UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: DSBA 7003 Optimization through spreadsheet **Semester: II**

Programme: MBA LSCM

Time: 03 hrs. **Max. Marks: 100**

Instructions: As per sections

SECTION A

S. No.		Marks	CO
	Attempt all questions	**20**	
Q 1	Excel Functions		
a)	Vlookup (Refer to excel sheet) A) Deliver value to cell. Find value from column 2 & 3. Use COLUMN function (tells you what column you are in). B) Use VLOOKUP to deliver a value to a formula.	**5**	**1**
b)	Conditional formatting (Refer to excel sheet) In a quarterly report summary, you want to find quarterly results that contribute 40% or more to the total with Blue background, or 25% or less to the total with Green background. Use conditional formatting rule as mentioned below: <table><tr><td>Conditional formatting rule</td><td>Format</td><td>Range</td></tr><tr><td>=B3>=$F3*0.40</td><td>Green background</td><td>B3:E16</td></tr><tr><td>=B3<=$F3*0.25</td><td>Blue background</td><td>B3:E16</td></tr></table>	**5**	**1**
c)	Data Table, Goal Seek (Refer to excel sheet) The quantity of water bottles sold for Rs. 8 is 40000. The fixed cost of setting the plant is Rs. 50000 and the variable cost per bottle is Rs. 5. A) Find the net profit in the excel sheet. Using goal seek function, find the quantity of water bottles to be sold for a profit of Rs. 90000. B) Fill the data table for the values of net profit considering Quantity of water bottles sold as row input and unit prices as column input.	**10**	**4**

SECTION B

	Attempt all questions	**20**	
Q2	Solve the following integer programming problem using branch and bound method $\quad$ Max $Z = 2x_1 + 3x_2$	**10**	**2**

	Subject to the constraints
	  i. $6x_1 + 5x_2 <= 25$
	  ii. $x_1 + 3x_2 <= 10$
	  iii. $x_2 >= 3$
	  iv. and $x_1, x_2 >= 0$ and integers		

Q3	Use solver to find the value of decision variables and objective function Max $Z = 12x_1 + 20x_2 + 45x_3$ Subject to i) $0.8x_1 + 1.7x_2 + 2.5x_3 <= 100$ ii) $x_1 <= 50$ iii) $x_2 <= 25$ iv) $x_3 <= 30$ v) $x_1 >= 20$ vi) $x_2 + x_3 >= 15$ vii) $x_1, x_2, x_3 >= 0$	5	2
Q4	Use regression analysis in excel to forecast the demand for period 9 	Period	1	2	3	4	5	6	7	8
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Demand	226	324	452	293	302	378	524	364		5	4

SECTION-C

	Attempt all questions	30	
Q5	A manufacturer of leather belts makes three types of belts A, B and C, which are processed on three machines M1, M2, and M3. Belt A requires 2 hours on machine M1 and 3 hours on machine M2 and 2 hours on machine M3. Belt B requires 3 hours on machine M1, 2 hours on machine M2 and 2 hours on machine M3 and Belt C requires 5 hours on machine M2 and 4 hours on machine M3. There are 8 hours of time per day available on machine M1, 10 hours of time per day available on machine M2, 15 hours of time per day available on machine M3. The profit gained from belt A is Rs. 3 per unit, from belt B is Rs. 5 per unit, from belt C is Rs. 4 per unit. What should be the daily production of each type of belt so that the products yield the maximum profit?	10	2
Q6	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: 		1	2	3	4	Supply
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A	3	5	4	4	50
B	6	8	5	2	50		10	3

C	1	9	7	3	50		
Demand	**20**	**60**	**30**	**40**			

Determine the optimal distribution that minimize total shipping cost through excel solver.

Q7	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.		

Jobs/Employees	I	II	III	IV	V
A	2	9	2	7	1
B	6	8	7	6	1
C	4	6	5	3	1
D	4	2	7	3	1
E	5	3	9	5	1

Use excel to calculate how should the jobs be allocated, one per employee, so as to minimize the total man hours?

(Q7: 10 | 3)

SECTION-D

Attempt all questions	**30**	

Q8 Use shortest route algorithm to find the shortest route from node A to node F in the given relationship and distance in table below:

Arcs	A-B	A-C	B-C	B-D	C-E	D-F	D-E
Distance	4	2	5	10	3	11	4

(Q8: 10 | 4)

Q9 Using the capacitated plant location model(Facility location) in excel, Find out which plants need to be opened and total cost for the below table.

Production and Transportation Cost per 1000 units=cij

Supply City/Demand City	Simla	Jaipur	Bhopal	Ddun	Goa	Kochi	Fixed cost	Capacity

(Q9: 10 | 3)

New Delhi	1075	550	875	1730	1060	2900	8250	16
Mumbai	1350	1800	950	150	650	1100	6500	22
Kolkata	1725	2200	1300	650	850	760	4300	24
Chennai	1380	1250	640	1120	750	2232	3400	14
Bangalore	1130	1724	850	600	412	1854	7200	26
Demand	10	8	14	6	7	11		

Q10 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 200 and 300, while those demanded at retail stores A, B and C are 100, 150 and 250, 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

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

10   **3**