Course Code	**:**	**BCS-040**
Course Title	**:**	**Statistical Techniques**
Assignment Number	**:**	**BCA(IV)040/Assignment/2024-25**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31st October, 2024 (For July session)**
		30th April, 2025 (For January session)

Note: This assignment has 8 questions of 80 marks (each question carries equal marks). Answer all the questions. Answer all the questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1. In a partially destroyed laboratory, the legible record of analysis of correlation of data, is as follows: 10 Variance of x = 9, Regression equations: **(10 Marks)**

i) $8x - 10y + 66 = 0$

ii) $4x - 18y - 214 = 0$

What were (a) the means of x and y, (b) the coefficient of correlation between x and y and (c) the standard deviation of y?

Q2. A) A random sample of size 64 has been drawn from a population with standard deviation 20. The mean of the sample is 80. **(5 Marks)**

(i) Calculate 95% confidence limits for the population mean.

(ii) How does the width of the confidence interval change if the sample size is 256 instead?

B) A population consists of the numbers 2, 5, 7, 8 and 10. Write all possible simple random samples of size 3 (without replacement). Verify that the sample mean is an unbiased estimator of the population mean. **(5 Marks)**

Q3. A computer chip manufacturer claims that at most 2% of the chips it produces are defective. To check the claim of the manufacturer, a researcher selects a sample of 250 of these chips. If there are eight defective chips among these 250, test the null hypothesis that more than 2% of the chips are defective at 5% level of significance. Does this disprove the manufacturer's claim? (Given that $Z_{0.05} = 1.645$) **(10 Marks)**

Q4. A) A problem of statistics is given to three students A, B and C whose chances of solving it are 0.3, 0.5 and 0.6 respectively. What is the probability that the problem will be solved? **(5 Marks)**

B) Suppose 2% of the items made in a factory are defective. Find the probability that there are: **(5 Marks)**

(i) 3 defectives in a sample of 100

(ii) no defectives in a sample of 50

Q5. A Manager of a car company wants to estimate the relationship between age of cars and annual

maintenance cost. The following data from six cars of same model are obtained as:

Age of Car (in years)	Annual Maintenance Cost (In hundred rupees)
1	10
2	15
3	18
4	20
5	25
6	35

(a) Construct a scatter diagram for the data given above. **(3 Marks)**

(b) Fit a best linear regression line, by considering annual maintenance cost as the dependent variable and the age of the car as the independent variable. **(2 Marks)**

(c) Use this regression line to predict the annual maintenance cost for the car of age 8 years.

(5 Marks)

Q6. What do you understand by the term forecasting? With the help of a suitable example discuss the relation between forecasting and future planning. Briefly discuss both forecasting model. **(10 Marks)**

Q7. Using the Regression line y =90 + 50x, fill up the values in the table below.

SAMPLE No. (i)	12	21	15	1	24
x_i	0.96	1.28	1.65	1.84	2.35
y_i	138	160	178	190	210
$\hat{y}_i$	138	-	-	-	-
$\hat{e}_i$	0	-	-	-	-

After filling the table, compute the parameters of Goodness to fit i.e. R and R^2. Based on the result of R and R^2, interpret the correlation between variable x and y. **(10 Marks)**

Q8. Explain the following with the help of an example each: **(10 Marks)**

(a) Linear and circular systematic sampling
(b) Z-test and t-test
(c) Correlation and Regression
(d) Probability Distribution