Roll.No. | 20USTCT4008

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(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc.Statistics - END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - IV
20USTCT4008 - Operations Research

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

Section B

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

1. A paper mill produces two grades of paper, X and Y. Because of raw material restrictions, it cannot produce more than 400 tonnes of grade X and 300 tonnes of grade Y in a week. There are 160 production hours in a week. It requires 0.2 and 0.4 hours to produce a tonne of products X and Y respectively with corresponding profits of Rs.200 and Rs.500 per tonne. Formulate this as a LPP to maximize profit and find the optimum product mix.

2. Solve the following assignment problem.

JOBS	Machines			
	I	II	III	IV
A	10	12	19	11
B	5	10	7	8
C	12	14	13	11
D	8	15	11	9

3. Solve the game whose payoff matrix is given by

Player A

$$\begin{array}{c} \\ A_1 \\ A_2 \\ A_3 \end{array} \begin{array}{c} \text{Player B} \\ \begin{bmatrix} B_1 & B_2 & B_3 \\ 1 & 3 & 1 \\ 0 & -4 & -3 \\ 1 & 5 & -1 \end{bmatrix} \end{array}$$

4. Describe the iterative procedure of determining the critical path.

5. Surya Roshni Ltd. has three factories - X, Y, and Z. It supplies goods to four dealers spread all over the country. The production capacities of these factories are 200, 500 and 300 per month respectively.Solve the following transportation problem to maximize the profit.

Contd...

Factory	Dealer				Capacity
	A	B	C	D	
X	12	18	6	25	200
Y	8	7	10	18	500
Z	14	3	11	20	300
Demand	180	320	100	400	

6. How will you solve Unbalanced and maximization in assignment problem.
7. Classify the types of games.
8. Examine the Rules of network construction.

Section C

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

9. Solve the following LPP using simplex method.
$Max.Z = 3X_1 + 2X_2$
subject to, $X_1 + X_2 \leq 4$
$X_1 - X_2 \leq 2$ and
$X_1, X_2 \geq 0$

10. Apply VAM method and find the initial basic feasible solution for the following transportation problem.

Destination						
		D_1	D_2	D_3	D_4	Supply
Origin	O_1	11	13	17	14	250
	O_2	16	18	14	10	300
	O_3	21	24	13	10	400
	Demand	200	225	275	250	950

11. The owner of a small machine shop has four mechanics available to assign jobs for the day. Five jobs are offered with expected profit for each mechanic on each jobs, which are as follows

		Jobs				
		A	B	C	D	E
Machines	1	62	78	50	111	82
	2	71	84	61	73	59
	3	87	92	111	71	81
	4	48	64	87	77	80

12. Solve and find the sequence that minimizes the total elapsed time (in hours) required to complete the following tasks on two machines.

Task	A	B	C	D	E	F	G	H	I
Machine I	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

13. A small maintenance project consists of the following jobs whose precedence relationships is given below:

Job	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Duration (days)	15	15	3	5	8	12	1	14	3	14

(i)Draw an arrow diagram representing the project.
(ii) Find the total float for each activity.
(iii) Find the critical path and the total project duration.

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