

26023873



26023873



Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, MAY 2026

Fourth Semester

Faculty of Science

Branch IX : Statistics

ST4E02/AS4E03—OPERATIONS RESEARCH

(Common with M.Sc. Applied Statistics with Computer Applications)

(2016—2018 Admissions—Mercy Chance)

Time : Three Hours

Maximum Weight : 30

Part A

*Answer **all** question.*

Each question carries 1 weight.

1. Explain the classical transportation problem.
2. Describe the method of processing 'n' jobs through two machines.
3. What do you mean by Economic Order Quantity ?
4. Write the cost components involved in an inventory problem.
5. State and explain the principal of optimality in dynamic programming.
6. List the characteristics of dynamic programming ?
7. Explain the terms : (a) Saddle point ; and (b) Value for a game.
8. Give an example of a pay-off matrix.

(5 × 1 = 5)

Part B

*Answer any **five** questions.*

Each question carries a weight of 2.

9. Explain Vogel's approximation method for finding an initial basic feasible solution of a transportation problem.

Turn over





26023873

10. What is PERT ? What information is revealed by PERT analysis ?
11. Obtain the formula for classical EOQ without shortage.
12. The demand for an item is 18,000 units per year. The holding cost is Rs. 1.20 per unit time and the cost of shortage is Rs. 500. The production cost is Rs. 400.00. Assuming that the replacement rate is instantaneous, determine the optimum order quantity.
13. Use the Kuhn-Tucker conditions to solve the following nonlinear programming problem.

$$\text{Max } Z = 10x_1 - x_1^2 + 10x_2 - x_2^2.$$

Subject to the constraints $x_1 + x_2 \leq 8$

$$-x_1 + x_2 \leq 5 \text{ and } x_1, x_2 \geq 0.$$

14. Explain Beale's method for solving quadratic programming problem.
15. In a game of matching coins with 2 players, A wins 1 unit value when there are 2 heads, wins nothing when there are 2 tails and lose $\frac{1}{2}$ unit value when there are one head and one tail. Determine Pay Off matrix and value of the game.
16. Explain how graphs and LP solution are used in game theory.

(5 × 2 = 10)

Part C

*Answer any **three** questions.*

Each question carries a weight of 5.

17. There are five jobs, each of which has to go through two machines A and B in the order A – B. The processing times of each job in the machines are as follows.

Job	:	J1	J2	J3	J4	J5
Machine 1	:	5	1	9	3	10
Machine 2	:	2	6	7	8	4

Determine the sequence which minimizes the total elapsed time. What is the idle time for each machine ?





26023873

18. Obtain the initial basic feasible solution by using Vogel's Approximation method and hence obtain the optimal solution, where A, B, C, D and E are retail shops and X, Y and Z are factories.

	A	B	C	D	E	Availability
X	5	8	6	6	3	80
Y	4	7	7	6	6	50
Z	8	4	6	6	3	90
Requirement	40	40	50	40	80	

19. An item is used at a uniform rate of 50,000 units per year. No shortage is allowed and delivery is at an infinite rate. The ordering, receiving and hauling cost is Rs. 13 per order, while inspection cost is Rs. 12 per order. Interest costs Rs. 0.056 and deterioration and obsolescence cost Rs. 0.004 respectively per year for each item actually held in inventory plus Rs. 0.02 per year per unit based on the maximum number of units in inventory. Calculate the Economic Order Quantity (EOQ). If lead time is 20 days, find reorder level.
20. Explain Wolfe's Modified Simplex Method to solve a QPP.
21. Solve the following LPP by dynamic programming :

$$\text{Max } Z = 3x + 2y$$

$$\text{Subject to } x + y \leq 300$$

$$2x + 3y \leq 800$$

$$x, y \geq 0.$$

Turn over





26023873

22. Reduce the following game by dominance and solve it :

		<i>Player B</i>					
		I	II	III	IV	V	VI
<i>Player A</i>	1	4	2	0	2	1	1
	2	4	3	1	3	2	2
	3	4	3	7	− 5	1	2
	4	4	3	4	− 1	2	2
	5	4	3	3	− 2	2	2

(3 × 5 = 15)

