

Rs. 100 per year in the sixth and the succeeding years. Assuming a 10 percent discount rate of money per year, find the optimum length of time to hold the machine before it is replaced.

- (b) The demand of an item is uniform at a rate of 25 units per month. The fixed cost is Rs. 30 each time a production run is made. The production cost is Rs. 2 per unit and inventory carrying cost is Rs. 0.50 per unit per month. If the shortage cost is Rs. 3 per item per month, determine how often to make a production run and of what size?

Register Number :

Name of the Candidate :

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B.Sc. DEGREE EXAMINATION, 2008

(MATHEMATICS WITH COMPUTER APPLICATIONS)

(SECOND YEAR)

(PART - III)

(PAPER - V)

640. OPERATIONS RESEARCH

December]

[Time : 3 Hours

Maximum : 100 Marks

PART - A (8 × 5 = 40)

Answer any EIGHT questions.

Each question carries FIVE marks.

1. A firm produces head - ache tablets in two sizes - A and B. Size - A contains 2 grains of aspirin, 5 grains of bicarbonate and 1 grain of codine. Size - B contains 1 grain of aspirin, 8 grains of bicarbonate and 6 grains of

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codine. It is found by users that it requires at least 12 grains of aspirin, 74 grains of bicarbonate and 24 grains of codine for providing immediate effect. It is required to determine the least number of tablets a patient should take to get immediate relief. Formulate the problem as a standard LPP.

2. Solve the following problem graphically :

Maximize

$$z = 3x_1 + 2x_2$$

Subject to the constraints :

$$x_1 - x_2 \leq 1 ;$$

$$x_1 + x_2 \geq 3 ;$$

$$x_1, x_2 \geq 0.$$

3. Define :

- (i) Standard L.P.P.
- (ii) Optimum solution.
- (iii) Surplus variable.
- (iv) Artificial variable.

14. (a) Solve the following assignment problem :

		Machine				
		A	B	C	D	E
Jobs	I	37	43	45	33	45
	II	45	29	33	26	41
	III	46	32	38	35	42
	IV	27	43	46	41	41
	V	34	38	45	40	44

(b) We have seven jobs each of which has to go through the machine M_1 and M_2 in order M_1, M_2 Processing times (in hours) are given as :

Job	:	1	2	3	4	5	6	7
Machine M_1	:	3	12	15	6	10	11	9
Machine M_2	:	8	10	10	6	12	1	3

Determine a sequence of jobs that will minimize the total elapsed time T.

15. (a) A machine costs Rs. 10,000. Operating costs are Rs. 500 per year for the first five years. Operating costs increase by

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12. Use dual simplex method to solve the following LPP :

Minimize

$$z = 2x_1 + 3x_2$$

Subject to the constraints

$$2x_1 + 3x_2 \leq 30$$

$$x_1 + 2x_2 \geq 10$$

$$x_1 - x_2 \geq 0$$

$$x_1 \geq 5, x_2 \geq 0.$$

13. Determine an initial basic feasible solution to the following transportation problem using the row minimum method and hence, find the optimal solution :

		To			
		A	B	C	
From	I	5	3	22	10
	II	9	4.5	17	30
	III	25	20	5	40
		40	20	20	
		Requirement			

Availability

4. Find the dual of the following LPP :

Maximize

$$z = 40x + 50y$$

Subject to constraints

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

$$4x + 2y \leq 2 ;$$

$$x, y, \geq 0.$$

5. Determine an initial basic feasible solution to the following transportation problem using (low cost method) matrix minimum method :

		To					
		3	4	6	8	9	
From	20	3	4	6	8	9	20
	30	2	10	1	5	8	30
	15	7	11	20	40	3	15
	13	2	1	9	14	16	13
		40	6	8	18	6	
		Demand					

Available

6. Explain travelling salesman problem.

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7. Write down the optimal sequence algorithm for n jobs 2 machines.
8. Find the economic lot size, the associated total cost, and the length of time between two orders, given that the setup cost is Rs. 100, the daily holding cost per unit of inventory is 5 paise and the daily demand is approximately 30 units.
9. A truck owner finds from his past records that the maintenance cost per year of truck whose purchase price is Rs. 8,000 are as given below :

Year	Maintenance cost	Resale price
1	1,000	4,000
2	1,300	2,000
3	1,700	1,200
4	2,200	600
5	2,900	500
6	3,800	400
7	4,800	400
8	6,000	400

Determine at which it is profitable to replace the truck,

10. Define reliability and give its important aspects.

PART - B (3 × 20 = 60)

*Answer any THREE questions.
All questions carry equal marks.*

11. Solve the following L.P.P.

Maximize

$$z = 4x_1 + 5x_2 + 9x_3 + 11x_4$$

Subject to the constraints

$$x_1 + x_2 + x_3 + x_4 \leq 15$$

$$7x_1 + 5x_2 + 3x_3 + 2x_4 \leq 120$$

$$3x_1 + 5x_2 + 10x_3 + 15x_4 \leq 100$$

$$x_1, x_2, x_3, x_4 \geq 0.$$

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