LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.A. DEGREE EXAMINATION – **ECONOMICS**

FOURTH SEMESTER – **APRIL 2025**

16/17/18UEC4ES01 – OPERATIONS RESEARCH

Date: 08-05-2025 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 PM

SECTION A

ANSWER ANY FOUR OF THE FOLLOWING **4 X10=40 Marks**

1. Elucidate the characteristics of Operations Research.
2. Describe the procedure to solve a Simplex Problem.
3. Distinguish CPM and PERT.
4. A dietician wishes to mix two types of food F1 and F2 in such a way that the vitamin contents of the mixture contains at least 6 units of vitamin A and 9 units of vitamin B. Food F1 costs 50 per kg and F2 costs 70 per kg. Food F1 contains 4 units per kg of vitamin A and 6 units per kg of vitamin B, while food F2 contains 5 units per kg of vitamin A and 3 units per kg of vitamin B. Formulate the above problem as a linear programming problem to minimize the cost of mixture.

5. Solve the following transportation problem using North West Corner Method.

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	

6. Find optimal Assignment using Hungarian Method.

Work \ Job	I	II	III	IV	V
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

7. Compute EST, EFT, LST and LFT for the given project. Also calculate critical path and the duration to complete the project.

Activitiy	1-2	1-3	2-4	2-5	3-4	4-5
Duration (in days)	8	4	10	2	5	3

8. A company uses Rs.10,000 worth of an item during the year. The Ordering costs are Rs. 25 per order and carrying charges are 12.5% of the average Inventory value. Find the economic order quantity, number of orders per year, time period per order and the total cost.

SECTION - B

ANSWER ANY THREE OF THE FOLLOWING **3 X 20 =60 Marks**

9. Show the rules for constructing network problem and numbering the events.

10. Solve the following LPP using Graphical Method.
Maximize $Z = 2x1 + 5x2$ Subject to the constraints
$x1 + 4x2 \leq 24$ $3x1 + x2 \leq 21$ $x1 + x2 \leq 9$ and $x1, x2 \geq 0$.

11. Find the initial basic feasible solution for the following transportation problem using (i) LCM (ii) VAM.

	R1	R2	R3	R4	Supply
P1	3	5	7	6	50
P2	2	5	8	2	75
P3	3	6	9	2	25
Demand	20	20	50	60	

12. The MDH Masala company has to process five items on three machines: A, B & C. Processing times are given in the following table. Find the optimal sequence, total elapsed time and idle time.

Job	1	2	3	4	5
A	4	9	8	6	3
B	4	5	3	2	6
C	6	9	11	8	7

13. The following table lists the jobs of a network along with their time estimates.

Job (i-j)	Duration (in days)		
	t_o	t_m	t_p
1-2	3	6	15
1-6	2	5	14
2-3	6	12	30
2-4	2	5	8
3-5	5	11	17
4-5	3	6	15
5-8	1	4	7
6-7	3	9	27
7-8	4	19	28

Draw the network of the above project. Compute expected duration, variance and critical path of the project.

14. The following table gives annual Demand and unit price of 3 items.

Items	Annual Demand (in units)	Unit Price (Rs.)
A	800	0.02
B	400	1.00
C	13,800	0.20

Ordering Cost is Rs.5 per order and annual holding cost is 10% of unit price.
Determine the following.

a) EOQ in units
b) Minimum Inventory cost
c) EOQ in rupees
d) EOQ in years of Supply
e) Number of orders per year
