

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. BIM - END SEMESTER EXAMINATIONS - APRIL 2025

SEMESTER - II

21UBBAT2002 - Elements of Operations Research

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

Section B

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

1. What is Operations Research? Explain various Operations Research Techniques.
2. Describe in brief about Operations Research in business and management.
3. A housewife wishes to mix two types of food F1 and F2 in such a way that the vitamin contents of the mixture contain at least 8 units of vitamin A and 11 units of vitamin B. Food F1 costs ₹60/Kg and Food F2 costs ₹80/kg. Food F1 contains 3 units/kg of vitamin A and 5 units/kg of vitamin B while Food F2 contains 4 units/kg of vitamin A and 2 units/kg of vitamin B. Formulate this problem as a linear programming problem to minimize the cost of the mixtures.

Vitamin Content	Food (in Kg)		Requirement (in units)
	F1	F2	
Vitamin A (unit/kg)	3	4	8
Vitamin B (unit/kg)	5	2	11
Cost (₹/Kg)	60	80	

4. Solve the following L.P.P by the graphical method

$$\text{Max } Z = 3x_1 + 2x_2$$

$$\text{subject to } -2x_1 + x_2 \leq 1$$

$$x_1 \leq 2$$

$$x_1 + x_2 \leq 3$$

$$\text{and } x_1, x_2 \geq 0$$

5. Solve the transportation problem :

		Destinations			Capacities
		1	2	3	
Sources	1	2	2	3	10
	2	4	1	2	15
	3	1	3	1	40
	Demand	20	15	30	

Contd...

6. Determine basic feasible solution to the following transportation problem using North West Corner Rule:

		Sinks					
		A	B	C	D	E	Supply
Origins	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	

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

Activity	P	Q	R	S	T	U
Predecessor	-	-	-	P, Q	P, R	Q, R

8. Solve the game with the following pay-off matrix

		Player B				
		Strategies				
Player A Strategies		I	II	III	IV	V
	1	-2	5	-3	6	7
	2	4	6	8	-1	6
	3	8	2	3	5	4
	4	15	14	18	12	20

Section C

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

9. Elaborate on the limitations of OR.
 10. Solve the following LPP by simplex method :

$$\begin{aligned} \text{Minimize } Z &= 8x_1 - 2x_2 \\ \text{Subject to } -4x_1 + 2x_2 &\leq 1 \\ 5x_1 - 4x_2 &\leq 3 \\ \text{and } x_1, x_2 &\geq 0 \end{aligned}$$

11. Solve the transportation problem using Vogel's method.

		Warehouse						
		A	B	C	D	E	F	Available
Factory	1	9	12	9	6	9	10	5
	2	7	3	7	7	5	5	6
	3	6	5	9	11	3	11	2
	4	6	8	11	2	2	10	9
	Requirement	4	4	6	2	4	2	

Contd...

12. Construct the network for the project whose activities and the three estimates of these activities (in weeks) are given below.

Compute

- i) Expected duration of each activity
- ii) Expected variance of each activity
- iii) Expected variance of the project length

Activity	t_o	t_m	t_p
1-2	3	4	5
2-3	1	2	3
2-4	2	3	4
3-5	3	4	5
4-5	1	3	5
4-6	3	5	7
5-7	4	5	6
6-7	6	7	8
7-8	2	4	6
7-9	1	2	3
8-10	4	6	8
9-10	3	5	7

13. Solve the following game graphically and find the value of the game

A	B			
	B1	B2	B3	B4
A1	2	2	3	-1
A2	4	3	2	6
