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 - NOV'2024
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 Graphically: Maximize: $Z = 8x + y$
   Subject to $x + y \leq 40$;
   $2x + y \leq 60$;
   and $x \geq 0, y \geq 0$.

2. A factory manufactures two types of products S and T and sells them at a profit of $2 on type S and $3 on type T. Each product is processed on two machines M1 and M2. Type S requires 1 minute of processing time on M1 and 2 minutes on M2. Type T requires 1 minute on M1 and 1 minute on M2. Machine M1 is available for not more than 6 hours 40 minutes while machine M2 is available for 10 hours during any working day. Formulate the problem as an LPP so as to maximise the profit.

3. Using North West corner rule determines the basic feasible solution to the following transportation problem.

		Destination					
		A	B	C	D	E	Supply
Source	P	2	11	10	3	7	4
	Q	1	4	7	2	1	8
	R	3	9	4	8	12	9
Demand		3	3	4	5	6	

4. Solve the following assignment problem

	Job				
Persons	1	2	3	4	5
A	8	4	2	6	1
B	0	9	5	5	4
C	3	8	9	2	6
D	4	3	1	0	3
E	9	5	8	9	5

Contd...

5. There are five jobs, each of which must go through the two machines A and B in the order AB. Processing times are given below: Processing time (hours)

Job	1	2	3	4	5
M1	3	8	5	7	4
M2	4	10	6	5	8

Determine the optimum sequence, minimum total elapsed time and idle time for the machines.

6. Using Dominance property solve the Game

	B			
A	-5	3	1	20
	5	5	4	6
	4	-2	0	-5

7. Draw the network for the project whose activities and their precedence relationships are given below:

Activity	A	B	C	D	E	F
Predecessor	-	-	-	A, B	A, C	B, C

8. Distinguish between CPM and PERT.

Section C

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

9. Solve the following transportation to minimize the total cost of the transportation.

Origin	**Destination**				**Supply**
	14	56	48	27	70
	82	35	21	81	47
	99	31	71	63	93
Demand	70	35	45	60	210

10. Solve the following sequencing problem of 4 jobs and 6 machines (Processing time in hours)

Jobs	**Machines**					
	M1	M2	M3	M4	M5	M6
A	19	8	8	3	11	24
B	18	6	9	6	9	18
C	12	5	8	5	7	15
D	20	5	3	4	8	11

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

Contd...

12. Calculate the total float free float and independent float for the project whose activities are given below:

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

13. Use the Simplex method to solve the (LP) model:
Max $Z = 4x1 - x2$
Subject to $x1 + 2x2 \leq 4$;
$2x1 + 3x2 \leq 12$;
$x1 - x2 \leq 3$;
and $x1, x2 \geq 0$.

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