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-2022
SEMESTER - II
21UBBAT2002 - Elements of 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 company manufactures 3 types of products which use precious metals, platinum and gold. Due to the shortage of these metals, the government regulates the amount that may be used per day. The relevant data with respect to supply, requirements and profits are summarized in the table below:

Product	Platinum required/unit (gms)	Gold required/unit (gms)	Profit/unit (Rs.)
A	2	3	500
B	4	2	600
C	6	4	1,200

   Daily allotment of platinum and gold is 160gms and 120gms respectively. How should the company divide the supply of scarce precious metals? Formulate the mathematical model.

3. Solve the following Linear Programing Problem using graphical method:
   Maximize Z = x + 3y
   subject to the constraints $2x + y \leq 20, x + 2y \leq 20$ and $x, y \geq 0$.

4. Find the initial basic feasible solution using North-West Corner method.

	X	Y	Z	
A	8	7	3	60
B	3	8	9	70
C	11	3	5	80
	50	80	80	

5. The following table gives the activities of a construction project and duration (in days):

Activity	1-2	1-3	2-3	2-4	3-4	4-5
Duration	20	25	10	12	6	10

   Draw the network diagram and find the critical path.

Contd...

6. Draw the network diagram for the following table which gives the characteristics of a project:

Job	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Predecessors	-	-	B	A,C	A,C	D	E	F,G
Duration (days)	10	5	3	4	6	6	5	5

7. Solve the following game:

		Player B				
		B1	**B2**	**B3**	**B4**	**B5**
Player A	**A1**	8	10	13	16	9
	A2	7	12	6	15	10
	A3	9	18	9	13	25
	A4	4	9	8	20	6

8. Solve the following game
$\begin{bmatrix} 8 & -3 \\ -3 & 1 \end{bmatrix}$

Section B

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

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

10. 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 $x_1, x_2 \geq 0$.

11. A project work consists of four major jobs for which four major contractors have submitted tenders. The tender documents quoted in thousands of rupees are given with the matrix as

		Jobs			
		J1	**J2**	**J3**	**J4**
Contractors	**C1**	15	27	35	20
	C2	21	29	33	17
	C3	17	25	37	15
	C4	14	31	39	21

Find the assignment which minimizes the total of the project cost. Each contractor has to be assigned one job.

12. Draw the network and determine the critical path for the given data:

Activity	1-2	1-3	2-4	3-4	3-5	4-5	4-6	5-6
Duration	6	5	10	3	4	6	2	9

Find the total float for each activity.

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13. Solve the following using graphical method:

	B1	**B2**
A1	-6	7
A2	4	-5
A3	-1	-2
A4	-2	5
A5	7	-6

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