

Roll.No.

21UCGAT3003

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
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B.Sc CS with CGS - END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - III

21UCGAT3003 - Operations Research

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions (6 × 5 = 30 Marks)

1. Solve the following L.P.P graphically

Maximize $Z=100x_1 + 40x_2$

subject to $5x_1 + 2x_2 \leq 1000$

$3x_1 + 2x_2 \leq 900$

$x_1 + 2x_2 \leq 500$

$x_1, x_2 \geq 0.$

2. There are five jobs, each of which is to be processed through two machines M1, M2 in the order M1 M2. Processing hours are as follows :

Job	1	2	3	4	5
M ₁	3	8	5	7	4
M ₂	4	10	6	5	8

Determine the optimal sequence for the five jobs and minimum total elapsed time. Find also the idle time of machines M1 and M2.

3. Solve the following 2 × 2 game :

A $\begin{matrix} & \text{B} \\ \begin{bmatrix} 2 & 5 \\ 7 & 3 \end{bmatrix} \end{matrix}$

4. State the rules for construction of network.

5. Assign the machines for the jobs so that the total processing time(in hours) is minimum.

		Machines				
		M1	M2	M3	M4	M5
Jobs	J1	9	22	58	11	19
	J2	43	78	72	50	63
	J3	41	28	91	37	45
	J4	74	42	27	49	39
	J5	36	11	57	22	25

6. Define sequencing problem and state the assumptions made while solving a sequencing problem.
7. Explain Maximin-minimax principle, with suitable example.
8. Compute the earliest start, earliest finish, latest start and latest finish of each activity of the project below:

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

Section C

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

9. Solve the following L.P.P by simplex method

Minimize $Z = 8x_1 - 2x_2$
 subject to $-4x_1 + 2x_2 \leq 1$
 $5x_1 - 4x_2 \leq 3$
 $x_1, x_2 \geq 0$.

10. Obtain an optimum basic feasible solution to the following transportation problem by MODI method

	To			Available
From	7	3	2	2
	2	1	3	3
	3	4	6	5
Demand	4	1	2	10

11. Find the sequence that minimizes the total elapsed time required to complete the following tasks on machines M1 , M2 and M3 in the same order. Also find the minimum total elapsed time and idle time (hours) and the idle time on the machine.

Task	A	B	C	D	E	F	G
Time on M1	3	8	7	4	9	8	7
Time on M2	4	3	2	5	1	4	3
Time on M3	6	7	5	11	5	6	12

12. Reduce the following game by dominance property and find the game value.

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

Contd..

13. The following table indicates the details of a project.

a) Draw the network

b) Find the critical path

c) Determine the expected standard deviation of the completion time.

Activity:	1-2	1-3	1-4	2-4	2-5	3-5	4-5
Optimistic time(in days):	2	3	4	8	6	2	2
Most likely time (in days):	4	4	5	9	8	3	5
Pessimistic time (in days)	5	6	6	11	12	4	7
