Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2023

Course: Optimization Modeling for LSCM Sector **Semester: 2ND**
Program: MBA – L&SCM **Time : 03 hrs.**
Course Code: LSCM7015 **Max. Marks: 100**
Instructions: All questions are compulsory

SECTION A
10Qx2M=20Marks

Q. No.		Marks	CO
Q1	A). **In mixed integer programming problems, the optimum values are _____** 1.all values are integers 2.All values are either zero or one 3.Some are non integer values 4. all are not integers.	**2**	**CO1**
	B) What are some common types of optimization problems encountered in the LSCM sector? 1) Transportation planning and routing 2) Inventory optimization 3) Supply chain network optimization 4) All of the above	**2**	**CO1**
	C). Which of the following is a commonly used optimization modeling technique in the LSCM sector? 1) Linear Programming 2) Circular Programming 3) Triangular Programming 4) Quadratic Programming	**2**	**CO1**
	D). How can simulation modelling be used in conjunction with optimization modelling in the LSCM sector? 1) To improve decision-making 2) To increase costs 3) To reduce efficiency 4) None of the above	**2**	**CO1**
	E). What are some ethical considerations that should be taken into account when using optimization modelling in the LSCM sector? 1) Privacy and data protection 2) Environmental sustainability 3) Fair labour practices 4) All of the above	**2**	**CO1**
	F). What is goal programming, and how is it used in decision-making? 1) A method for identifying the optimal solution to a linear programming problem 2) A method for identifying the optimal solution to a nonlinear programming problem	**2**	**CO1**

	3) A method for handling multiple conflicting objectives in decision-making 4) A method for handling deterministic constraints in decision-making		
	G). What is the difference between linear and nonlinear programming? 1) Linear programming involves linear constraints and objectives, while nonlinear programming involves nonlinear constraints and objectives. 2) Linear programming involves binary variables, while nonlinear programming does not. 3) Linear programming is used for continuous variables, while nonlinear programming is used for discrete variables. 4) Linear programming involves multiple objectives, while nonlinear programming involves a single objective.	**2**	**CO1**
	H).What is the purpose of modelling in optimization? 1) To create a mathematical representation of the problem. 2) To identify the optimal solution to the problem. 3) To simulate the problem and generate data. 4) To evaluate the performance of the optimization algorithm.	**2**	**CO1**
	I). Which of the following is a technique used for solving optimization problems with discrete variables? 1) Linear programming 2) Dynamic programming 3) Integer programming 4) Gradient descent	**2**	**CO1**
	J). What is mixed integer linear programming (MILP), and how is it different from linear programming? 1) MILP allows for only binary decision variables, while linear programming allows for continuous decision variables 2) MILP allows for both continuous and integer decision variables, while linear programming only allows for continuous decision variables 3) MILP only considers a single objective, while linear programming allows for multiple objectives 4) There is no difference between MILP and linear programming	**2**	**CO1**
SECTION B **4Qx5M= 20 Marks**			
Q 2	What is the primary difference between goal programming and traditional linear programming?	**5**	**CO2**
Q 3	What is the difference between a binary integer variable and a general integer variable in MILP (mixed integer linear programming) ?	**5**	**CO2**
Q 4	What are the basic characteristics in linear programing problems ?	**5**	**CO2**
Q 5	What are some ethical considerations that should be taken into account when using optimization modeling in the LSCM sector? ?	**5**	**CO2**
SECTION-C **3Qx10M=30 Marks**			
Q 6	A furniture company produces two types of chairs, A and B. Chair A requires 5 units of wood and 2 units of labor, while chair B requires 4 units of wood and 4 units of labor. The company has 30 units of wood and 16 units of labor available. Chair A sells for	**10**	**CO3**

<table>
<tr><td></td><td>$50 and chair B sells for $80. How many of each chair should the company produce to maximize revenue?</td><td></td><td></td></tr>
<tr><td>Q 7</td><td>How is the gravity model used in optimization, and what are some common applications of this model in optimization problems?</td><td>10</td><td>CO3</td></tr>
<tr><td>Q 8</td><td>A firm has 3 factories - A, E, and K. There are four major warehouses situated at B, C, D, and M. Average daily product at A, E, K is 30, 40, and 50 units respectively. The average daily requirement of this product at B, C, D, and M is 35, 28, 32, 25 units respectively. The transportation cost (in Rs.) per unit of product from each factory to each warehouse is given below
<table>
<tr><td>Factory</td><td colspan="4">Warehouse</td><td>supply</td></tr>
<tr><td>A</td><td>6</td><td>8</td><td>8</td><td>5</td><td>30</td></tr>
<tr><td>E</td><td>5</td><td>11</td><td>9</td><td>7</td><td>40</td></tr>
<tr><td>K</td><td>8</td><td>9</td><td>7</td><td>13</td><td>50</td></tr>
<tr><td>Demand</td><td>35</td><td>28</td><td>32</td><td>25</td><td></td></tr>
</table>
Determine a route plan that minimizes total transportation cost by using any method ?</td><td>10</td><td>CO3</td></tr>
<tr><td colspan="4">SECTION-D
2Qx15M= 30 Marks</td></tr>
<tr><td>Q 9</td><td>What is a mixed-integer optimization problem, and how does it differ from other types of optimization problems? What are some common techniques for solving mixed-integer optimization problems, and what are some real-world applications of this type of optimization problem?</td><td>15</td><td>CO4</td></tr>
<tr><td>Q 10</td><td>A bakery produces two types of bread, white and wheat. The bakery has four ovens and a limited amount of flour, and the production capacity of each oven is different. The bakery wants to determine the optimal production plan to maximize profits while meeting the demand for both types of bread.

The bakery has 4 ovens with the following production capacity: Oven 1 produces 400 loaves of white bread and 100 loaves of wheat bread; Oven 2 produces 300 loaves of white bread and 200 loaves of wheat bread; Oven 3 produces 200 loaves of white bread and 300 loaves of wheat bread; Oven 4 produces 100 loaves of white bread and 400 loaves of wheat bread.

The demand for white bread is 600 loaves, and the demand for wheat bread is 400 loaves.

The profit for each loaf of white bread is $2, and the profit for each loaf of wheat bread is $3.

The cost of producing one loaf of white bread is $1, and the cost of producing one loaf of wheat bread is $2.

Formulate a mixed integer linear programming (MILP) model to determine the optimal production plan for the bakery.

Questions:

A).What is the decision variable for the production plan?
B).What is the objective function for the MILP model?
C).What are the constraints for the MILP model?</td><td>15</td><td>CO4</td></tr>
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