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 NOVEMBER -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. Explain the pros and cons of Operations Research.
2. Describe the importance of operations research in decision making process.
3. Solve the following problem using simplex method
   Maximize $Z=21x_1+15x_2$
   Subject to the constraints $-x_1-2x_2 \geq -6$
4. Solve the following transportation problem

| | $D_1$ | $D_2$ | $D_3$ | $D_4$ | |
|---|---|---|---|---|---|
| $O_1$ | 1 | 2 | 3 | 4 | 6 |
| $O_2$ | 4 | 3 | 2 | 0 | 8 |
| $O_3$ | 0 | 2 | 2 | 1 | 10 |
| | 4 | 6 | 8 | 6 | 24 |

5. 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 |

6. 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...**

7. You are given the following pay-off table

| | **States of Nature** | | | |
|---|---|---|---|---|
| **Alternative** | $S_1$ | $S_2$ | $S_3$ | $S_4$ |
| $A_1$ | 1 | 3 | 8 | 5 |
| $A_2$ | 2 | 5 | 4 | 7 |
| $A_3$ | 4 | 6 | 6 | 3 |
| $A_4$ | 6 | 8 | 3 | 5 |

Decide the best course of action according to
i. Maximax criterion
ii. Maximin criterion
iii. Minimax regret criterion
iv. Laplace criterion

8. Solve the following game

**Player B**

$$\textbf{Player A}\begin{bmatrix} 12 & 1 & 30 & -10 \\ 20 & 3 & 10 & 5 \\ -5 & -2 & 25 & 0 \\ 15 & -4 & 10 & 6 \end{bmatrix}$$

## Section C

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

9. Illustrate the different types of models used in Operations Research.

10. Solve the following LLP using Simplex method
Max $Z=45x_1 + 80x_2$
Subject to $5x_1+20x_2 \leq 400$
$10x_1+15x_2 \leq 450$
$x_1, x_2 \geq 0$.

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** | | | |
|---|---|---|---|---|---|
| | | $J_1$ | $J_2$ | $J_3$ | $J_4$ |
| **Contractors** | $C_1$ | 15 | 27 | 35 | 20 |
| | $C_2$ | 21 | 29 | 33 | 17 |
| | $C_3$ | 17 | 25 | 37 | 15 |
| | $C_4$ | 14 | 31 | 39 | 21 |

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

12. A project has the following characteristics

| **Activity** | **Duration (weeks)** | **Predecessors** |
|---|---|---|
| A | 6 | None |
| B | 8 | A |
| C | 4 | A |
| D | 9 | B |
| E | 2 | C |
| F | 7 | D |

Construct the network and compute TE, TL for each and the critical path and project duration.

13. Using the principle of Dominance solve the following game

$$\begin{bmatrix} 8 & 10 & 9 & 14 \\ 10 & 11 & 8 & 12 \\ 13 & 12 & 14 & 13 \end{bmatrix}$$

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