Name: Enrolment No:	UPES UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

End semester Examination – May, 2022

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

SECTION A
10Qx2M=20Marks

S.No.	Attempt all questions in this section	COs
Q 1	There is an overabundance of _____ data for the purposes of managerial decision making a) Transactional b) Normative c) Analytical d) Big	CO1
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	CO1
Q 3	Range of optimality is _____ and range of feasibility is _____.	CO1
Q 4	The explicit methods for integer programming solution are _____, _____ and _____.	CO1
Q 5	The various types of symbolic models are _____, _____ and _____.	CO1
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
Q 7	Iconic model is analogous to the system (True/False)	CO1
Q 8	The two functions discussed during the class for human resources through employee code table are _____ and _____.	CO1
Q 9	The use of _____ analysis in excel is carried out to conduct forecasting for data	CO1

	with trend.	
Q 10	_____ variables are under the control of the decision maker.	CO1

SECTION B
4Qx5M= 20 Marks

Instruction: Answer all questions

Q 11	What is a linear programming model? How do you solve the model using graphical technique?	CO2
Q 12	A department of a company has six employees with six jobs to be performed. The time in hours that each man takes to perform each job is given in the effectiveness matrix. Jobs/Employees | I | II | III | IV | V | VI A | 7 | 6 | 2 | 8 | 5 | 5 B | 6 | 8 | 4 | 5 | 4 | 6 C | 9 | 9 | 8 | 12 | 10 | 6 D | 1 | 3 | 1 | 2 | 1 | 1 E | 16 | 18 | 10 | 14 | 19 | 12 F | 12 | 14 | 12 | 18 | 20 | 24 Formulate the problem using LP standard form. How should the jobs be allocated, one per employee, so as to minimize the total man hours?	CO2
Q 13	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. $10x_1 + 6x_2 <= 45$ and $x_1, x_2 >= 0$ and integers	CO2
Q 14	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 $2x_1 + 5x_2 >= 44$?	CO2

Section C
3Qx10M=30 Marks

Instruction: Answer all questions

Q 15	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.	CO3

		D1	**D2**	**D3**	**D4**	**Supply**
	S1	21	16	15	3	**11**
	S2	17	18	14	23	**13**
	S3	32	27	18	41	**20**
	Demand	**6**	**11**	**12**	**15**	
Q 16	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 200 and 400 and the product demanded at D1, D2 and D3 are 100, 150 and 350 units respectively. The cost of shipments is given. Determine the initial feasible solution through Vogel's Approximation Method.						CO3
			Source		Destination		
			S1	S2	D1	D2	D3
Q 17	Use Simplex method to solve the following LP problem Max Z = $5x_1 + 4x_2$ Subject to the constraints i. $6x_1 + 4x_2 <= 24$ ii. $x_1 + 2x_2 <= 6$ iii. $-x_1 + x_2 <= 1$ iv. $x_2 <= 2$ and $x_1, x_2 >= 0$	Source	S1	0	80	10	20	30	CO3
			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	
	Section D **2Qx15M= 30 Marks** **Instruction: Read the case & answer the following questions**						
Q 18	The Beaver Company manufactures and assembles chairs, tables, and bookshelves. The plant produces semifinished products that are assembled in the company's assembling facility. The (unassembled) monthly production capacity of the plant includes 3000 chairs, 1000 tables, and 580 bookshelves. The assembling facility employs 150 workers in two 8-hour shifts a day, 5 days a week. The average assembly times per chair, table, and bookshelf are 20,40, and 15 minutes, respectively. The size of the labor force in assembly facility fluctuates because of the annual leaves taken by the employees. Pending requests for leaves include 20 workers for May, 25 for June, and 45 for July. Sales of the three products for the months of May, June, and July are forecast by the marketing department as given in Table 1. The production cost and selling price for the three products are in Table 2. If a unit is not sold in the month in which it is produced, it is held over for possible sale in the later month. The storage cost is about 2% of the unit production cost. Formulate the mathematical model for the problem. Table 1						CO4
	Sales forecast (units)						
	Product	**May**	**June**	**July**	**End of April inventory**		

	Chair	2800	2300	3350	30
	Table	500	800	1400	100
	Bookshelf	320	300	600	50

Table 2

Product	**Unit Cost ($)**	**Unit Price ($)**
Chair	150	250
Table	400	750
Bookshelf	60	120

Q 19	Should Beaver approve the proposed annual leaves?	CO4