SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc.(CGS) - END SEMESTER EXAMINATIONS NOVEMBER -2023
SEMESTER - III
21UCGAT3003 - Operations Research

Total Duration : 2 Hrs 30 Mins.   Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks$)$

1. Solve the L.P.P by using Graphical Method,

        Max $z = 2x_1 + 3x_2$

        Subject to $x_1 - x_2 \leq 2$,

                $x_1 + x_2 \geq 4$

        and $x_1, x_2 \geq 0$

2. A company produces refrigerators in Unit I and heaters in Unit II. The two products are produced and sold on a weekly basis. The weekly production cannot exceed 25 in Unit I and 36 in Unit II, due to constraints 60 workers are employed. A refrigerator requires 2 man-week of labour, while a heater requires 1 man-week of labour. The profit available is Rs.600 per refrigerator and Rs.400 per heater. Formulate this as LPP.

3. Find the Starting Solution of the following Transportation Model using
   (i) North West Corner Rule   (ii) Least Cost Method
   (iii) Vogel's Approximation Method

1	2	6	7
0	4	2	12
3	1	5	11
10	10	10	

4. Solve the Transportation Problem with unit Transportation Costs, Demands and Supplies as given below:

		Destination				
		D1	D_2	D_3	D_4	**Supply**
	S_1	6	1	9	3	70
Source	**S_2**	11	5	2	8	55
	S_3	10	12	4	7	70
	Demand	85	35	50	45	

Contd...

5. Find the sequence that minimises the total elapsed time required to complete the following tasks on the machine in the order 1-2-3. Find also the minimum total elapsed time (hours) and the idle time on the machine.

Task Time on	A	B	C	D	E	F	G
Machine 1	3	8	7	4	9	8	7
Machine 2	4	3	2	5	1	4	3
Machine 3	6	7	5	11	5	6	12

6. Using Graphical Method, solve the Rectangular Game whose payoff matrix for player A is $\begin{pmatrix} 2 & -1 & 5 & -2 & 6 \\ -2 & 4 & -3 & 1 & 0 \end{pmatrix}$

7. Solve using Dominance property

		B			
		I	II	III	IV
A	1	-5	3	1	20
	2	5	5	4	6
	3	-4	-2	0	-5

8. A project schedule has the following characteristics:

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

Construct PERT network and find the critical path

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Apply the Simplex Method to solve the problem.

Max $z = 100x_1 + 200x_2 + 50x_3$

Subject to $5x_1 + 5x_2 + 10x_3 \le 1000$

$10x_1 + 8x_2 + 5x_3 \le 2000$

$10x_1 + 5x_2 \le 500$

$x_1, x_2, x_3 \ge 0$

10. Solve the following Travelling Salesman Problem so as to minimize cost per cycle:

To City

	1	2	3	4	5
1	-	10	25	25	10
2	1	-	10	15	2
3	8	9	-	20	10
4	14	10	24	-	15
5	10	8	25	27	-

Contd...

11. Solve the following Sequencing Problem giving an optimal solution if passing is not allowed.

Jobs		M_1	M_2	M_3	M_4
		Machine			
	A	13	8	7	14
	B	12	6	8	19
	C	9	7	8	15
	D	8	5	6	15

12. A and B play a game in which each has three coins, a 5p, a 10p and 20p. Each selects a coin without the knowledge of the other's choice. If the sum of the coins is an odd amount, A wins B's coin, If the sum is even B wins A's coin. Find the best strategy for each player and the value of the game.

13. Calculate the Earliest Start, Earliest Finish, Latest Start and Latest Finish of each activity of the project given below and determine the critical path of the project.

Activity	1-2	1-3	1-5	2-3	2-4
Duration (in weeks)	8	7	12	4	10
Activity	3-4	3-5	3-6	4-6	5-6
Duration (in weeks)	3	5	10	7	4

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