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.Sc. Maths - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - VI
22UMACT6015 - Operations Research

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

Section B

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

1. Enumerate the applications 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 two minutes on M_2 . Type B requires 1 minute of processing time on M_1 and one 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 so as to maximize the profit.
3. Define Slack variable and Surplus variable.
4. Express the following LPP in the canonical form:
   Maximize $Z = 2x_1 + 3x_2 + x_3$
   Subject to $4x_1 - 3x_2 + x_3 \leq 6$
   $x_1 + 5x_2 - 7x_3 \geq -4$
   $x_1, x_3 \geq 0$, x_2 is unrestricted.
5. Explain the methods of solving two-phase method.
6. Solve the following transportation problem by North-West corner rule.

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

7. Solve the following transportation problem by Least Cost Method.

	To				**Supply**
From	1	2	1	4	**30**
	3	3	2	1	**50**
	4	2	5	9	**20**
Demand	**20**	**40**	**30**	**10**	

Contd...

8. Solve the following Assignment problem.

	Operators				
		I	**II**	**III**	**IV**
Machine	**A**	10	5	13	15
	B	3	9	18	3
	C	10	7	3	2
	D	5	11	9	7

Section C

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

9. Use graphical method and solve:
   Maximize $Z = 3x_1 + 4x_2$
   Subject to $x_1 + x_2 \leq 450$
   $2x_1 + x_2 \leq 600$
   $x_1, x_2 \geq 0.$
10. Use simplex method to solve the following LPP
    Maximize $Z = 4x_1 + 10x_2$
    Subject to $2x_1 + x_2 \leq 50$
    $2x_1 + 5x_2 \leq 100$
    $2x_1 + 3x_2 \leq 90$
    $x_1, x_2 \geq 0.$
11. Use Big-M method to solve
    Minimize $Z = 4x_1 + 3x_2$
    Subject to $2x_1 + x_2 \geq 10$
    $-3x_1 + 2x_2 \leq 6$
    $x_1 + x_2 \geq 6$
    $x_1, x_2 \geq 0$.
12. Compute the initial feasible solution using VAM and find the optimal solution of the transportation problem.

	To			
	7	3	2	**2**
From	2	1	3	**3**
	3	4	6	**5**
	4	**1**	**5**	

13. Solve the following travelling salesman problem.

	To				
		A	**B**	**C**	**D**
From	**A**	-	46	16	40
	B	41	-	50	40
	C	82	32	-	60
	D	40	40	36	-

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