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Total No. of Pages : 04

Total No. of Questions : 09

B.Com (Sem.-6)
OPERATION RESEARCH
Subject Code : BCOM602-18
M.Code : 79471
Date of Examination : 16-05-2023

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY** consisting of TEN questions carrying TWO marks each.
2. **SECTIONS-B** consists of FOUR Sub-sections : Units-I, II, III & IV.
3. Each Sub-section contains TWO questions each, carrying TEN marks each.
4. Student has to attempt any ONE question from each Sub-section.

SECTION-A

1. Attempt all questions.

- a) Discuss assumptions of Linear Programming Problem.
- b) What are the various assumptions of EOQ formula?
- c) What do you understand by unbalanced Assignment Problem.
- d) Define fair game.
- e) What are the general similarities between dynamic programming and linear programming?
- f) Discuss the methods used for Decision making under uncertainty.
- g) Discuss use of Transportation problem.
- h) Maximize $5x+3y$ subject to: $3x+5y \leq 15$ and $5x+2y \leq 10$, $x, y \geq 0$.
- i) What is traffic intensity in queuing theory?
- j) A computer centre has three expert programmers. The centre wants three application programmes to be developed. The head of the computer centre, after carefully

studying the programmes to be developed, estimates the computer time in minutes required by the experts for the application programmes as follows :

Programmes	Programmers		
	120	100	80
	80	90	110
	110	140	120

Assign the programmers to the programmes in such a way that the total computer time is minimum.

SECTION-B

UNIT-I

2. A distribution system has the following data :

Factory	Capacity (units)	Warehouse	Demand (units)
A	45	I	25
B	15	II	55
C	40	III	20

The transportation cost / unit (Rs) associated with each route is as follows :

	I	II	III
A	10	7	8
B	15	12	9
C	7	8	12

Find the optimum transportation schedule and the minimum cost of transportation.

3. Solve the following LPP

$$\text{Maximize } Z = 2x_1 + 3x_2 + x_3$$

$$\text{Subject to } x_1 + 4x_2 + 2x_3 \geq 8 \text{ and } 3x_1 + 2x_2 \geq 6$$

where all $x_i \geq 0$ for $i = 1, 2, 3$.

UNIT-II

4. Solve the following game whose pay-off matrix is given by :

Player A	Player B				
		B ₁	B ₂	B ₃	B ₄
	A ₁	3	3	1	10
	A ₂	5	5	4	6
	A ₃	4	−2	0	−5

5. In a toy manufacturing company, suppose the product acceptance probabilities are not known but the following data is known:

Product Acceptance	Anticipated First Year Profit ('000 Rs) Product Line		
	Full	Partial	Minimal
Good	8	70	50
Fair	50	45	40
Poor	-25	-10	0

Determine the optimal decision under each of the following decision criteria and show how you arrived at it :

- Maximax
- Maximin
- Equal likelihood
- Minimax regret?

UNIT-III

6. Draw network diagram corresponding to the following information. Determine the critical path and duration of the project.

Activity	1-2	1-3	2-6	3-4	3-5	4-6	5-6	5-7	6-7
Duration (Days)	4	6	8	7	4	6	5	19	10

7. Speedy Oil provides a single-channel automobile oil change and lubrication service. Customers provide an arrival rate of 3 cars per hour. The service rate is 6 cars per hour. Assume arrivals follow Poisson probability distribution and that service times follow an exponential probability distribution.
- What is the average number of cars in the system?
 - What is the average time that a car waits for the oil and lubrication service to begin?
 - What is the average time a car spends in the system?

UNIT-IV

8. Machine A costs Rs 45,000 and its operating costs are estimated to be Rs 1,000 for the first year increasing by Rs 10,000 per year in the second and subsequent years. Machine B costs Rs 50,000 and operating costs are Rs 2,000 for the first year, increasing by

Rs 4,000 in the second and subsequent years, If at present we have a machine of type A, should we replace it with B? If so when? Assume that both machines have no resale value and their future costs are not discounted.

9. A company that operates for 50 weeks in a year is concerned about its stocks of copper cable. This costs Rs 240 a meter and there is a demand for 8,000 meters a week. Each replenishment costs Rs 1,050 for administration and Rs 1,650 for delivery, while holding costs are estimated at 25 percent of value held a year. Assuming no shortages are allowed, what is the optimal inventory policy for the company? How would this analysis differ if the company wanted to maximize its profits rather than minimize cost? What is the gross profit if the company sells the cable for Rs 360 a meter?

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.