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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, Dec 2019

Program: MBA LSCM **Semester – I**
Subject (Course): Quantitative Methods **Max. Marks : 100**
Course Code : DSQT-7001 **Duration : 3 Hrs**
No. of page/s: 5

SECTION A (Attempt all)	**[10x2 = 20 marks]**	
Q1. Which normal distribution is better? **(a)** N (40, 5) **(b)** N (50, 5) **(c)** N (40, 10) **(d)** All of these	2	CO4
Q2. Find f(x + h) - f(x) given that f(x) = a x + b	3	CO1
Q3. Determine the nth term of this series 3, 5, 7, 9 ……	3	CO4
Q4. The electrostatic force F, is measured in Newton's, between two charged particles can be related to the distance between the particles d, in centimetres, by the formula $F(d)=2/d^2$. Find the average rate of change of force if the distance between the particles is increased from 2 cm to 6 cm.	3	CO1
Q5. Answer True/False **a)** A closed loop would always involve an even number of cells, subject to a minimum of 4. **b)** An iso-cost line cannot be parallel to the line of constraint. **c)** VAM cannot be used to find an initial solution to a transportation problem if some routes are given to be prohibited. **d)** The Big-M method and the Two-Phase method require the same number of iterations for solving a linear programming problem. **e)** An assignment problem is said to be balanced when the number of rows in the given matrix matches with the number of columns.	5	CO1, CO2, CO3

Q6. The variation of the Y values around the regression line is best expressed as: — 2 — CO5

a) $\sum \left(Y-\overline{Y}\right)^2$

b) $\sum \left(Y-\hat{Y}\right)^2$

c) $\sum \left(Y+\hat{Y}\right)^2$

d) None of these

Q7. Which of the following is NOT an example of compressed data? — 2 — CO3

a) Frequency distribution
b) Probability distribution
c) Data array
d) Histogram
e) Ogive
f) Pareto chart

SECTION B (Attempt any four) — **[4x5 = 20 marks]**

Q8. A manufacturing firm needs 5 component parts. Due to inadequate resources, the firm is unable to manufacture all its requirement. So the management is interested in determining as to how many, if any, units of each component should be purchased from outside and how many should be produced internally. The relevant data are given here. — 5 — CO2

Component	M	A	T	TR	PP	PC
C_1	4	1	1.5	20	48	30
C_2	3	3	2	50	80	52
C_3	1	1	0	45	24	18
C_4	3	1	0.5	70	42	31
C_5	2	0	0.5	40	28	16

M: Per unit milling time in hours
A: Per unit assembly time in hours
T: Per unit testing time in hours
TR: Total requirement in units
PP: Price per unit quoted in the market
PC: Per unit direct costs (including materials, labour, etc.)

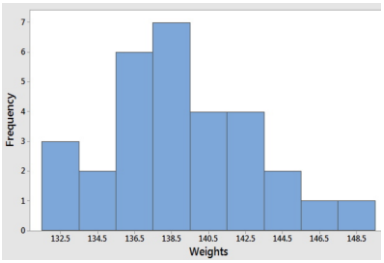
Resources available are as follows:

Milling hours: 300
Assembly hours: 160
Testing hours: 150

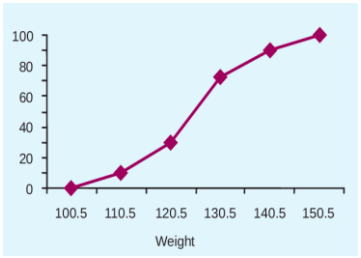
Formulate this as an LPP, taking the objective function as maximization of saving by producing the components internally.

Q9. What is the difference between the symbol *"r"* and *"r-squared"* in regression method?	5	CO5
Q10. What are the assumptions in LPP?	5	CO2
Q11. Construct the dual of the following problem: Minimise $Z = 7x_1 + 5x_2 - 2x_3$ Subject to $x_1 + x_2 + 3x_3 = 10$ $2x_1 - x_2 + 3x_3 \leq 16$ $3x_1 + x_2 - 2x_3 \geq 0$ $x_1 \geq 0, x_2 \geq 0, x_3$ *unrestricted*	5	CO3
Q12. Attempt all: **a)** Kurtosis Vs Skewness **b)** Interfactile Range Vs Interquartile Range	5	CO3, CO4
SECTION C (Attempt all)	**[3x10 = 30 marks]**	
Q13. Transmission Fix-IT stores recorded the number of tickets submitted by each of its 50 stores last month as follows- 42 70 64 47 66 69 73 38 48 25 55 85 10 24 45 31 62 47 63 84 16 40 81 15 35 17 40 36 44 17 38 79 35 36 23 64 75 53 31 60 31 38 52 16 81 12 61 43 30 33 **a)** Construct a frequency distribution for the data using five class intervals **b)** Construct a frequency distribution for the data using 10 class intervals. **c)** Examine the results of (a) and (b) and comment on the usefulness of the frequency distribution in terms of tickets summarization capability.	10	CO3
Q14. A finished product must weigh exactly 150 grams. The two raw materials used in manufacturing the product are *A*, with a cost of Rs 2 per unit and *B* with a cost of Rs 8 per unit. At least 14 units of *B* and not more than 20 units of *A* must be used. Each unit of *A* and *B* weighs 5 and 10 grams respectively. How much of each type of raw material should be used for each unit of the final product in order to minimize the cost? Use Simplex method.	10	CO2

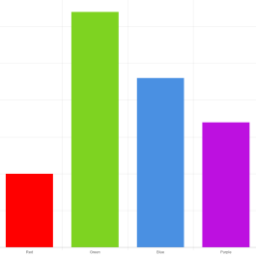
Q15. Name the following graphs:



a)_____



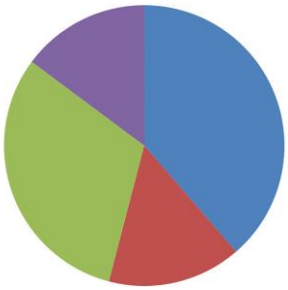
b)_____



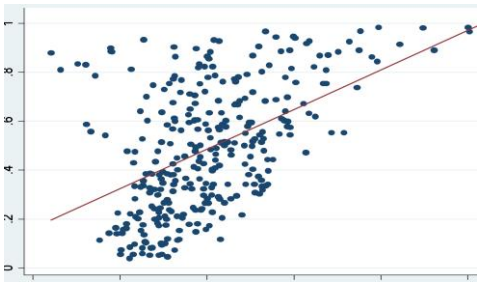
c)_____

10

CO4



d)_____



e)_____

SECTION D (Compulsory)	**[2x15 = 30 marks]**

Q16. A company has four sales representatives who are to be assigned to four different sales territories. The monthly sales increase estimated for each sales representative for different sales territories (in lakhs of rupees) as shown below.

Sales Territories				
Sales Representatives	I	II	III	IV
A	200	150	170	220
B	160	120	150	140
C	190	195	190	200
D	180	175	160	190

Suggest optimal assignment and the total maximum sales increase per month. If for certain reasons, sales representative *B* cannot be assigned to sales territory III, will the optimal assignment schedule be different? If so, find the schedule and the effect on total sales.

15

CO2

Q17. Given the following transportation problem: 	Warehouse	Market			Supply
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	A	B	C	
1	10	12	7	180
2	14	11	6	100
3	9	5	13	160
4	11	7	9	120
Demand	240	200	220	| Determine the least cost transport schedule using NWCCM and LCCM. Which is the best method?	15	CO2