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. END SEMESTER EXAMINATION APRIL/NOV – 2021

SEMESTER - IV

13USTCT4008 — Operations Research - I

Total Duration	**: 3 Hrs**	**Total Marks**	**: 75**
MCQ	: 30 Mins	MCQ	: 15
Descriptive	: 2 Hrs.30 Mins	Descriptive	: 60

Section B

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

1. A firm manufactures two products A and B on which the profits earned per unit are Rs.3 and Rs.4 respectively. Each product is processed on two machines M_1 and M_2. Product A requires one minute of processing time on M_1 and two minutes on M_2, while B requires one minute on M_1 and one minute on M_2. Machine M_1 is available for not more than 7 hours and 30 minutes, while machine M_2 is available for 10 hours during any working day. Formulate the problem as LPP to find the number of units of products A and B to get maximum profit.

2. Use the graphical method to solve the following LPP

   Minimize $Z = -x_1 + 2x_2$

   Subject to

   $-x_1 + 3x_2 \leq 10$

   $x_1 + x_2 \leq 6$

   $x_1 - x_2 \leq 2$ and $x_1, x_2 \geq 0$

3. Explain the essential elements of decision making problem.

4. Explain the major steps in EOL criterion.

5. Solve the game whose payoff matrix is given by

$$\begin{matrix} & \text{Player B} \\ \text{Player A} & \end{matrix} \begin{pmatrix} 1 & 3 & 1 \\ 0 & -4 & 3 \\ 1 & 5 & -1 \end{pmatrix}$$

6. In a factory, there are six jobs to perform, each of which should go through two machines A and B. The processing timings (hrs) for the jobs are given below. Determine the sequence for performing the jobs.

Job	1	2	3	4	5	6
A	1	3	8	5	6	3
B	5	6	3	2	2	10

Contd…

7. Explain the difference between decision under risk and decision under uncertainty in decision making.

8. Define EVPI. How it is calculated?

Section C

Answer any ***THREE*** questions (3 × 10 = 30 Marks)

9. Solve:
Maximize $z = 22x_1 + 30x_2 + 25x_3$
subject to
$2x_1+2x_2 \leq 100$
$2x_1+x_2+x_3 \leq 100$; $x_1,x_2,x_3 \geq 0$

10. Discuss the different criteria under conditions of uncertainty in decision making.

11. Explain the decision tree analysis.

12. Solve the game whose payoff matrix is given below:

$$\begin{array}{c} \\ \text{Player A} \end{array} \begin{array}{c} \begin{array}{cccc} B_1 & B_2 & B_3 & B_4 \end{array} \\ \begin{pmatrix} 4 & -2 & 3 & -1 \\ -1 & 2 & 0 & 1 \\ -2 & 1 & -2 & 0 \end{pmatrix} \end{array}$$

13. Determine the optimal sequence of jobs that minimizes the total elapsed time based on the Following information:

	Machines					
	M_1	M_2	M_3	M_4	M_5	M_6
Job A	18	8	7	2	10	25
Job B	17	6	9	6	8	19
Job C	11	5	8	5	7	15
Job D	20	4	3	4	8	12

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