

Advance Engineering Mathematics(AEM)

**Branch :Information Technology,
Sem:IIIrd**



Dr. Kashish Parwani
Associate Professor, Dept. of Mathematics
JECRC, Sitapura Jaipur

Vision of the Institute

To become a renowned centre of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities

Dr. Kashish Parwani

Associate Professor (Mathematics), JECRC, Jaipur

Mission of the Institute

- Focus on evaluation of learning outcomes and motivate students to inculcate research aptitude by project based learning.
- Identify, based on informed perception of Indian, regional and global needs, the areas of focus and provide platform to gain knowledge and solutions.
- Offer opportunities for interaction between academia and industry.
- Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders may emerge.

Dr. Kashish Parwani

Associate Professor (Mathematics, JECRC, Jaipur)

Course Outcomes

- **CO2:** To learn the formulation of different mathematical problems into optimization problems.
- **CO3:** Apply the principles of optimization using differential calculus.
- **CO4:** To understand the concepts of Linear Programming
- **CO1:** To learn the concepts and principles of Random variables and Probability distribution.

Solve the following LPP by Two Phase Method

$$\text{Max. } Z = 5x_1 + 8x_2$$

Sub. to

$$3x_1 + 2x_2 \geq 3$$

$$x_1 + 4x_2 \geq 4$$

$$x_1 + x_2 \leq 5$$

$$x_1, x_2 \geq 0$$

Phase 1 : The Problem of phase 1 is

$$\text{Max. } Z^1 = 0 \cdot x_1 + 0 \cdot x_2 + 0 \cdot S_1 + 0 \cdot S_2 - 0 \cdot S_3 - 0S_4 + 0S_5$$

s.to

$$3x_1 - 2x_2 - S_1 + S_3 = 3$$

$$x_1 + 4x_2 - S_2 + S_4 = 4$$

$$x_1 + x_2 + S_5 = 5$$

$$x_1, x_2, S_1, S_2, S_3, S_4, S_5 \geq 0$$

Table 1.

C_B	B.v.	C_j X_B	0 x_1	0 x_2	0 s_1	0 s_2	-1 s_3	-1 s_4	0 s_5	Mini Ratio
-1	s_3	3	3	2	-1	0	1	0	0	3/2
-1	s_4	4	1	4	0	-1	0	1	0	4/4
0	s_5	5	1	1	0	0	0	0	1	5/1
	Z_j	$-C_j$	-4	-6	1	1	0	0	0	
				↑				↓		

Dr. Kashish Parwani

Associate Professor (Mathematics, JECRC, Jaipur)

Table 2.

C_B	B.v.	C_j X_B	0 x_1	0 x_2	0 s_1	0 s_2	-1 s_3	0 s_5	Mini Ratio
-1	s_3	1	5/2	0	-1	1/2	1	0	2/5
0	x_2	1	1/4	1	0	-1/4	0	0	4
0	s_5	4	3/4	0	0	1/4	0	1	16/3
	Z_j	$-C_j$	-5/2	0	1	-1/2	0	0	
			↑				↓		

Dr. Kashish Parwani

Associate Professor (Mathematics, JECRC, Jaipur)

Table 3.

C_B	B.v.	X_B	x_1	x_2	s_1	s_2	s_5
0	x_1	$2/5$	1	0	$-2/5$	$1/5$	0
0	x_2	$9/10$	0	1	$1/10$	$-3/10$	0
0	s_5	$37/10$	0	0	$3/10$	$1/10$	1
			0	0	0	0	0

Phase I ends.

Dr. Kashish Parwani

Associate Professor (Mathematics, JECRC, Jaipur)

Phase II.

		Cj	5	8	0	0	0	Mini
C _B	B.v	X _B	x ₁	x ₂	s ₁	s ₂	s ₅	Ratio
	.							
5	X ₁	2/5	1	0	-2/5	1/5	0	2/5*5/1 =2
8	X ₂	9/10	0	1	1/10	-3/10	0	-
0	S ₅	37/10	0	0	3/10	1/10	1	37
			0	0	-6/5	-7/5	0	
				↓		↑		

Phase II, Table 2.

C_B	B.v.	X_B	x_1	x_2	s_1	s_2	s_5
0	s_2	2	5	0	-2	1	0
8	x_2	$3/2$	$3/2$	1	$-1/2$	0	0
0	s_5	$7/2$	$-1/2$	0	$1/2$	0	1
			7	0	-4		0
					↑		↓

Dr. Kashish Parwani

Associate Professor (Mathematics, JECRC, Jaipur)

Phase II, Table 3.

C_B	B.V.	X_B	x_1	x_2	s_1	s_2	s_5
0	s_2	16	3	0	0	1	4
8	x_2	5	1	1	0	0	1
0	s_1	7	-1	0	1	0	2
			3	0	0	0	8

Dr. Kashish Parwani

Associate Professor (Mathematics, JECRC, Jaipur)

Optimal Solution is

$$X_1=0, X_2=5 \text{ and } Z_{\max}=40$$

Thank You

Dr. Kashish Parwani
Associate Professor (Mathematics) JECRC, Jaipur