'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

BBA Honours 3rd Semester Examination, 2021

GE2-P1-BBA (304)

QUANTITATIVE TECHNIQUES FOR MANAGEMENT

Time Allotted: 2 Hours | Full Marks: 60

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

GROUP-A

Answer any *two* questions from the following 12×2 = 24

1. (a) Use the two-phase method to solve the following LPP 6+6 = 12

Minimize $Z = x_1 + x_2$

Subject to $2x_1 + x_2 \geq 4$

$x_1 + 7x_2 \geq 7$

$x_1 \geq 0,\ x_2 \geq 0$

(b) Solve the following LPP by the method of big M

Minimize $Z = 4x_1 + x_2$

Subject to $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 4$

$x_1 \geq 0,\ x_2 \geq 0$

2. Solve the following transportation problem using VAM and hence find the optimum solution. The Costs to Transportation Table is given below: 12

Warehouses	Destinations				Supply
	P	Q	R	S	
A	10	18	11	7	20
B	9	12	14	6	40
C	8	9	12	10	35
Demand	16	18	31	30	

3. Find the optimum solution of the game 12

Player - B

Player A	B_1	B_2	B_3	B_4
A_1	3	2	4	0
A_2	2	4	2	4
A_3	4	2	4	0
A_4	0	4	0	8

4. The following table shows the activities for completing a project with their optimistic, pessimistic and most likely time estimates in terms of days. 4+4+4 = 12

Job	**A**	**M**	**b**
1 – 2	3	6	15
1 – 6	2	5	14
2 – 3	6	12	30
2 – 4	2	5	8
3 – 5	5	11	17
4 – 5	3	6	15
5 – 8	1	4	7
6 – 7	3	9	27
7 – 8	4	19	28

(a) Draw the project network

(b) Find the critical path

(c) Find the probability of the project being completed in 31 days.

GROUP-B

5. Answer any ***four*** questions: 6×4 = 24

(a) A company has 5 jobs to be done on five machines. Any job can be done on any machine. The costs of doing the jobs on different machines are given below. Assign the jobs for different machines so as to minimize the total cost. 6

	Machines				
Jobs	**A**	**B**	**C**	**D**	**E**
1	13	8	16	18	19
2	9	15	24	9	12
3	12	9	4	4	4
4	4	12	10	8	13
5	15	17	18	12	20

(b) Write a short note on: 3+3

(i) Hurwicz Criterion

(ii) Minimax Regret Criterion

(c) Write the dual of the following primal LPP 6

$$\text{Min} \quad Z = 5x_1 + 8x_2 + 10x_3$$

Subject to

$$x_1 + x_2 + 2x_3 \leq 120$$

$$3x_1 - 5x_2 - 2x_3 \geq 90$$

$$2x_1 + 4x_2 + 2x_3 = 100$$

$$x_1 \geq 0,\ x_2 \geq 0 \text{ and } x_3 \geq 0$$

(d) Solve the following LPP using simplex method 6

$$\text{Min} \quad Z = 12x_1 + 16x_2$$

Subject to

$$20x_1 + 16x_2 \leq 200$$

$$12x_1 + 20x_2 \geq 150$$

$$x_1 \geq 0,\ x_2 \geq 0$$

(e) Solve the game 6

		Player - B		
Player		B_1	B_2	B_3
Player A	A_1	1	3	1
	A_2	0	–4	–3
	A_3	1	5	–1

(f) Explain the differences between a transportation problem and an assignment problem. 6

GROUP-C

6. Answer any ***four*** questions: 3×4 = 12

(a) What do you mean by mixed strategy? 3

(b) Define feasible solution and optimum solution. 3

(c) What do you mean by saddle point? 3

(d) Distinguish between risk and uncertainty. 3

(e) How would you calculate total float, free float and independent float? 3

(f) What do you mean by expected pay-off? 3

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