



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.Sc. DEGREE EXAMINATION – MATHEMATICS**

**FIFTH SEMESTER – APRIL 2017**

**MT 5507- OPERATIONS RESEARCH**

Date: 26-04-2017  
01:00-04:00

Dept. No.

Max. : 100 Marks

**PART – A**

**ANSWER ALL QUESTIONS**

**10 X 2 = 20**

1. Define Linear Programming.
2. Define Basic feasible solution in an LPP.
3. What is a Assignment problem?
4. Define Initial basic feasible solution in a Transportation problem.
5. Define Saddle point of a game.
6. Define Strictly determinable game.
7. Define a network.
8. What is the main difference between CPM and PERT.
9. What is Economic Order Quantity?
10. What are the main decisions to be made in inventory control?

**PART – B**

**ANSWER ANY FIVE QUESTIONS**

**5 X 8 = 40**

11. Solve graphically: Maximize  $Z = 3x_1 + 4x_2$  subject to the constraints

$$x_1 + x_2 \leq 450, 2x_1 + x_2 \leq 600 \text{ and } x_1, x_2 \geq 0.$$

12. Solve by simplex method: Maximize  $Z = 5x_1 + 3x_2$  subject to the constraints

$$x_1 + x_2 \leq 2, 5x_1 + 2x_2 \leq 10, 3x_1 + 8x_2 \leq 12 \text{ and } x_1, x_2 \geq 0.$$

13. Find an initial solution by least cost method.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

14. Solve the assignment problem:

	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

15. Determine the optimum strategies and the value of the game.

		$P_2$	
$P_1$		5	1
		3	4

16. A project consists of a series of tasks labeled  $A, B, \dots, H, I$  with the following relationships  $A < D, E; B, D < F; C < G; B < H; F, G < I$ . Construct the network diagram.

17. A project schedule has the following characteristics: Find the critical path and duration

Activity	Time (weeks)	Activity	Time (weeks)
1-2	4	5-6	4
1-3	1	5-7	8
2-4	1	6-8	1
3-4	1	7-8	2
3-5	6	8-10	5
4-9	5	9-10	7

18. The demand for a commodity is 100 units per day. Every time an order is placed, a fixed cost of Rs. 400 is incurred. Holding cost is Re. 0.08 per unit per day. Unit cost is Rs.20. Determine the economic lot size and the time between two orders.

ANSWER ANY TWO QUESTIONS

2 X 20 = 40

19. Solve by Big M method: Maximize  $Z = 2x_1 + 3x_2$  subject to the constraints

$x_1 + 2x_2 \leq 4, x_1 + x_2 = 3$  and  $x_1, x_2 \geq 0$ .

20. Solve the following transportation problem:

	D	E	F	G	Capacity
A	19	30	50	10	7
B	70	30	40	60	9
C	40	8	70	20	18
Requirement	5	8	7	14	

21. The optimistic, most likely and pessimistic times of the activities of a project are given below. Activity 40 – 50 must not start before 22 days, while activity 70 – 90 must end by 15 days. The scheduled completion time of the project is 46 days. Draw the network and determine the critical path. What is the probability of completing the project in scheduled time?

Activity	$t_0 - t_m - t_p$	Activity	$t_0 - t_m - t_p$
10 – 20	4 – 8 – 12	50 – 70	3 – 6 – 9
20 – 30	1 – 4 – 7	50 – 80	4 – 6 – 8
20 – 40	8 – 12 – 16	60 – 100	4 – 6 – 8
30 – 50	3 – 5 – 7	70 – 90	4 – 8 – 12
40 – 50	0 – 0 – 0	80 – 90	2 – 5 – 8
40 – 60	3 – 6 – 9	90 – 100	4 – 10 – 16

22. (a). A stockiest has to supply 400 units of a product every Monday to his customers. He gets the product at Rs. 50 per unit from the manufacturer. The cost of ordering and transportation from the manufacturer is Rs. 75 per order. The cost of carrying inventory is 7.5% per year of the cost of the product. Find

- (i) the economic lot size.
- (ii) the total optimal cost ( including the capital cost ).
- (iii) the total weekly profit if the item is sold for Rs. 55 per unit.

(b). Solve the game using graphical method.

	<i>Player B</i>				
<i>Player A</i>	[ 2	-2	3	7	6 ]
	[ 6	5	1	4	0 ]

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