Name: Enrolment No:	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

End semester Examination – May, 2021

Course: Optimization Modelling for LSCM sector **Semester: II**
Subject/: MBA LSCM **Time: 3 Hours**
Course Code: LSCM 7015 **Max. Marks: 100**

SECTION A

1. Each Question will carry 5 Marks
2. Instruction: Complete the statement / Select the correct answer(s)

S.No.	Question	COs
Q 1	There is an overabundance of _____ data for the purposes of managerial decision making a) Transactional b) Normative c) Analytical d) Big	CO2
Q 2	Assuming there are no other changes to the input parameters, the change in the objective function value per unit increase to a right hand side of a constraint is called the _____ a) What if analysis b) Sensitivity analysis c) Shadow Price d) Feasible solution	CO2
Q 3	Range of optimality is _____ and range of feasibility is _____.	CO1
Q 4	The explicit methods for integer programming solution are _____, _____ and _____.	CO3
Q 5	The various types of symbolic models are _____, _____ and _____.	CO2
Q 6	What if analysis in spreadsheet comprise of which of the following features a. Goal seek b. Scenario Manager c. Data Table d. Conditional Formatting	CO1

SECTION B

1. Each question will carry 10 marks
2. Instruction: Solve the numerical problems

<table>
<tr><td>Q 7</td><td>What is a linear programming model? How do you solve the model using graphical technique?</td><td>CO1</td></tr>
<tr><td>Q 8</td><td>A department of a company has five employees with five jobs to be performed. The time in hours that each man takes to perform each job is given in the effectiveness matrix.

<table>
<tr><td>Jobs/Employees</td><td>I</td><td>II</td><td>III</td><td>IV</td><td>V</td></tr>
<tr><td>A</td><td>10</td><td>5</td><td>13</td><td>15</td><td>16</td></tr>
<tr><td>B</td><td>3</td><td>9</td><td>18</td><td>13</td><td>6</td></tr>
<tr><td>C</td><td>10</td><td>7</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>D</td><td>7</td><td>11</td><td>9</td><td>7</td><td>12</td></tr>
<tr><td>E</td><td>7</td><td>9</td><td>10</td><td>4</td><td>12</td></tr>
</table>

Formulate the problem using LP standard form. How should the jobs be allocated, one per employee, so as to minimize the total man hours?</td><td>CO2</td></tr>
<tr><td>Q 9</td><td>Use Simplex method to solve the following LP problem
Max Z = $x_1 + 4x_2 + 5x_3$
Subject to the constraints
i) $3x_1 + 3x_2 <= 22$
ii) $x_1 + 2x_2 + 3x_3 <= 14$
iii) $3x_1 + 2x_2 <= 14$
and $x_1, x_2, x_3 >= 0$</td><td>CO4</td></tr>
<tr><td>Q 10</td><td>Solve the following integer programming problem using branch and bound method
Max Z = $5x_1 + 4x_2$
Subject to the constraints
i. $x_1 + x_2 <= 5$
ii. $10x_1 + 6x_2 <= 45$
iii. and $x_1, x_2 >= 0$ and integers</td><td>CO3</td></tr>
<tr><td>Q 11</td><td>Use graphical model to solve the following LP problem.
Minimize Z = $600x_1 + 400x_2$
Subject to the constraints
i) $3x_1 + 3x_2 >= 40$
ii) $3x_1 + x_2 >= 40$
iii) $2x_1 + 5x_2 >= 44$
and $x_1, x_2 >= 0$
What is the shadow price for the constraint $2x_1 + 5x_2 >= 44$?</td><td>CO2</td></tr>
<tr><td colspan="3">Section C
1. Each Question carries 20 Marks.
2. Instruction: Answer any one question from the analytical questions</td></tr>
</table>

Q 12

1. Determine the initial basic feasible solution to the following transportation problem by using Least cost method and optimal distribution that minimize total shipping cost through Modi method.

	D1	**D2**	**D3**	**D4**	**Supply**
S1	21	16	15	3	**11**
S2	17	18	14	23	**13**
S3	32	27	18	41	**19**
Demand	**6**	**10**	**12**	**15**	

OR

2. Consider the following trans-shipment problem with two sources S1 and S2, and three destinations D1, D2 and D3. The number of units available in S1 and S2 are 100 and 200 and the product demanded at D1, D2 and D3 are 100, 100 and 100 units respectively. The cost of shipments is given. Determine the initial feasible solution through Vogel's Approximation Method.

		Source		Destination		
		S1	S2	D1	D2	D3
Source	S1	0	80	10	20	30
	S2	10	0	20	50	40
Destination	D1	20	30	0	4	10
	D2	40	20	10	0	20
	D3	60	70	80	20	0

CO4