R19

Code No: 762AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MBA II Semester Examinations, March/April - 2023
QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS

Time: 3 Hours **Max.Marks:75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(25 Marks)

1.a) What is Operations Research and what is its nature? [5]
b) Give an example of a real-world application of linear programming. [5]
c) What is the difference between a balanced and unbalanced assignment problem? [5]
d) Explain the basic concepts of Decision Theory. [5]
e) Discuss the basic components of a queuing model. [5]

PART - B

(50 Marks)

2.a) Discuss the types of models used in Operations Research.
b) What is the process for developing an Operations Research model? [5+5]

OR

3.a) What is the difference between quantitative and qualitative analysis in Operations Research?
b) What are the shortcomings of using an Operations Research model? [5+5]

4.a) What is the difference between the primal and dual formulations of a linear programming problem?
b) Solve the following Linear programming problem:
Maximize $Z = 3x1 + 2x2$
subject to the constraints:
$x1 + x2 \leq 4$
$2x1 + 5x2 \leq 10$
$x1, x2 \geq 0$. [4+6]

OR

5.a) What is an unbalanced transportation problem? How do you balance an unbalanced problem?
b) Find the initial basic feasible solution by using North-West Corner Rule. [4+6]

W→ F ↓	W_1	W_2	W_3	W_4	Factory Capacity
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Warehouse Requirement	5	8	7	14	34

6.a) Describe the variations of the assignment problem and explain how to resolve.

b) Certain equipment needs 5 repair jobs which have to be assigned to 5 machines. The estimated time (in hours) that a mechanic requires to complete the repair job is given in the table. Assuming that each mechanic can be assigned only one job, determine the minimum time assignment. [4+6]

	J1	J2	J3	J4	J5
M1	7	5	9	8	11
M2	9	12	7	11	10
M3	8	5	4	6	9
M4	7	3	6	9	5
M5	4	6	7	5	11

OR

7.a) Explain the Hungarian method for solving the assignment problem.

b) Solve the following travelling salesmen problem. [5+5]

From	To					
		1	2	3	4	5
	1	∞	2	5	7	1
	2	6	∞	3	8	2
	3	8	7	∞	4	7
	4	12	4	6	∞	5
	5	1	3	2	8	∞

8.a) Discuss the difference between decision making under certainty, risk and uncertainty. Provide examples of each type of decision-making scenario.

b) Consider the following pay-off (profit) matrix. [5+5]

Action	States			
	(S_1)	(S_2)	(S_3)	(S_4)
A_1	5	10	18	25
A_2	8	7	8	23
A_3	21	18	12	21
A_4	30	22	19	15

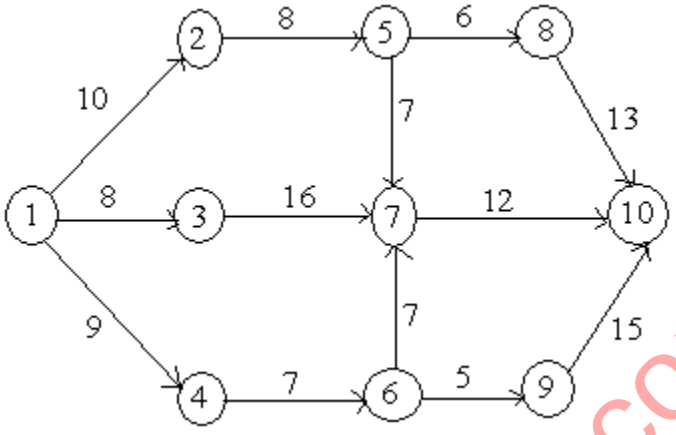
No Probabilities are known for the occurrence of the nature states. Compare the solutions obtained by each of the following criteria:

(i) Maximin (ii) Laplace (iii) Hurwicz (assume that $\alpha = 0.5$). [5+5]

OR

9.a) Compare and contrast the PERT and CPM techniques of project management. Discuss the situations where each method is more suitable.

b) Determine the early start and late start in respect of all node points and identify critical path for the following network. [5+5]



10.a) Discuss the single and multiple service station queuing models with finite and infinite population. How do these models differ from each other?

b) A fast-food restaurant has one cashier and one cook. Customers arrive in a Poisson process with an average rate of 20 per hour, and each customer takes an average of 5 minutes to be served by the cook. The cashier takes an average of 1 minute to take an order and accept payment. The service times for both the cashier and cook follows an exponential distribution. What is the average waiting time for a customer and the average number of customers in the queue? [5+5]

OR

11.a) Explain the following terms
i) Competitive Game
ii) Strategy
iii) Value of the game
iv) Pay-off-matrix
v) Optimal strategy

b) From the following game, evaluate the optimal strategies and value of the game for both the players. [5+5]

A's Strategy	B's Strategy				
	B1	B2	B3	B4	B5
A1	8	10	-3	-8	-12
A2	3	6	0	6	12
A3	7	5	-2	-8	17
A4	-11	12	-10	10	20
A5	-7	0	0	6	2

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