

CONTENTS

CHAPTER 1 : NUMERICAL METHODS	1-86
1.1 Introduction	1
1.2 Algebraic and Transcendental Equations	1
1.3 Iteration Method (Method of successive approximation)	2
1.4 Bisection Method	8
1.5 Newton-Raphson Method	12
1.6 Regula-Falsi Method (Method of False position)	17
1.7 Secant Method	22
1.8 Numerical Solutions of Non-homogeneous equations	26
1.9 Gauss Elimination Method	26
1.10 Gauss-Jordan Method	31
1.11 Jacobi Iteration Method	34
1.12 Gauss-Seidel Iteration Method	38
1.13 Finite Differences	42
1.14 Backward Difference Operator ∇	46
1.15 The Operator E-Shift Operator	47
1.16 Relation between the Operators Δ , E, ∇ , $D = \frac{d}{dx}$	47
1.17 Interpolation	49
1.18 Interpolation with Unequal Intervals	60
1.19 Inverse Interpolation	64
1.20 Numerical Integration	66
1.21 Numerical Solution of Ordinary Differential Equations	75
1.22 Taylor's Series Method	75
1.23 Euler's Method	78
1.24 Runge-Kutta Method	82
CHAPTER-2 : LINEAR PROGRAMMING	87-180
2.1 Introduction	87
2.2 Formulation of Linear Programming Problem	87
2.3 Graphical Method	98
2.4 Simplex Method	110
2.5 Basic Solution	112
2.6 Basic Feasible Solution	112
2.7 Simplex Algorithm	116
2.8 Big M method (Penalty method)	133
2.9 Two Phase Method	140
2.10 Special cases in Simplex Method Application	145
2.11 Duality	155

2.12	Relation between the Optimal Primal and Dual Solutions	160
2.13	Dual Simplex Method	172

CHAPTER 3 : TRANSPORTATION & ASSIGNMENT PROBLEMS **181–256**

3.1	Introduction	181
3.2	Formulation	182
3.3	Solution of Transportation Problem	183
3.4	Finding Basic Feasible Solution	183
3.5	The Northwest–Corner rule	184
3.6	Row Minima and Column Minima Method	187
3.7	Vogel's Approximation Method	191
3.8	Finding the Optimal Solution using MODI Method	198
3.9	Unbalanced Transportation Problems	211
3.10	Transshipment Model	224
3.11	Assignment Problems	232
3.12	Formulation	232
3.13	Hungarian Method	233
3.14	Travelling Salesman Problem	245

FLOW CHARTS AND COMPUTER PROGRAMS **257–290**

1.	Program to find root of a polynomial using iterative method	259
2.	Program to find root of a polynomial using bisection method	261
3.	Program to find root of a polynomial using Newton–Raphson method	263
4.	Program to find root of a polynomial using Regula–Falsi method	265
✓5.	Solution of Simultaneous linear equations using Gauss–Seidel method	267
6.	Solving the differential equations using Euler's method	269
7.	Solving the differential equations using Euler's Modified method	270
8.	Solving the differential equations using Runge–Kutta II method	272
9.	Solving the differential equations using Runge–Kutta IV method	274
✓10.	Numerical Integration using Simpson's and Trapezoidal rule	276
✓11.	Newton's Forward Interpolation formula	281
✓12.	Newton's Backward Interpolation formula	283
13.	Lagrange's Interpolation formula	285
✓14.	Program for Gauss	287
✓15.	Program for Gauss Jordan iteration	288
16.	Program for Jacobi iteration	289