

(6 pages)

S.No. 580

12PCA13

(For the candidates admitted from 2012-2013 onwards)

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

Third Semester

OPTIMIZATION TECHNIQUES

Time : Three hours

Maximum : 75 marks

SECTION A — (5 × 5 = 25 marks)

Answer ALL the questions.

1. (a) Solve the following LPP using graphical method :

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

$$\text{Subject to } x_1 + x_2 \geq 6$$

$$7x_1 + x_2 \geq 14$$

$$x_1, x_2 \geq 0$$

Or

- (b) Form the dual of the following primal problem :

$$\text{Maximize } Z = 4x_1 + 10x_2 + 25x_3$$

$$\text{Subject to } 2x_1 + 4x_2 + 8x_3 \leq 25$$

$$4x_1 + 9x_2 + 8x_3 \leq 30$$

$$6x_1 + 8x_2 + 2x_3 \leq 40$$

$$x_1, x_2, x_3 \geq 0$$

2. (a) Convert the following transportation problem into a balanced transportation problem :

	Destination				Supply
Source	5	12	6	10	300
	7	8	10	3	400
	9	4	9	2	300
Demand	200	300	450	250	1200/1000

Or

- (b) Write down the algorithm for Vogel's approximation method.

3. (a) A textile mill buys its raw material from a vendor. The annual demand of the raw material is 9000 units. The ordering cost is Rs. 100 per order and the carrying cost is 20% of the purchase price per unit per month, where the purchase price per unit is Re. 1. Find the EOQ and the total cost w.r.t EOQ.

Or

- (b) Discuss the manufacturing model without shortages.

4. (a) A set of single operation jobs that is to be processed in a CNC lathe and the processing times of the jobs are given in the following table :

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

Find the optimal sequence which will minimize the mean flow time and also obtain the corresponding minimum mean flow time.

Or

- (b) Write down the algorithm for 2 jobs and m machines job shop scheduling.
5. (a) Explain (M/M/1):(GD/ ∞ / ∞) model.

Or

- (b) Cars arrive at a drive-in restaurant with a mean arrival rate of 24 cars per hour and the service rate of the cars is 20 cars per hour. The arrival rate and the service rate follow poisson distribution. The number of parking space for cars is only 4. Find the standard results of this system.

SECTION B — (5 × 10 = 50 marks)

Answer ALL questions.

6. (a) Solve the following LPP using dual simplex method :

$$\text{Minimize } Z = 2x_1 + 4x_2$$

$$\text{Subject to } 2x_1 + x_2 \geq 4$$

$$x_1 + 2x_2 \geq 3$$

$$2x_1 + 2x_2 \leq 12$$

$$x_1, x_2 \geq 0$$

Or

- (b) Solve the following LPP using Big M method.

$$\text{Minimize } Z = 10x_1 + 15x_2 + 20x_3$$

$$\text{Subject to } 2x_1 + 4x_2 + 6x_3 \geq 24$$

$$3x_1 + 9x_2 + 6x_3 \geq 30$$

$$x_1, x_2, x_3 \geq 0$$

7. (a) Consider the following transportation problem :

		Market					Supply
Plant		10	2	16	14	10	300
		6	18	12	13	16	500
		8	4	14	12	10	825
		14	22	20	8	18	375
Demand		350	400	250	150	400	

Find the initial basic feasible solution using.

(i) North west corner method.

(ii) Least cost cell method.

Or

(b) Write down the procedure for solving an assignment problem by applying Hungarian method.

8. (a) Explain the purchase model with instantaneous replenishment and without shortages.

Or

(b) The demand for an item is 6000 units per year. Its production rate is 1000 units per month. The carrying cost is Rs. 50 unit/year and the set-up cost is Rs. 2,000 per set-up. The shortage cost is Rs. 1,000 per unit per year. Find various parameter of the inventory system.

9. (a) Consider a 3 machine 5 job flow shop problem given below.

Processing time

Job	Machine 1	Machine 2	Machine 3
1	10	10	12
2	12	8	20
3	16	6	14
4	12	4	20
5	20	8	2

Find the optimal sequence and corresponding processing time.

Or

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(b) Consider the 2 machines and 6 jobs flow shop scheduling as shown below.

Job :	1	2	3	4	5	6
Machine 1 :	4	10	14	8	18	16
Machine 2 :	6	12	10	12	6	8

Find the optimal sequence and the corresponding makespan.

10. (a) Prepare a flow chart for the single server queuing system.

Or

(b) Explain the terminologies of the queuing system and classification of the queuing models.

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