13907

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – LLM-2022/LLM-2023/LLM-2024/LLM-2025
Course Name – Quantitative Analysis
Course Code - LLM104
(Semester I)

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) Identify the fundamental characteristic of the transportation problem.

a) It is a single-period linear programming problem
b) It involves finding the shortest path in a network
c) It deals with allocating resources from several sources to several destinations
d) It requires the use of quadratic programming techniques

(ii) Locate the feasible region in linear programming.

a) It is the region that contains all the points that satisfy the objective function
b) It is the region where the objective function takes on its maximum value
c) It is the region that contains all the points that violate the constraints
d) It is the region where the objective function is not defined

(iii) Select the correct statement about the transportation problem.

a) The transportation problem always involves only one source and one destination
b) The transportation problem can be solved using only graphical methods
c) The transportation problem requires all supplies and demands to be equal
d) The transportation problem deals with finding the optimal way to transport goods at minimum cost

(iv) Indicate the purpose of the dual variables in linear programming.

a) They represent the decision variables of the original problem
b) They measure the sensitivity of the objective function coefficients
c) They help in identifying the slack or surplus in the constraints
d) They assist in converting a maximization problem into a minimization problem

(v) Predict the steps involved in solving a linear programming problem.

a) Step 1: Formulate the objective function and constraints
b) Step 2: Skip the graphical method and directly use the Simplex algorithm
c) Step 3: Choose any initial feasible solution for the problem
d) Step 4: The optimal solution is always at one of the corner points of the feasible

region

(vi) Choose the correct statement regarding the duality theorem in linear programming.

a) The duality theorem only applies to integer linear programming problems

b) The duality theorem states that the dual problem has the same objective function as the primal problem

c) The duality theorem establishes a relationship between the optimal solutions of the primal and dual problems

d) The duality theorem is not relevant when dealing with linear programming problems with more than three variables

(vii) Identify the condition under which the transportation problem becomes unbalanced.

a) When the total supply exceeds the total demand

b) When the total demand exceeds the total supply

c) When the transportation problem has only one source

d) When the transportation problem has only one destination

(viii) Select the objective of the simplex algorithm in linear programming.

a) To maximize the number of iterations required to reach the optimal solution

b) To minimize the decision variables subject to the constraints

c) To maximize the objective function subject to the constraints

d) To minimize the number of constraints in the problem

(ix) Locate the condition under which a feasible solution becomes an optimal solution in linear programming.

a) When it satisfies all the constraints with equality

b) When it satisfies all the constraints with inequality

c) When it violates some of the constraints

d) When it is located outside the feasible region

(x) Select the correct statement about the dual simplex method

a) It is used to find the optimal solution for integer linear programming problems

b) It is an extension of the simplex algorithm used to solve unbalanced transportation problems

c) It is employed to find the optimal solution for linear programming problems with multiple objectives

d) It is used to update the dual variables and maintain feasibility in the dual problem during iterations

(xi) Select the distribution pattern followed by the PERT analysis.

a) gamma distribution

b) normal distribution

c) beta distribution

d) log-normal distribution

(xii) Predict the steps involved in the Project Evaluation and Review Technique (PERT).

a) Determining the critical path, estimating activity durations, and creating a network diagram

b) Applying the Critical Path Method (CPM), conducting risk analysis, and identifying project milestones

c) Analyzing the cost-benefit ratio, assigning resources to activities, and creating a Gantt chart

d) Conducting risk analysis, estimating activity costs, and determining the project's total duration

(xiii) Predict the concept of slack in PERT and CPM.

a) It refers to the total float in the network

b) It represents the difference between early and late start times for an activity

c) It indicates the critical path of the project

d) It measures the total duration of the project

(xiv) Select the impact of a negative float on a projects schedule in PERT and CPM.

a) It indicates that the project is ahead of schedule

b) It suggests that some activities may be delayed without affecting the projects completion time

c) It represents the total duration of the project

d) It indicates that the project is behind schedule and may require adjustments to meet the deadline

(xv) Predict the significance of float in network analysis.

a) It represents the total duration of the project

b) It indicates the maximum delay each activity can tolerate without delaying the project

c) It includes all activities that have negative float and are causing delays in the project

d) It represents the shortest path in the network and indicates the minimum project duration

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain the concept of Dummy activity. (3)
3. State the objective of the linear programming problem. (3)
4. Describe the decision variables. (3)
5. State the dual problem corresponding to the given linear programming problem. (3)
6. Evaluate the use independent float in network analysis. (3)

OR

Evaluate the use of total float in network analysis. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Distinguish between the objective function and the constraints in a linear programming problem. (5)
8. Describe the role of decision variables in linear programming problems. (5)
9. Illustrate the interpretation of the dual variables in the context of linear programming. (5)
10. Evaluate differences between transportation problem and assignment problem. (5)
11. Illustrate the concept of feasible solutions in transportation problems. (5)
12. Estimate objectives of the transportation problem. (5)

OR

Estimate the steps in formulation of the transportation problem. (5)

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