UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

End Semester Examination, December 2021

Course: Operations Research | **Semester: III**
Program: BBA (FAS) | **Duration: 3 Hours**
Course Code: DSQT2006 | **Max. Marks: 100**

IMPORTANT INSTRUCTIONS

1. ***Each Question will carry equal Marks section wise***

Q.No	Section A (Type the answers in test box)	10Qx2M=20Marks	COs
1	_____ deals with decision situations in which two intelligent opponents with conflicting objectives are vying to outdo each other.		CO1
2	The different types of inventory costs are _____.		CO1
3	_____ simulation estimates stochastic or deterministic parameters based on random sampling.		CO2
4	_____ algorithm is used to solve the assignment problem a) Dantzig-Wolfe b) Hungarian c) Lagrangian d) Bayesian		CO1
5	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		CO1
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
7	_____ problem deals with finding the shortest(Closed) tour in an n city situation.		CO2
8	The various types of replacement problems are _____.		CO1
9	A straightforward way to solve TSP is _____.		CO1
10	The two types of local search heuristics to solve TSP are _____ and _____.		CO2

<table>
<tr><td></td><td>Section B
(Scan and upload)</td><td>4Qx5M= 20 Marks</td><td></td></tr>
<tr><td>11</td><td>What is a linear programming model? How do you solve the model using graphical technique?</td><td></td><td>CO1</td></tr>
<tr><td>12</td><td>Consider a two person zero sum game with the data given below. Player A has two strategies and player B has two strategies. Solve the problem to get steady state payoff. The payoff is for player A.
<table><tr><td></td><td>B1</td><td>B2</td></tr><tr><td>A1</td><td>-3</td><td>7</td></tr><tr><td>A2</td><td>4</td><td>-6</td></tr></table></td><td></td><td>CO2</td></tr>
<tr><td>13</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 $x_1, x_2 >=0$</td><td></td><td>CO2</td></tr>
<tr><td>14</td><td>Use Simplex method to solve the following LP problem
Max Z = $3x_1 + 2x_2$
Subject to the constraints
i) $x_1 - x_2 <= 1$
ii) $3x_1 - 2x_2 <= 6$
and $x_1, x_2, x_3 >=0$</td><td></td><td>CO3</td></tr>
<tr><td></td><td>Section C
(Scan and upload)</td><td>3Qx10M=30 Marks</td><td></td></tr>
<tr><td>15</td><td>A diet for a sick person must contain at least 2000 units of vitamins, 50 units of minerals and 1400 calories. Two foods A and B are available at the cost of Rs. 3 and Rs. 5 per unit, respectively. If one of A contains 200 units of vitamins, 1 unit of mineral and 40 calories and one unit of food B contains 80 units of vitamins and 40 calories, find what combination of foods be used to have least cost?</td><td></td><td>CO3</td></tr>
<tr><td>16</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>60</td><td>50</td><td>100</td><td>85</td><td>95</td></tr><tr><td>B</td><td>65</td><td>45</td><td>100</td><td>75</td><td>90</td></tr><tr><td>C</td><td>70</td><td>60</td><td>110</td><td>97</td><td>85</td></tr><tr><td>D</td><td>70</td><td>55</td><td>105</td><td>90</td><td>93</td></tr><tr><td>E</td><td>60</td><td>40</td><td>120</td><td>85</td><td>97</td></tr></table></td><td></td><td>CO2</td></tr>
</table>

	a) How should the jobs be allocated, one per employee, so as to minimize the total man hours?		
17	Consider a firm having two factories. The firm is to ship its products from the factories to three retail stores. The number of units available at factories X and Y are 300 and 400, while those demanded at retail stores A, B and C are 200, 150 and 350, respectively. Rather than shipping the products directly from factories to retail stores, it is asked to investigate the possibility of trans-shipment. The transportation cost(in rupees) per unit is given the table below		CO3

		Factory		Retail Store		
		X	Y	A	B	C
Factory	X	0	8	7	8	9
	Y	6	0	5	4	3
Retail store	A	7	2	0	5	1
	B	1	5	1	0	4
	C	8	9	7	8	0

	Section D **(Scan and upload)**	**2Qx15M= 30 Marks**	
18	A furniture company has plants in cities A, B, and C, which ship to four demand locations 1, 2, 3, 4 with transporting costs (in hundred rupees) as shown below:		CO4

	1	**2**	**3**	**4**	**Supply**
A	3	5	4	4	**50**
B	6	8	5	2	**50**
C	1	9	7	3	**50**
Demand	**20**	**60**	**30**	**40**	

Determine the initial feasible solution through Vogel Approximation method and optimal distribution that minimize total shipping cost through Modi method.

19	Assume that the company is going to manufacture the item with the equipment that is estimated to produce 100 units per day. The consumption of the item is 10000 units/year. The cost of the unit thus produced is Rs 3.50 per unit. The set-up cost is Rs. 150 per set-up and the inventory carrying charge is 25% of the unit cost. What is the optimum production lot size(Q*)? Assume 250 working days in the year. In the above question, if the average lead-time to receive an order is 9 days, standard deviation of demand is 5, standard deviation of lead time is 1 day and the customer service level is 90%, find the reorder point.		CO4
