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S. No.	Subject	P	Credits
1.	Managerial Economics and Financial Analysis	**4**	**4**
2.	Probability & Statistics	**4**	**4**
3.	Mathematical Foundations of Computer Science	**4**	**4**
4.	Digital Logic Design	**4**	**4**
5.	Electronics Devices & Circuits (EDC)	**4**	**4**
6.	Data Structures	**4**	**4**
7.	EDC Lab	**3**	**2**
8.	Data Structures Lab	**3**	**2**
9.	Professional Communicational skills	**2**	**0**
	6 Theory + 3 Laboratories.		**28**

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2.1.1. MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Common to all Branches **Code No.10 05 21 1**

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.

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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.

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)

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TEXT BOOKS :

1. Managerial Economics and Financial Analysis,2011 , **N. Appa Rao, P. Vijaya Kumar,** Cengage
2. Managerial Economics and Financial Analysis, 2011, J.V.Prabhakar Rao, Maruthi

2.1.2 PROBABILITY AND STATISTICS Code No. 10 05 21 2

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 VI:

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 VII:

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 V:

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

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

TEXT BOOKS:

1. Probability and Statistics for Engineers, Miller ,John E. Freund, PHI
2. Probability and Statistics, D. K. Murugeson P. Guru Swamy, Anuradha Publishers.
3. Probability, Statistics and Random processes. T. Veerrajan, TMH
4. Probability, Statistics and Queuing theory applications for Comp. Sciences, 2 /e, Trivedi, John Wiley.

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2.1.3. MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE & ENGINEERING Code No. 10 05 21 3

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:

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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.

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

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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
4. Discrete Mathematics,Chandrasekaran,Umaparvathi,2010,PHI
5. Discrete and Combinational Mathematics, 5/e ,Ralph. P.Grimaldi, Ramana, Pearson
6. Elements of Discrete Mathematics, CL Liu,Mahapatra,TMH

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2.1.5. ELECTRONIC ENGINEERING Code No. 10 05 21 5

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

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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:

Transistor 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:

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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

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2.1.6. DATA STRUCTURES Code No. 10 05 21 6

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:

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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.

TEXT BOOKS:

1. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH,
2. 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 Prees
4. C & Data Structures, V.V.Muniswamy, I.K.International

2.1.8 DATA STRUCTURES LAB Code No. 10 05 21 8

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:

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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

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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

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