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.(ISM) END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - II
20UBIAT2002 - Operations Research

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

Section B

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

1. Define OR and state its applications.

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 summarised 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 160 gms and 120 gms respectively. How should the company divide the supply of scarce precious metals? Formulate the mathematical model.

3. Solve graphically

   Max z = $30x_1+20_2$

   subject to the constraints

   $2x_1+x_2 \leq 800$

   $x_1+2x_2 \leq 1000$

   $x_1, x_2 \geq 0$

4. Obtain the initial basic feasible solution using VAM

	S1	**S2**	**S3**	**Supply**
W1	5	4	3	6
W2	7	4	7	6
W3	2	5	8	12
W4	8	6	7	4
Demand	8	10	12	

Contd...

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

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

6. A project has the following time schedule

Activity	1-2	1-3	1-4	2-5	3-6
Time in month	2	2	1	4	8

Activity	3-7	4-6	5-8	6-9	7-9	8-9
Time in month	5	3	1	5	4	3

   i) Construct the network.
   ii) Find the total float for each activity.
   iii) Find the critical path and the project duration.

7. Construct the PERT network for the following project and determine the critical path and project duration.

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Duration in days	4	1	1	1	6	8	2	4	1	5	5	2
Immediate predecessors	-	-	A	B	C	E	F	F	G	H, I	D,G	K

8. Determine the criteria for decision making under uncertainty.

Section C

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

9. Explain the models and modelling in operations research and state its advantages and disadvantages.

10. Solve the following problem using simplex method.

    Max z = $21x_1+15x_2$

    Subject to the constraints

    $-x_1-2x_2 \leq -6$

    $4x_1+3x_2 \leq 12$

    $x_1, x_2 \geq 0$

11. Solve the following transportation problem

	A	**B**	**C**	$\mathbf{a_i}$
F1	10	9	8	8
F2	10	7	10	7
F3	11	9	7	9
F4	12	14	10	4
$\mathbf{b_j}$	10	10	8	

12. The activities of a project have the following PERT time estimates

Job	**1-2**	**7-8**	**2-3**	**3-5**	**5-8**	**6-7**	**4-5**	**2-4**	**1-6**
Optimistic time	3	4	6	5	1	3	3	2	2
Most likely time	6	19	12	11	4	9	6	5	5
Pessimistic time	15	28	30	17	7	27	15	8	14

i) Draw the network diagram and determine the critical path.
ii) Find the project completion time and its variance.

13. i) Using the principal of dominance solve the following game

Player B

Player A	*I*	*II*	*III*	*IV*
I	8	10	9	14
II	10	11	8	12
II	13	12	14	13

ii) Solve the following using graphical method

	B_1	B_2	B_3	B_4	B_5
A_1	2	-2	3	7	6
A_2	6	5	1	4	0

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