BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – MBA-2022
Course Name – Quantitative Techniques
Course Code - MBA208
(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) In the assignment problem, what is the objective?

a) Minimize cost b) Maximize profit
c) Minimize time d) Maximize utility

(ii) Which method can be used to solve the assignment problem?

a) Simplex algorithm b) Gradient descent algorithm
c) Hungarian algorithm d) K-means clustering algorithm

(iii) In the assignment problem, what is the constraint that limits each task to be assigned to only one agent?

a) Capacity constraint b) Assignment constraint
c) Demand constraint d) Supply constraint

(iv) In the assignment problem, what is the constraint that limits each agent to be assigned to only one task?

a) Capacity constraint b) Assignment constraint
c) Demand constraint d) Supply constraint

(v) What is a Linear Programming problem?

a) A problem involving linear relationships between variables b) A problem involving non-linear relationships between variables
c) A problem involving only one variable d) A problem involving no variables

(vi) What is a constraint in Linear Programming?

a) A mathematical relationship between variables b) A physical limitation on resources
c) A restriction on the variables d) An objective to be optimized

(vii) Which of the following is NOT an assumption of Linear Programming?

a) Additivity
b) Divisibility
c) Continuity
d) Non-negativity

(viii) In which of the following case LPP could NOT be used?

a) Manufacturing
b) Finance
c) Transportation
d) Consumer Behavior

(ix) Which of the following is not a method of solving Linear Programming problems?

a) Simplex Method
b) Branch and Bound Method
c) Genetic Algorithm
d) Gauss-Seidel Method

(x) What is the mean waiting time in a queuing system with Poisson arrivals and exponential service times?

a) $\lambda/(\mu-\lambda)$
b) $\mu/(\mu-\lambda)$
c) λ/μ
d) μ/λ

(xi) Which of the following represents a potential use of Little's Law in queuing theory?

a) Estimating the average time between arrivals in a queue
b) Calculating the probability of a server being idle in a queue
c) Predicting the maximum capacity of a queue system
d) Determining the average number of customers in a queue system

(xii) Which of the following is an example of a non-zero-sum game?

a) Chess
b) Rock-paper-scissors
c) Poker
d) All of the above

(xiii) Which of the following is not a property of the dual problem in Linear Programming?

a) The dual problem has the same number of constraints as the primal problem
b) The dual problem has the same number of variables as the primal problem
c) The optimal solution of the dual problem is greater than or equal to the optimal solution of the primal problem
d) The dual problem has a different objective function than the primal problem

(xiv) In game theory, what is the definition of a dominant strategy?

a) A strategy that is always the best choice, no matter what the other player does
b) A strategy that is only the best choice if the other player chooses a specific strategy
c) A strategy that is the worst choice, no matter what the other player does
d) A strategy that is only the best choice if the other player also chooses the same strategy

(xv) In the Ultimatum Game, what happens if the proposer offers a split that the responder considers unfair?

a) The responder accepts the offer
b) The responder rejects the offer, and both players get nothing
c) The responder rejects the offer, and both players get equal shares
d) The responder rejects the offer, and the proposer gets everything

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define artificial variable. Why do we need them? Explain with example. (3)
3. Explain sensitivity analysis and its importance? (3)
4. What is the difference between a assignment problem and a traveling salesmen problem? (3)
5. Illustrate 'tandem queue' and "series queue" models with examples. (3)
6. What are the techniques in CPM and PERT that could be used to optimize project schedules, and resource allocation, balancing the trade-offs? (3)

OR

How can game theory be combined with other decision-making tools, such as decision analysis and simulation, to improve strategic decision-making in complex and uncertain environments? (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Evaluate the uses of decision analysis in making better decisions. (5)
8. "Risks can be quantified and evaluated in decision analysis". Critically evaluate this statement. (5)
9. Explain the following in the context of assignment problem: a) Balanced assignment problem b) The Hungarian method c) An infeasible assignmen (5)
10. A car park contains 5 cars. The arrival of cars is Poisson at a mean rate of 10 per hour. The length of time each car spends in the car park is exponential distribution with mean of 5 hours. How many cars are in the park on the average? (5)
11. In a super market, the average arrival rate of customers is 10 every 30 minutes, following Poisson process. The average time taken by a cashier to list and calculate the customer's purchase is two and half minutes following exponential distribution. What is the probability that the queue length exceeds six? What is the expected time spent by a customer in the system? (5)
12. A person requires at least 10 and 12 units of chemicals A and B respectively, for his garden. A liquid product contains 5 and 2 units of A and B respectively per bottle. A dry product contains 1 and 4 units of A and B respectively per box. The liquid products are sold for Rs. 30 per bottle, dry products are sold for Rs. 40 per box. How many of each should be purchased in order to minimize the cost and meet the requirements? Formulate the L.P.P (5)

OR

A project schedule has the following characteristics. Draw the network diagram and find the critical path. Activity 1-2(6 days), Activity 1-3(5 days), Activity 2-4(10 days), Activity 3-4(3 days), Activity 3-5(4 days), Activity 4-5(6 days), Activity 4-6(2 days), Activity 5-6(9 days) (5)

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