

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.Com. A&F - END SEMESTER EXAMINATIONS - NOVEMBER 2025

SEMESTER - II

**23UAFAT2002 - 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  $\text{Max } Z = 2x_1 + 3x_2$

$$\text{St } x_1 + x_2 \leq 30$$

$$x_2 \geq 3$$

$$x_2 \leq 12$$

$$x_1 - x_2 \geq 0$$

$$x_1 \leq 20$$

$$x_1, x_2 \geq 0$$

2. Determine an initial basic feasible solution to the following transportation problem using least cost entry method.

	S1	S2	S3	
W1	5	4	3	6
W2	4	7	6	8
W3	2	5	8	12
W4	8	6	7	4
	8	10	12	30

3. Solve the following unbalanced assignment problem of minimizing total time for doing all the jobs.

Operator	Job				
	1	2	3	4	5
1	6	2	5	2	6
2	2	5	8	7	7
3	7	8	6	9	8
4	6	2	3	4	5
5	9	3	8	9	7
6	4	7	4	6	8

Contd...

4. The activities of a project have the following PERT time estimates.

Job	Optimistic time	Most likely time	Pessimistic time
1 – 2	3	6	15
7 – 8	4	19	28
2 – 3	6	12	30
3 – 5	5	11	17
5 – 8	1	4	7
6 – 7	3	9	27
4 – 5	3	6	15
2 – 4	2	5	8
1 – 6	2	5	14

- Draw the network diagram and determine the critical path.
- Find the project completion time and its variance.

5. What are the classification of queuing system?

6. Explain the various steps of the Hungarian method for assignment problems.

7. The Amulya Milk Company has three plants located throughout a state with production capacity 50, 75, and 25 gallons. Each day the firm must furnish its four retail shops  $R_1$ ,  $R_2$ ,  $R_3$ , &  $R_4$  with at least 20, 20, 50 and 60 gallons respectively. The transportation costs (in Rs.) are given below:

Plant	Retail Shop				Supply
	$R_1$	$R_2$	$R_3$	$R_4$	
$P_1$	3	5	7	6	50
$P_2$	2	5	8	2	75
$P_3$	3	6	9	2	25
<b>Demand</b>	20	20	50	60	

The economic problem is to distribute the available product to different retail shops in such a way so that the total transportation cost is minimum.

8. Draw an event-oriented network for the following data:

Event No.	1	2	3	4	5	6	7
<b>Immediate predecessors:</b>	-	1	1	2,3	3	4,5	5,6

### Section C

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

9. Solve the following LPP, using Simplex method.

$$\text{Max } Z = 5x_1 + 3x_2$$

$$\text{Subject to } 3x_1 + 5x_2 \leq 15$$

$$5x_1 + 2x_2 \leq 10$$

$$x_1, x_2 \geq 0$$

Contd...

10. Consider the following transportation cost table. The costs are given in rupees. The supply and demand are in units. Determine an optimal solution.

	Restriction					
Source	1	2	3	4	5	Supply
I	40	36	26	38	30	160
II	38	28	34	34	198	280
III	36	38	24	28	30	240
Demand	160	160	200	120	240	

11. Solve the following Assignment Problem.

	1	2	3	4	5
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

12. A project has the following time schedule.

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

- i) Construct the Network
  - ii) Find the total float for each activity
  - iii) Find the critical path and the project duration.
13. State the contents of single channel queueing model.

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