CLASS: B. TECH.   SEMESTER: III
BRANCH: PIE   SESSION: MO/2023

SUBJECT: PE203 OPERATIONS RESEARCH

TIME: 02 Hours   FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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			CO	BL
Q.1(a)	Briefly enumerate the requirements of LPP.	[2]	1	2
Q.1(b)	Omega leather goods company manufactures two types of leather soccer balls X and Y. Each type of ball requires work by two types of employees – semi-skilled and skilled. Basically, the semi-skilled employees use machines, while the skilled employees stitch the balls. The available time (per week) for manufacturing each type of employee and the time requirement for each type of ball are given below:	[3]	1	3

Type of Employee	Manufacturing Time Requirement (hr.)		Time Available (hr./week)
	Ball X	Ball Y	
Semi-skilled	2	3	80
Skilled	4	6	150

The cost of an hour of semi-skilled labor is Rs 5.50 and that of an hour of skilled labor is Rs 8.50. To meet the weekly demand requirements, at least 15 balls of type X and at least 10 balls of type Y must be manufactured. Formulate this problem as an LP model so as to minimize cost of production.

Q.2(a)   Use graphical method to solve the following LP problem: [5] 1 3
Maximize $Z = 3x_1 + 2x_2$
Subject to:

$$x_1 - x_2 \geq 1$$
$$x_1 + x_2 \geq 3$$
$$x_1, x_2 \geq 0$$

Q.3(a)   Use Big-M method to solve the following LP problem.   [5] 2 3
Minimize $Z = 5x_1 + 3x_2$
Subject to:

$$2x_1 + 4x_2 \leq 12$$
$$2x_1 + 2x_2 = 10$$
$$5x_1 + 2x_2 \geq 10$$
$$x_1, x_2 \geq 0$$

Q.4(a)	What is the main difference between degenerate and non-degenerate basic feasible solution of the LPP solved by simplex method.	[2]	2	2
Q.4(b)	Find the corresponding solution for the Question 3(a) solved by dual method.	[3]	2	3

Q.5(a)	What are the various assumptions in the Transportation Model?	[2]	3	2
Q.5(b)	Find the initial basic feasible solution of the following transportation problem in which the cells contain the transportation cost in rupees the using VAM:	[3]	3	3

	W1	W2	W3	W4	W5	Available
F1	7	6	4	5	9	40
F2	8	5	6	7	8	30
F3	6	8	9	6	5	20
F4	5	7	7	8	6	10
Required	30	30	15	20	5	

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