(6 pages)

S.No. 576 **08PCA13**

(For the candidates admitted from 2008–2009 onwards)

M.C.A. DEGREE EXAMINATION, NOVEMBER 2017.

Third Semester

OPTIMIZATION TECHNIQUES

Time : Three hours Maximum : 75 marks

PART A — (5 × 5 = 25 marks)

Answer ALL questions.

1. (a) Use graphical method to solve:

Min $Z = -x_1 + 2x_2$

Subject to the constraints

$$-x_1 + 3x_2 \leq 10$$
$$x_1 + x_2 \leq 6$$
$$x_1 - x_2 \leq 2$$
$$x_1, x_2 \geq 0$$

Or

(b) Use simplex method to solve:

Max $Z = 4x_1 + 10x_2$

Subject to the constraints:

$$2x_1 + x_2 \leq 50$$
$$2x_1 + 5x_2 \leq 100$$
$$2x_1 + 3x_2 \leq 90$$
$$x_1, x_2 \geq 0$$

2. (a) Describe the Vogel's approximation method.

Or

(b) Solve the following assignment problem:

	A	B	C	D	E
1	12	8	7	15	4
2	7	9	17	14	10
3	9	6	12	6	7
4	7	6	14	6	10
5	9	6	12	10	6

3. (a) Describe the various costs involved in inventory.

Or

(b) A certain item costs Rs. 235/ton. The monthly requirement is 5 tons. Each time the stock is replenished there is a set-up cost of Rs. 1000 incurred. The cost of carrying inventory has been estimated at 10% value of the stock per year. What is the optimal order quantity?

4. (a) What is production scheduling and classify it?

Or

(b) What are the assumptions in flow shop scheduling?

5. (a) What is Kendall notation? Classify the queueing system.

Or

(b) Describe the different types of simulation.

PART B — (5 × 10 = 50 marks)

Answer ALL questions.

6. (a) Use big M method to solve:

Min $Z = 12x_1 + 20x_2$

Subject to the constraints

$6x_1 + 8x_2 \geq 100$

$7x_1 + 12x_2 \geq 120$

$x_1, x_2 \geq 0$

Or

(b) Apply the principle of duality to solve:

Min $Z = 4x_1 + 3x_2 + 6x_3$

Subject to the constraints:

$x_1 + x_3 \geq 2$

$x_2 + x_3 \geq 5$

$x_1, x_2, x_3 \geq 0$

7. (a) A company has 4 ware houses and 6 stores; the cost of shipping one unit from warehouse i to store j is C_{ij}.

If $C = C_{ij} = \begin{pmatrix} 7 & 10 & 7 & 4 & 7 & 8 \\ 5 & 1 & 5 & 5 & 3 & 3 \\ 4 & 3 & 7 & 9 & 1 & 9 \\ 4 & 6 & 9 & 0 & 0 & 8 \end{pmatrix}$

and the requirements of the six stores are 4, 4, 6, 2, 4, 2 and quantities at the warehouses are 5, 6, 2, 9. Find the optimal solution. Use lowest cost entry method to find the initial solution.

Or

(b) Given the following matrix of set-up cost. Show how to sequence the production so as to minimize the set-up cost per cycle.

	A	B	C	D	E
A	∞	2	5	7	1
B	6	∞	3	8	2
C	8	7	∞	4	7
D	12	4	6	∞	5
E	1	3	2	8	∞

8. (a) The demand for a particular item is 18,000 units per year. The holding cost per unit is Rs. 1.20 per year and the cost of one procurement is Rs. 400. No shortages are allowed and the replacement is instantaneous. Determine

(i) Order quantity

(ii) Number of orders per year

(iii) Time between orders

(iv) Average yearly cost.

Or

(b) The demand for an item is a company is 18,000 units per year. The company can produce the item at the rate of 3000 per month. The cost of one set-up is Rs. 500 and the holding cost per unit per month is 0.15. The shortage cost of one unit is Rs. 20/year. Determine the economic order quantity and the amount of shortage.

9. (a) Consider the problem:

Job:	1	2	3	4	5
Processing time:	7	18	6	8	12
Weight:	1	2	1	2	3

Determine the sequence which will minimize the weighted mean flow time of this problem. Also find the corresponding weighted mean flow time.

Or

(b) Explain the branch-and-bound technique to minimize mean tardiners.

10. (a) Four counters are being run on the frontier of a country to check the passports and necessary papers of the tourists. The tourists choose a counter at random. If the arrivals at the frontier is Poisson at the rate λ and the service time is exponential with parameter $\lambda/2$. What is the average queue?

Or

(b) Describe the functions of any five basic blocks of GPSS.

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