERING

UNIT I:Mathematical Logic :
Propositional Calculus: Statements and Notations, Connectives, Truth Tables, Tautologies, Equivalence of Formulas, Duality law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, **Consistency of Premises, Indirect Method of Proof.**
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
Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams.

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,
Spanning Trees: Properties, Algorithms for Spanning trees and Minimum Spanning Tree.

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)
Algebraic Systems with two Binary Operations: Rings

UNIT VII: Combinatorics:
Basic of Counting, Permutations, Derangements, Permutations with Repetition of Objects, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Pigeonhole Principle and its Application.

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II B.Tech. CSE. I.Sem & II Sem.

Binomial Theorem**,** Binomial and Multinomial Coefficients, Generating Functions of Permutations and Combinations, The Principles of Inclusion – Exclusion.

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

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II B.Tech. CSE. I.Sem & II Sem.

2.1.4 DIGITAL LOGIC DESIGN

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:
Basic Gates: NOT, AND, OR, Boolean Theorems, Complement, Duality principal, Universal Gates, Ex-OR and Ex-NOR Gates, SOP,POS, Minimizations Of Logic Functions using Boolean Theorems, Multilevel Realization Of Logic Functions using Universal Gates. Parity Checking, Generating Circuits. Introduction to Verilog HDL and Verilog programming for minimized logic functions.

UNIT III: Gate - Level Minimization:
Karnaugh Map Method (K-Map): Minimization Of Boolean Functions Using 4 Variable , 5 and 6 Variable Maps, POS and SOP Simplifications with Don't Care Conditions using K-Map. Verilog Programs for Simplified Expressions.

UNIT IV: Combinational Arithmetic Logic Circuits:
Design Of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Ripple Adders and Subtractors, Ripple Adder/Subtractor Using Ones and Twos Complement Method. Serial Adder, Carry Look Ahead Adder, Binary Multiplier. Verilog Programming for above Circuits.

UNIT V: Combinational Logic Circuits:
Design of Decoders, Encoders, Multiplexers, Demultiplexers, Higher Order Demultiplexers and Multiplexers, Realization Of Boolean Functions Using Decoders and Multiplexers, Priority Encoders, Code Converters, Magnitude Comparator. Verilog Programming for above 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:
Classification, Basic Sequential Logic Circuits: Latch and Flip-Flop, RS- Latch using NAND and NOR Gates and their Truth Tables. RS, JK, T and D Flip Flops, Truth Tables and Excitation Tables, Conversion of Flip Flops. Flip Flops With Asynchronous Inputs (Preset and Clear). Verilog Programming for above 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

w.e.f.2010 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA

II B.Tech. CSE. I.Sem & II Sem.

REFERENCE BOOKS:

1. Switching and Finite Automata Theory,3/e,Kohavi, Jha, Cambridge.
2. Digital Logic Design, Leach, Malvino, Saha,TMH
3. Verilog HDL primer, Jaya Bhaskar, PEA

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II B.Tech. CSE. I.Sem & II Sem.

2.1.5. ELECTRONIC ENGINEERING

UNIT I:Review of P & N type semiconductors:
Insulators, Semi conductors, and Metals classification using Energy Band Diagrams, Mobility and Conductivity, Electrons and holes in Intrinsic Semi conductors, Extrinsic Semi Conductor, (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

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II B.Tech. CSE. I.Sem & II Sem.

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

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II B.Tech. CSE. I.Sem & II Sem.

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:
Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, In-fix- to postfix Transformation, Evaluating Arithmetic Expressions.
Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues-Round robin Algorithm, Enqueue, Dequeue, Circular Queues, Priority 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(post)order 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.

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II B.Tech. CSE. I.Sem & II Sem.

TEXT BOOKS:

1. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
2. Data Structures and Algorithms, 2008, G.A.V.Pai, TMH

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 Prees

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II B.Tech. CSE. I.Sem & II Sem.

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.
3. Soldering practice – Simple Circuits using active and passive components.
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 Charecteristics
9. UJT Charectristics
10. CE Amplifier
11. CC Amplifier (Emitter Follower).
12. Single stage R-C coupled Amplifier.
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 Resitance 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

w.e.f.2010 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA

II B.Tech. CSE. I.Sem & II Sem.

2.1.8 DATA STRUCTURES LAB

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 programe for calculation of GCD (n, m)
c) Write recursive C programe 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

w.e.f.2010 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA

II B.Tech. CSE. I.Sem & II Sem.

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

Exercise10:

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

w.e.f.2010 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA

II B.Tech. CSE. I.Sem & II Sem.

2.2.1 SOFTWARE ENGINEERING

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.

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II B.Tech. CSE. I.Sem & II Sem.

w.e.f.2010 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA

II B.Tech. CSE. I.Sem & II Sem.

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

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II B.Tech. CSE. I.Sem & II Sem.

2.2.2 PRINCIPLES OF PROGRAMMING LANGUAGES

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:
Functional Programming Concepts, A Review/Overview of Scheme, Evaluation Order Revisited, Higher-Order Functions, Theoretical Foundations
Logic Languages: Logic Programming Concepts, Prolog, Theoretical Foundations, Logic Programming in Perspective

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II B.Tech. CSE. I.Sem & II Sem.

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

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II B.Tech. CSE. I.Sem & II Sem.

2.2.3 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

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:
Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:

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

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2.Java: How to Program, 8/e, Dietal, Dietal, PHI

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
3.Object Oriented Programming through Java, P. Radha Krishna, University Press.

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22 4 COMPUTER ORGANIZATION

UNIT I: Instruction Set Architectures:
Levels of Programming Languages.,Assembly Language Instructions,Instruction Set Architecture Design,A Relatively Simple Instruction Set Architecture.,The 8085 Microprocessor Instruction Set Architecture.

UNIT II: Introduction to Computer Organization:
Basic Computer Organization,CPU Organization,Memory Subsystem Organization and Interfacing,I/O Subsystem Organization and Interfacing,A Relatively Simple Computer,An 8085-based Computer.

UNIT III: Register Transfer Languages:
Micro-operations and Register Transfer Language, Using RTL to Specify Digital Systems, More Complex Digital Systems and RTL.,VHDL-VHSIC Hardware Description Language.

UNIT IV: CPU Design:
Specifying a CPU, Design and Implementation of a Very Simple CPU,Design and Implementation of a Relatively Simple CPU, Shortcomings of the Simple CPUs,Internal Architecture of the 8085 Microprocessor, Microsequencer Control Unit Design, Basic Microsequencer Design,Design and Implementation of a Very Simple Microsequencer, Reducing the Number of Microinstructions, Microprogrammed Control vs. Hardwired Control.

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:
Asynchronous Data Transfers, Programmed I/O,Interrupts., Direct Memory Access,I/O Processors, Serial Communication,Serial Communication Standards.

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:

1. Computer Systems Organization and Architecture, John D. Carpinelli, PEA, 2009

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REFERENCE BOOKS :

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5/e, MCG,2002.
2. Computer Organization and Architecture,8/e, William Stallings , PEA,2010.
3. Computer Systems Architecture,3/e, M.Moris Mano, PEA, 2007

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II B.Tech. CSE. I.Sem & II Sem.

2.2.5 DATABASE MANAGEMENT SYSTEMS

UNIT I : Introduction:
Data base System Applications, data base System VS file System, View of Data, Data Abstraction, nstances 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.
Relational Algebra: Selection and projection set operations , renaming, Joins , Division , Examples of Algebra overviews
Relational calculus: Tuple relational Calculus

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 Data bases.

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:
Transaction State,Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability ,Implementation of Isolation, Testing for serializability, Failure classification,Storage,Recovery and Atomicity,Recovery algorithm.

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.

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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
3. Database System Concepts, Peter ROB,Coronel, Ceneage.

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2.2.6 FORMAL LANGUAGES AND AUTOMATA THEORY

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 $\in$ - transitions, Significance, Conversion of NFA with $\in$ - transitions to NFA without $\in$ - 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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II B.Tech. CSE. I.Sem & II Sem.

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
3.Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.

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II B.Tech. CSE. I.Sem & II Sem.

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 x1 and x2, and x1>0.
23. WAJP to create an abstract class named Shape, that contains an empty method named numberOfSides(). Provide three classes named Trapezoid, Triangle andHexagon, 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.

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II B.Tech. CSE. I.Sem & II Sem.

2.2.8 Data Base Management Systems Lab

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.