

Roll No. ....

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**1035/MJ**

**F-10/2051**

**LINEAR PROGRAMMING**

Paper–MCSC-205

Semester–II

Time allowed : 3 Hours] [Maximum Marks : 70

**Note:** The candidates are required to attempt two questions each from section A and section B carrying 10 marks each and the entire section C consisting of 10 questions carrying 3 marks each.

**SECTION-A**

1. Using two phase Method , solve the given L.P.P:

$$\text{Max. } Z = 2x_1 - x_2 + x_3$$

$$\text{s.t. } x_1 + x_2 + 3x_3 \leq 8$$

$$4x_1 - x_2 + x_3 \leq 2$$

$$2x_1 + 3x_2 - x_3 \leq 4$$

$$\text{and } x_1, x_2, x_3 \geq 0.$$

2. (a) Use graphical method to determine the minimum time needed to process two jobs on five machines A, B, C, D, and E. the technological order for the these jobs on machines is as follows :

Processing time (in hours) are given as follows:

Job 1 :	3	4	2	6	2
Job 2 :	5	4	3	2	6

(b) A firm manufactures 2 types of products A & B and sells them at a profit of Rs. 2 on type A & Rs. 3 on type B. Each product is processed on 2 machines G & H. Type A requires 1 minute of processing time on G and 2 minutes on H. Type B requires one minute on G & 1 minute on H. The machine G is available for not more than 6 hrs. 40 mins, while machine H is available for 10

hrs during any working day. Formulate the problem as LPP.

3. Solve the following LPP problem using simplex method:

Maximize 'Z' =  $7x_1 + 5x_2$  (Subject to constraints)

$x_1 + x_2 \leq 6$

$4x_1 + 3x_2 \leq 12$

Where,  $x_1, x_2 \geq 0$  (Non-negativity constraints)

4. Solve the following LPP using the Big M method.

Maximise 'Z' =  $5x_1 + 3x_2$  (Subject to constraints)

$x_1 + x_2 \leq 6$

$2x_1 + 3x_2 \leq 3$

$x_1 \leq 3$

$x_2 \leq 3$

Where,  $x_1, x_2 \geq 0$

**SECTION-B**

5. Solve the following Assignment problem.

Job

	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	H <sub>5</sub>
A	6	5	8	11	16
B	1	13	16	1	10
C	16	11	8	8	8
D	9	14	12	10	10
E	10	13	11	8	16

Worker

6. Explain the various types of assignment problems? Also write any 5 applications of assignment problems?
7. Find an optimal solution using MODI method for the transportation problem given in this table:

Destination

		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	Supply
Source	S <sub>1</sub>	19	30	50	10	7
	S <sub>2</sub>	70	30	40	60	9
	S <sub>3</sub>	40	8	70	20	18
	<b>Demand</b>	<b>8</b>	<b>8</b>	<b>7</b>	<b>14</b>	

8. Solve the transportation problem :

		Destination			Supply
		1	2	3	
Source	1	3	5	7	10
	2	11	8	9	8
	3	13	3	9	5
Demand		5	9	11	23
					25

### SECTION-C

9. Attempt all question :

- (i) What is the use of price vectors in LPPs?
- (ii) Explain the use of two phase method in solving LPP?
- (iii) What are slack variables in LPP?
- (iv) Write any advantages of using Graphical method?
- (v) Write any four characteristics of LPP?
- (vi) Explain transportation problem?

(vii) Explain briefly the term 'Artificial' variables.

(viii) Differentiate between balanced and unbalanced assignment problems?

(ix) How degeneracy is resolved in transportation problem?

(x) How is optimality tested in solving transportation problems?