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(20524) Roll No. .....

BCA-IV Sem.

# 18019

## B.C.A. Examination, May-2024

## OPTIMIZATION TECHNIQUES

## (BCA-404)

*Time : Three Hours ]* *[Maximum Marks : 75*

**Note :** Attempt all the sections as per instructions.

### Section-A

### (Very Short Answer Type Questions)

**Note :** Attempt all questions. Each question carries 3 marks. 5×3=15

1. Define a linear programming problem.

2. Explain deterministic model of inventory.

3. Explain characteristics of queuing system.

4. Explain money value and discount ratio.

5. Explain sequencing problem for n jobs on two machines.

### Section-B

### (Short Answer Type Questions)

**Note :** Attempt any **two** questions from this section. Each question carries 7.5 marks. 2×7.5=15

6. Solve the following assignment problem:

| | | Subordinates | | | |
|---|---|---|---|---|---|
| | | I | II | III | IV |
| Tasks | A | 8 | 26 | 17 | 11 |
| | B | 13 | 28 | 4 | 26 |
| | C | 38 | 19 | 18 | 15 |
| | D | 19 | 26 | 24 | 10 |

7. A machine owner finds from his past records that the cost per year of maintaining a machine whose purchase price is Rs. 6,000 are as given below :

| Year | Maintenance Cost Rs. | Resale price Rs. |
|---|---|---|
| 1 | 1000 | 3000 |
| 2 | 1200 | 1500 |
| 3 | 1400 | 750 |
| 4 | 1800 | 375 |
| 5 | 2300 | 200 |
| 6 | 2800 | 200 |
| 7 | 3400 | 200 |
| 8 | 4000 | 200 |

At what age the replacement is due?



8. We have five jobs each of which must go through two machines A and B in order AB. Processing times in hours are given in the following table :

| Job | Machine A (Ai) | Machine B (Bi) |
|---|---|---|
| 1 | 5 | 2 |
| 2 | 1 | 6 |
| 3 | 9 | 7 |
| 4 | 3 | 8 |
| 5 | 10 | 4 |

Determine the sequence for the five jobs that will minimize the elapsed time.

## Section-C

### (Long Answer Type Questions)

**Note :** Attempt any **three** questions out of the following **five** questions. Each question carries 15 marks. 3×15=45

9. Solve the following LPP :

Max. $z=5x_1+3x_2$

s.t. $x_1+x_2 \leq 2$

$5x_1+2x_2 \leq 10$

$3x_1+8x_2 \leq 12$

$x_1, x_2 \geq 0$

10. Solve the following transportation problem :

| | | To | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | Supply |
| From | 1 | 1 | 2 | 1 | 4 | 30 |
| | 2 | 3 | 3 | 2 | 1 | 50 |
| | 3 | 4 | 2 | 5 | 9 | 20 |
| Demand | | 20 | 40 | 30 | 10 | 100 |

11. Find the optimal sequence of jobs which minimize the total elapsed time based on the following informations :

| Jobs | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Machine A (Ai) | 3 | 8 | 7 | 5 | 2 |
| Machine B (Bi) | 3 | 4 | 2 | 1 | 5 |
| Machine C (Ci) | 5 | 8 | 10 | 7 | 6 |

12. Discuss economic lot size model with uniform rate of demand, finite rate of replenishment having no shortages.

13. If you wish to have a return of 10% per annum on your investment then which of the following plans would you prefer?

| | Plan A (Rs.) | Plan B (Rs.) |
|---|---|---|
| Ist Cost | 2,00,000 | 2,50,000 |
| Scrap value after 15 years | 1,50,000 | 1,80,000 |
| Excess of annual revenue over annual disbursement | 25,000 | 30,000 |