

NATIONAL UNIVERSITY of Computer & Emerging Sciences, Lahore

Department of Computer Science

MT4031– Operations Research Spring - 2024

Program: BSCS Credit Hours: 3

Course Moderator: Dr. Hira Iqbal

Textbook:

Hamdy A Taha "Operations Research: An Introduction" 10th edition

Reference Books

Prem Kumar Gupta and D.S. Hira, "Operations Research" Frederick S. Hiller, Gerald J. Lieberman, "Introduction to Operations Research", 9th Edition.

Evaluations

1. Assignments: 10%

2. Quizzes: 10%

3. Midterm Exams:30%

4. Final Exam: 50%

Course Policies

1. No makeup for missed quizzes or assignments.

2. 80% attendance is essential.

Grading Scheme

Relative

Weekly lesson plan

| Vector Topics to be covered Section/chapter Section/chapte | | | Weekly lesson plan | |
|--|------|---------|--|-----------------------------|
| Introduction to development of LP models 2.1 and 2.2 | week | Lecture | | |
| 2 | 1 | 1 | | (chapter 1 go through it) |
| Solution of LP models involving 2 variables | | | Introduction to development of LP models | 2.1 and 2.2 |
| Solution of LP models involving 2 variables | | | | |
| Solution of LP models involving 2 variables | | 2 | Development of LP model and graphical | 2.3 (2.3.1) and 2.4 |
| Chapter 2 - excel solver | | | | |
| 3 | | | | |
| Introduction to analytical solutions | 2 | 3 | | (3.1 and 3.2, 3.3) |
| Introduction to simplex method | | | | |
| 4 Simplex method and its interpretation continues continues | | | | |
| Continues Sig M and two phase methods 3.4 | | 4 | | 3.1. 3.2 and 3.3 continues |
| S | | • | | 3.1 , 3.2 and 3.3 continues |
| Second Primary Seco | 3 | 5 | | 3.4 |
| Tie for the Key Column. Unbounded Solution, Degeneracy Variants of the Simplex Method; Multiple Solutions, Infeasible Solution / Non-existing feasible Solution, Unrestricted-in-Sign Variables Sensitivity Analysis: Sensitivity Analysis 3.6 | | | | |
| Unbounded Solution, Degeneracy | | 0 | | 3.3 |
| 1 | | | | |
| Multiple Solution Non-existing feasible Solution Non-existing feasible Solution Unrestricted-in-Sign Variables | | _ | | |
| Infeasible Solution / Non-existing feasible Solution, Unrestricted-in-Sign Variables | 4 | 7 | | Continued 3.5 |
| Solution, Unrestricted—in—Sign Variables | | | | |
| Unrestricted-in-Sign Variables | | | | |
| Sensitivity Analysis: Sensitivity Analysis 3.6 | | | | |
| Using Simplex Method | | | | |
| S | | 8 | Sensitivity Analysis: Sensitivity Analysis | 3.6 |
| S | | | Using Simplex Method | |
| 10 | 5 | 9 | Concept of the Duality, | 4.1 and 4.2.1 |
| Primal-Dual Solution Relationship MID TERM | | | | |
| MID TERM | | | * | · |
| 11 | | | | |
| Method And generalized simplex method | - | 11 | | 4.4 |
| And generalized simplex method 12 | 6 | 11 | | 4.4 |
| 12 | | | | |
| 13 | | 10 | | |
| Types of Transportation Problem, Methods to Solve Transportation Problem (Basic Feasible Solution Methods) | | | | |
| to Solve Transportation Problem (Basic Feasible Solution Methods) 14 Method to Solve Transportation Problem: Test for Optimality 8 15 Method to Solve Transportation Problem: Test for Optimality, Introduction to Assignment Problem 16 Transshipment model, Types of Assignment Problem, Assignment Problem: Hungarian Method 9 17 Routing Techniques (Network Techniques); Introduction, Minimum Spanning Tree Problem, Shortest—Path Model 18 Dijkstra's Algorithm 6.3 10 19 Floyd's Algorithm 6.3, 6.4 20 Maximal Flow Problem 6.4 11 21 Continues Excel solver coding etc. 22 Introduction to Integer Programming, 9.1 Branch & Bound Method MID Term II 12 23 Cutting Plane Method 9.2 24 Continues excel solver and coding 13 25 Dynamic Programming: An Introduction, Deterministic dynamic programming | 7 | 13 | | |
| Feasible Solution Methods Method to Solve Transportation Problem: Test for Optimality 5.3 | | | | 5.2 |
| 14 | | | | |
| Test for Optimality Solve Transportation Problem: Test for Optimality, Introduction to Assignment Problem Solve Transportation Problem: Test for Optimality, Introduction to Assignment Problem Solve Transportation Problem: Hongarian Method Transshipment model, Types of Assignment Problem, Assignment Problem: Hungarian Method Routing Techniques (Network Techniques); Introduction, Minimum Spanning Tree Problem, Shortest—Path Model Solve Problem, Shortest—Path Model Solve Problem Solve Probl | | | , | |
| 8 15 Method to Solve Transportation Problem: | | 14 | - | 5.3 |
| Test for Optimality, Introduction to Assignment Problem 16 | | | | |
| Assignment Problem | 8 | 15 | | 5.3, 5.4 |
| 16 Transshipment model, Types of Assignment Problem, Assignment Problem: Hungarian Method 9 17 Routing Techniques (Network Techniques); Introduction, Minimum Spanning Tree Problem, Shortest–Path Model 18 Dijkstra's Algorithm 6.3 10 19 Floyd's Algorithm 6.3, 6.4 20 Maximal Flow Problem 6.4 11 21 Continues Excel solver coding etc. 22 Introduction to Integer Programming, Branch & Bound Method MID Term II 12 23 Cutting Plane Method 24 Continues excel solver and coding 25 Dynamic Programming: An Introduction, Deterministic dynamic programming | | | Test for Optimality, Introduction to | |
| Problem, Assignment Problem: Hungarian Method | | | Assignment Problem | |
| Problem, Assignment Problem: Hungarian Method | | 16 | Transshipment model, Types of Assignment | 5.4 |
| Method Routing Techniques (Network Techniques); | | | | |
| 17 | | | | |
| Introduction, Minimum Spanning Tree Problem, Shortest—Path Model 18 | 9 | 17 | | 6.1. 6.2 |
| Problem, Shortest—Path Model 18 | - | | | |
| 18 Dijkstra's Algorithm 6.3 10 19 Floyd's Algorithm 6.3, 6.4 20 Maximal Flow Problem 6.4 11 21 Continues Excel solver coding etc. 22 Introduction to Integer Programming, Branch & Bound Method 9.1 MID Term II Value of the programming of | | | | |
| 10 19 Floyd's Algorithm 6.3, 6.4 20 Maximal Flow Problem 6.4 11 21 Continues Excel solver coding etc. 22 Introduction to Integer Programming, Branch & Bound Method 9.1 MID Term II 23 Cutting Plane Method 9.2 24 Continues excel solver and coding 13 25 Dynamic Programming: An Introduction, Deterministic dynamic programming 12.1 | | 18 | | 6.3 |
| 20 Maximal Flow Problem 6.4 | | | | |
| 11 21 Continues | | - | | |
| Excel solver coding etc. 22 | | | | 0.4 |
| 22 Introduction to Integer Programming, Branch & Bound Method MID Term II 12 23 Cutting Plane Method 9.2 24 Continues excel solver and coding 13 25 Dynamic Programming: An Introduction, Deterministic dynamic programming | | Δ1 | | |
| Branch & Bound Method MID Term II | | 22 | | 0.1 |
| MID Term II 12 23 Cutting Plane Method 9.2 24 Continues excel solver and coding 13 25 Dynamic Programming: An Introduction, Deterministic dynamic programming | | 22 | | 9.1 |
| 12 23 Cutting Plane Method 9.2 24 Continues excel solver and coding 13 Dynamic Programming: An Introduction, Deterministic dynamic programming | | | | |
| 24 Continues excel solver and coding 13 Dynamic Programming: An Introduction, Deterministic dynamic programming 12.1 | | | | |
| 13 Dynamic Programming: An Introduction, 12.1 Deterministic dynamic programming | | | | 9.2 |
| Deterministic dynamic programming | | 24 | | |
| Deterministic dynamic programming | 13 | 25 | Dynamic Programming: An Introduction, | 12.1 |
| | | | | |
| 26 Dynamic Programming: 12.2 | | 26 | Dynamic Programming; | 12.2 |
| | 14 | | | |
| steps of simulation | | 2, | | 17.117.2 |
| 28 Monte Carlo simulations and application 19.119.2 | | 28 | | 10 110 2 |