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. CA - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - IV
21UCCAT4004 - Elements of Operation Research

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

Section B

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

1. Describe the Limitations of Operations Research.
2. A firm manufactures two types of products A and B, and sells them at a profit of Rs.2 on type A and Rs.3 on type B. Each product is processed on two machines M_1 and M_2. Type A requires 1 minute of processing time on M_1 and 2 minutes on M_2. Type B requires 1 minute on M_1 and 1 minute on M_2. Machine M_1 is available for not more than 6 hours 40 minutes while machine M_2 is available for 10 hours during any working day. Formulate the problem as a LPP to maximize the profit.
3. Explain the procedure for forming an LPP model.
4. Express the following LPP in the canonical form.
   Maximize $Z = 2X_1 + 3X_2 + X_3$
   subject to the constraints $4X_1 - 3X_2 + X_3 \leq 6$
   $X_1 + 5X_2 - 7X_3 \geq -4$
   and $X_1, X_3 \geq 0$, X_2 is unrestricted.
5. Use simplex method to solve the LLP.
   Maximize $Z = 4X_1 + 10X_2$
   Subject to $2X_1 + X_2 \leq 50$
   $2X_1 + 5X_2 \leq 100$
   $2X_1 + 3X_2 \geq 90$ and $X_1, X_2 \geq 0$.
6. Determine the basic feasible solution to the following transportation problem using North West Corner Rule:

		Sink					**Supply**
		A	**B**	**C**	**D**	**E**	
Origin	**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**	

Contd...

7. Find the initial basic feasible solution for the following transportation problem by VAM.

		Distribution Centers				Availability
		D_1	D_2	D_3	D_4	
Origin	S_1	11	13	17	14	250
	S_2	16	18	14	10	300
	S_3	21	24	13	10	400
Requirements		200	225	275	250	

8. Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows:

		Job				
		1	2	3	4	5
Person	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

Determine the optimum assignment schedule.

Section C

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

9. Elaborate the techniques of Operations Research.

10. A person wants to decide the constituents of a diet which will fulfil his daily requirements of proteins, fats and carbohydrates at the minimum cost. The choice is to be made from four different types of foods. The yields per unit of these foods are given in the following table:

Food Type	Yield/Unit			Cost/Unit (Rs.)
	Proteins	Fats	Carbohydrates	
1	3	2	6	45
2	4	2	4	40
3	8	7	7	85
4	6	5	4	65
Minimum requirement	800	200	700	

Formulate the LP model for the problem.

11. Solve the following LPP by graphical method
Maximize Z $= 3x_1 + 2x_2$
subject to -$2x_1 + x_2 \leq 1$
$x_1 \leq 2$
$x_1 + x_2 \leq 3$
and $x_1, x_2 \geq 0$

12. Explain vogel's approximation method and find the starting solution of the following transportation problem by vogel's approximation method:

	1	**2**	**3**	**4**	**Supply**
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Demand	6	10	12	15	

13. A company has a team of four salesmen and there are four districts where the company wants to start its business. After taking into account the capabilities of salesman and the nature of districts, the company estimates that the profit per day in rupees for each salesman in each district is as below:

		Districts			
		1	**2**	**3**	**4**
Salesman	**A**	16	10	14	11
	B	14	11	15	15
	C	15	15	13	12
	D	13	12	14	15

Find the assignment of salesman to various districts which will yield maximum profit.

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