BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – MBA-2024
Course Name – Quantitative Techniques
Course Code - MBA20116
(Semester II)

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 key components of a Linear Programming model.

a) Decision variables   b) Objective function
c) Constraints   d) All of these

(ii) Describe the purpose of constraints in an LP model.

a) They limit feasible solutions   b) They maximize the objective function
c) They ensure optimality   d) They define decision variables

(iii) Select the correct condition for an optimal LP solution.

a) Feasible region must be defined   b) The objective function must be negative
c) All decision variables must be positive d) All constraints must be violated

(iv) Indicate the first step in solving a transportation problem using the North-West Corner Rule.

a) Allocate to the top-left cell   b) Choose the least cost cell
c) Balance supply and demand   d) Calculate opportunity cost

(v) Identify the primary objective of the transportation problem.

a) Optimize allocation   b) Maximize demand
c) Minimize cost   d) Reduce supply

(vi) Infer the best initial solution method when costs vary significantly.

a) Least Cost Method   b) North-West Corner Rule
c) Hungarian Method   d) Vogel's Approximation Method

(vii) Predict the outcome of an unbalanced transportation problem if supply exceeds demand.

a) Artificial supply is added   b) Problem remains the same

c) Artificial destination is added

d) It becomes an assignment problem

(viii) Indicate the primary objective of the assignment problem.

a) Allocate resources

b) Minimize cost

c) Maximize profit

d) Optimize scheduling

(ix) Identify the key method used to solve assignment problems.

a) Graph theory

b) Branch and bound

c) Simplex method

d) Hungarian method

(x) Infer the reason why the Hungarian method is preferred for solving assignment problems.

a) It uses dynamic programming

b) It avoids integer programming

c) It is faster

d) It provides an optimal solution

(xi) Explain the statement: A linear programming problem having an empty constraint set is said to be_____.

a) Feasible

b) Bounded

c) Unbounded

d) Infeasible

(xii) Select the correct option: Any feasible solution of a canonical maximization (respectively minimization) linear programming problem which maximizes (respectively minimizes) the objective function is called_____.

a) Feasible solution

b) Optimal solution

c) Unbounded solution

d) Bounded solution

(xiii) Select the correct option: The quantitative approach to decision analysis is a _____.

a) logical approach

b) rational approach

c) scientific approach

d) all of these

(xiv) Choose the correct option: In a two-player zero-sum game, under what conditions is it optimal for a player to employ a mixed strategy?

a) No saddle point exists

b) A saddle point exists

c) Dominance Rule can be applied

d) Minimax Rule can be applied

(xv) Assess the following statement and identify the correct one that describes a mixed strategy in Game Theory.

a) A strategy where a player chooses a pure strategy with some probability

b) A strategy where a player uses a dominant strategy

c) A strategy where a player uses the minimax rule

d) A strategy where a player uses the dominance rule

Group-B
(Short Answer Type Questions)

3 x 5=15

2. Infer the initial basic solution for the given problem using NWCM. (3)

	W1	W2	W3	W4	Supply
F1	14	25	45	5	6
F2	16	25	35	55	8
F3	35	3	65	15	16
Demand	4	7	6	13	30

3. Solve the Assignment problem using Hungarian Method. (3)

Jobs	Machines
	I	II	III	IV
A	9	2	7	8
B	6	4	3	7
C	5	8	1	8
D	7	6	9	4

4. (3)

Arrival at a telephone booth is considered Poisson, with an average time of 12 minutes between one arrival and the next. The length of a phone call is assumed to be distributed exponentially with mean 3 minutes. Estimate the average length of the queue.

5. A company produces two types of goods A and B that requires gold and silver. Each unit of (3) type A good requires 3 gm. of silver and 1 gm. of gold, while type B requires 1 gm of silver and 2 gm of gold. The company can use at most 9 gm of silver and 8 gm of gold. If each unit of type A brings a profit of Rs. 40 and B brings Rs. 50. Find the number of units of each type that the company should produce to maximize the profite. Enumerate the LPP.

6. The following matrix gives the payoffs of different strategies S1, S2, S3 (3) and S4 against various conditions; N1, N2, N3 and N4. Deduce the best possible strategy using the Minimin decision criteria.

	N1	N2	N3	N4
S1	200	500	300	700
S2	250	400	170	330
S3	300	280	750	220
S4	480	370	760	350

OR

Evaluate the usefulness of Expected Opportunity Loss (EOL) in making optimal decisions. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Summarize fundamental principle of duality. (5)
8. Describe the various phases in solving an OR problem. (5)
9. Compare and contrast Pure Strategy and Mixed Strategy. (5)
10. Predict a simulation model to analyze the performance of a complex queuing system, such as (5) a call center or a bank.

11. Predict a method to optimize the performance of a queuing system, such as adjusting the arrival rate or service rate. (5)

12. Compare and contrast different queuing models and evaluate their strengths and limitations in modeling real-world queuing systems. (5)

OR

Explain Expected (or average) queue length or expected number of customers waiting in the queue. (5)

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