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.(PA) END SEMESTER EXAMINATIONS APRIL-2022
SEMESTER - VI
19UPACT6018 - Operations Research

Total Duration : 3 Hrs. **Total Marks : 60**

Section A

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

1. What are the characteristic features of OR?
2. A dietician wishes to mix two types of food in such a way that the Vitamin contents of the mixture contains at least 8 units of Vitamin A and 10 units of Vitamin B. Food I contains 2 units per kg of Vitamin A and 1 unit per kg of Vitamin B while Food II contains 1 unit per kg of Vitamin A and 2 units per kg of Vitamin B. It costs Rs.5 per kg to purchase food I and Rs.8 per kg to purchase food II. Prepare a mathematical model of the problem stated above.
3. Solve the following Linear Programing Problem using graphical method:
   Maximize Z = 30x + 20y subject to the constraints
   $2x + y \leq 800$, $x + 2y \leq 1000$ and $x,y \geq 0$.
4. Solve the following linear programming problem by simplex method:
   Maximize $Z = 4x_1 + 7x_2$ subject to the constraints
   $4x_1 + 3x_2 \leq 12$, $3x_1 + 4x_2 \leq 12$ and $x_1,x_2 \geq 0$.
5. Find the initial basic feasible solution using Least cost method.

	X	**Y**	**Z**	
A	10	9	8	**8**
B	10	7	10	**7**
C	11	9	7	**9**
D	12	14	10	**4**
	10	**10**	**8**	

6. Find the optimal solution for the assignment problem with the following cost matrix:

		Area			
		W	**X**	**Y**	**Z**
Salesman	**A**	11	17	8	16
	B	9	7	12	6
	C	13	16	15	12
	D	14	10	12	11

Contd...

7. Solve the following game:

		Player B				
		B_1	B_2	B_3	B_4	B_5
Player A	A_1	8	10	13	16	9
	A_2	7	12	6	15	10
	A_3	9	18	9	13	25
	A_4	4	9	8	20	6

8. Solve the following game : $\begin{bmatrix} 3 & -2 \\ -2 & 5 \end{bmatrix}$

Section B

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

9. Define Operations Research and explain its Scope and Limitations.

10. A firm buys castings of P and Q type of parts and sells them as finished product after machinery, boring and polishing. The purchasing cost for castings are Rs.3 and Rs.4 each for parts P and Q and selling costs are Rs.8 and Rs.10 respectively. The per hour capacity of machines used for machinery, boring and polishing for two products is given below:

Capacity (per hour)	Parts	
	P	Q
Machinery	30	50
Boring	30	45
Polishing	45	30

The running costs for machinery, boring and polishing are Rs.30, Rs.22.5 and Rs.22.5 per hour respectively. Formulate the linear programming problem to find out the product mix to maximize the profit.

11. Solve the following linear programming problem by simplex method:
Maximize $Z = 5x_1 + 3x_2$ subject to the constraints
$3x_1 + 5x_2 \leq 15$, $5x_1 + 2x_2 \leq 10$ and $x_1, x_2 \geq 0$.

12. Five jobs 1, 2, 3, 4 and 5 are to be assigned to five persons A, B, C, D and E. The time taken (in minutes) by each of them on each job is given below:

	1	2	3	4	5
A	16	13	17	19	20
B	14	12	13	16	17
C	14	11	12	17	18
D	5	5	8	8	11
E	5	5	8	8	10

Contd...

13. Solve the following using graphical method:

	$\mathbf{B}_1$	$\mathbf{B}_2$	$\mathbf{B}_3$	$\mathbf{B}_4$	$\mathbf{B}_5$
$\mathbf{A}_1$	2	-2	3	7	6
$\mathbf{A}_2$	6	5	1	4	0

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