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END TERM EXAMINATION

FIRST SEMESTER [LLB] JANUARY 2024

Paper Code: BBALLB-121 **Subject: Quantitative Techniques**

Time: 3 Hours **Maximum Marks: 60**

Note: Attempt any five questions. All questions carry equal marks.

Q1 (a) Calculate the Quartile Deviation from following frequency distribution:

Class Interval	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84
Freq	1	2	6	7	9	11	8	7	5	3	1

(b) The mean and the standard deviation of the 100 observations are found to be 40 and 10 respectively. If at the time of calculation, two observations were taken wrongly as 30 and 70 in the place of 3 and 27 respectively. Determine the accurate standard deviation.

Q2 From the following records of two players regarding their performance in cricket matches:

Score of Player A	48	52	55	60	65	45	63	70
Score of Player B	33	35	80	70	100	15	41	25

(a) Which player has scored more on average?
(b) Which player is more consistent in performance?

Q3 (a) In a partially destroyed laboratory record of an analysis of correlation data, following information is available:
Variance of X = 9

Two Regression equations are:

$8X - 10Y + 66 = 0$

$40X - 18Y + 214$

Calculate the following:

(i) Mean of X and mean of Y
(ii) Standard deviation of Y
(iii) Two regression coefficients

(b) Distinguish Karl Pearson's Correlation and Spearman's Rank Correlation. What are the situations where Spearman's Rank Correlation is used?

Q4 What is regression? State its assumptions clearly. What are its applications in business decisions? How is it different from correlation?

Q5 Define linear programming. What are the important assumptions of a linear programming model? State its assumptions in business decisions clearly.

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Q6 The Aggrawal Metals Ltd. wishes to schedule the production of a kitchen appliance that requires two resources – labour and material. The company is considering three different models, and its production engineering department has furnished the following data:

	Model		
	A	B	C
Labour (hours per unit)	7	3	6
Material (pounds per unit)	4	4	5
Profit ($ per unit)	4	2	3

The supply of raw material is restricted to 200 pounds per day. The daily availability of labour is 150 hours. Formulating this as a linear programming model to determine the daily production rate of the various models in order to maximize the total profit, use simplex method to solve the problem.

Q7 A company produces a single product and selling it through five agencies situated in different cities. All of a sudden, there is a demand for the product in five more cities that do not have any agency of the company. The company is faced with the problem of deciding on how to assign the existing agencies to dispatch the product to the additional cities in such a way that the travelling distance is minimized. The distances (in kms) between the surplus and deficit cities are given in the following distance matrix.

Deficit City / Surplus City	I	II	III	IV	V
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

Determine the optimum assignment schedule.

Q8 A company has 3 factories manufacturing the same product and 5 agencies in different parts of the country. Production costs differ from factory to factory and the sales prices vary from agency to agency. The shipping cost per unit product from each factory to any agency is known. Given the following data, find the production and distribution schedules most profitable to the company.

Production Cost / Unit	Max. Capacity (no. of units)	Factory
20	150	1
22	200	2
18	125	3

Shipping Cost per unit from Factory to Agency (in Rs.)

Agency / Factory	A	B	C	D	E
1	1	1	5	9	4
2	9	7	8	3	8
3	4	5	3	2	7
Demand by each agency (in no. of units)	80	100	75	45	125
Selling Price (in Rs.)	30	32	31	34	29

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END TERM EXAMINATION

FIRST SEMESTER [LLB] FEBRUARY 2023

Paper Code: BBALLB-121 ***Subject: Quantitative Techniques***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions. Simple calculator is allowed. All questions carry equal marks.

Q1 The following is the age distribution of 2000 persons working in a large textile mill:

Age Group	No. of Persons	Age Group	No. of Persons
15 but less than 20	80	45 but less than 50	268
20 but less than 25	250	50 but less than 55	150
25 but less than 30	300	55 but less than 60	75
30 but less than 35	325	60 but less than 65	25
35 but less than 40	287	65 but less than 70	20
40 but less than 45	220		

Because of the heavy losses the management decides to bring down the strength to 40% of the present number according to following scheme:

(i) To retrench the first 10% from lower group.
(ii) To absorb the next 40% in other branches.
(iii) To make 10% from the higher age group retire prematurely.

What will be the age limits of persons retained in the mill and of those transferred to other branches? Also calculate the average age of those retained.

Q2 From the following records of two players regarding their performance in cricket matches:

Score of Player A	48	52	55	60	65	45	63	70
Score of Player B	33	35	80	70	100	15	41	25

(a) Which player has scored more on average?
(b) Which player is more consistent in performance?

Q3 What is correlation? State the properties of Karl Pearson's coefficient of correlation. How do you interpret the value of coefficient of correlation? Also explain the term probable error of coefficient of correlation.

Q4 (a) Compute the regression coefficient of Y on X from the following data:

X	1	2	3	4	5
Y	140	180	140	180	200

(b) If two regression coefficients are -0.7 and -1.3, what would be the value of coefficient of correlation? Also state the value of explained and unexplained variance.

Q5 What is Linear Programming? What are its assumptions? Mention its applications in different business functions.

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Q6 Solve the following Linear Programming Model by Simplex Method:
Maximize $Z = 2X_1 + 3X_2 + 4X_3$
Subject to
$3X_1 + X_2 + 4X_3 <= 600$
$2X_1 + 4X_2 + 2X_3 >= 480$
$2X_1 + 3X_2 + 3X_3 = 540$
and X_1, X_2 and $X_3 >= 0$

Q7 A company has factories at F1, F2 and F3 that supply products to warehouses at W1, W2 and W3. The weekly capacities of the factories are 200, 160 and 90 units respectively. The weekly warehouse requirements are 180, 120 and 150 units respectively. The per unit shipping costs (in Rs.) are given below:

	Warehouse			
Factory	W1	W2	W3	Supply
F1	16	20	12	200
F2	14	8	18	160
F3	26	24	16	90
	180	120	150	450

Determine the optimal distribution for this company in order to minimize its total shipping cost.

Q8 A company operates in four territories, and four salesmen are available for assignment. The territories are not equally rich in their sales potential. It is estimated that a typical salesman operating in each territory would bring in the following annual sales:

Territory	I	II	III	IV
Annual Sales (in Rs.)	126000	105000	84000	63000

The four salesmen also differ in their ability. It is estimated that, working under the same conditions, their yearly sales would be proportionately as follows:

Salesmen	A	B	C	D
Proportion	7	5	5	4

If the criterion is maximum expected total sales, the intuitive answer is to assign the best salesman to the richest territory, the next best salesman to the second richest, and so on; verify the answer by assignment technique.

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