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BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – BBA-Hons-2023

Course Name – Operations Research

Course Code - BBA40202

(Semester IV)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Define Operations Research.
 - a) The study of algorithms
 - b) The application of mathematical methods for decision-making
 - c) The study of historical events
 - d) The process of software development
- (ii) Select the correct step in formulating an LPP.
 - a) Ignoring constraints
 - b) Defining the decision variables
 - c) Avoiding the objective function
 - d) Randomly assigning coefficients
- (iii) State a limitation of Linear Programming.
 - a) It handles non-linear constraints
 - b) It can only solve integer problems
 - c) It assumes linear relationships
 - d) It is independent of optimization
- (iv) Recognize a managerial application of Operations Research.
 - a) Optimizing production scheduling
 - b) Conducting employee satisfaction surveys
 - c) Managing social media accounts
 - d) Writing company blogs
- (v) Identify an example of a constraint in LPP.
 - a) Maximize profit
 - b) Minimize cost
 - c) $x + y \leq 10$
 - d) Solve using graphs
- (vi) Indicate the primary objective of solving a transportation problem.
 - a) Minimizing transportation cost
 - b) Maximizing supply
 - c) Reducing delivery time
 - d) Equalizing supply and demand
- (vii) Infer the limitation of the Least Cost Method in transportation problems.
 - a) Always guarantees optimality
 - b) May not provide an initial feasible solution
 - c) Requires balanced supply and demand
 - d) Only works for square matrices
- (viii) Relate the Vogel's Approximation Method (VAM) to optimization.
 - a) It selects the highest cost first
 - b) It considers penalty costs to make allocations

- c) It always provides the optimal solution d) It cannot handle unbalanced problems
- (ix) Represent a special case in transportation problems.
- a) Assignment problems b) Degeneracy
- c) Supply excess d) Non-linearity
- (x) Identify when the Hungarian method is used.
- a) Transportation problems b) Assignment problems
- c) Linear programming d) Network flow problems
- (xi) Calculate the total project duration using the critical path method (CPM).
- a) Sum of all activities b) Sum of all critical activities
- c) Longest path through the network d) Shortest path through the network
- (xii) Choose the primary purpose of a Work Breakdown Structure (WBS).
- a) Identify project risks b) Break down project scope into smaller components
- c) Assign resources to tasks d) Estimate project costs
- (xiii) Solve for the earliest start time of an activity without predecessors.
- a) Zero b) One
- c) Activity duration d) Project start time
- (xiv) Determine the float for a non-critical activity.
- a) Difference between latest and earliest start times b) Difference between latest and earliest finish times
- c) Duration of the activity d) Sum of latest start and earliest start times
- (xv) Establish the relationship between CBS and WBS.
- a) CBS is derived from WBS b) WBS is derived from CBS
- c) CBS and WBS are independent d) CBS is a subset of WBS

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Group-B
(Short Answer Type Questions)

3 x 5=15

2. What are constraints in an LPP? (3)
3. Using the **Least Cost Method (LCM)**, allocate the supplies from the origins (O1, O2, O3) to the demands (D1, D2, D3) based on the given cost table and supply/demand constraints. Then, calculate the total transportation cost. (3)

Cost Table:

	D1	D2	D3	Supply
O1	8	9	7	40
O2	4	3	5	25
O3	8	5	6	35
Demand	30	30	40	Total: 100

4. Explain the concept of opportunity loss in decision making. (3)
5. What is a pure strategy in game theory? (3)
6. Analyze why an LPP might become infeasible and how different constraints contribute to this situation. (3)

OR

Examine the role of optimality tests in solving transportation problems. How do these tests ensure that the best possible solution is achieved, and why are they important in optimization? (3)

Group-C

(Long Answer Type Questions)

7. Can you explain how the concept of Operations Research applies to real-world problem-solving? (5)
8. Question: (5)

Mr. Mistry owns a small shop called "Mistry Furniture Shop" and deals with only two items—tables and chairs.

Total Budget: Rs 50,000

Storage Limit: 60 pieces

Cost & Profit per Item:

- Table: Cost = Rs 2,500, Profit = Rs 250
- Chair: Cost = Rs 500, Profit = Rs 75

Based on this information, answer the following:

1. Define the **decision variables** clearly.
2. Formulate the **objective function** to maximize profit.
3. Write down the **constraints** based on the given budget and storage limits.

(Do not solve the problem; just formulate the Linear Programming Problem.)

9. Define an optimality test in transportation problems. Describe the role of the Modified Distribution (MODI) method in checking the optimality of a solution. (5)
10. What do you understand by project network representation? Explain its role and significance in effective project management with suitable examples. (5)
11. Distinguish between pure strategy and mixed strategy in games or decisions. Explain them in a simple way and provide an example to show how they are different. (5)
12. Find the initial basic feasible solution for the given transportation problem using Vogel's Approximation Method. (5)

	D1	D2	D3	D4	Supply
O1	11	13	17	14	250
O2	16	18	14	10	300
O3	21	24	13	10	400
Demand	200	225	275	250	

OR

Can you argue whether the assumption in Game Theory that players are rational decision-makers always holds true in real life? Can you think of a situation where emotions or external factors might affect a player's choices? (5)
