

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, December 2021

Statistical Data Analysis I

M. Tech., Semester I

Course Code : AS2106

Roll No.....

Time: 3 hours

Max. Marks: 30

Instructions for students:

1. Do not write anything other than your roll number on the question paper.
2. Formulas on a single A4 size paper can be brought to the exam hall.

Q.1 A publishing company has just published a new college textbook. Before the company decides the price at which to sell this textbook, it wants to know the average price of all such text-books in the market. The research department at the company took a sample of 25 comparable textbooks and collected information on their prices. This information produced a mean price of \$145 for this sample. It is known that the standard deviation of the prices of all such textbooks is \$35 and the population of such prices is normal. 5

(a) What is the point estimate of the mean price of all such college textbooks?

(b) Construct a 90% confidence interval for the mean price of all such college textbooks.

Q.2 What is Central Limit Theorem and its physical significance? 5

The management of Priority Health Club claims that its members lose an average of 10 pounds or more within the first month after joining the club. A consumer agency that wanted to check this claim took a random sample of 36 members of this health club and found that they lost an average of 9.2 pounds within the first month of membership. The population standard deviation is known to be 2.4 pounds. Find the p-value for this test. What will your decision be if significance level $\alpha = .01$? What if significance level $\alpha = .05$?

Q.3 Find the least squares regression line for the data on incomes and food expenditures of the seven households given in Table. Use income as an independent variable (x) and food expenditure as a dependent variable (y). 5

Income (x)	Food Expenditure (y)
55	14
83	24
38	13
61	16
33	9
49	15
67	17

Q4 Explain each of the following concepts. You may use graphs to illustrate each concept. 5

- a. Perfect positive linear correlation
- b. Perfect negative linear correlation
- c. Strong positive linear correlation
- d. Strong negative linear correlation
- e. Weak positive linear correlation

f. Weak negative linear correlation

g. No linear correlation

Calculate the correlation coefficient for **data presented in Question 3** on incomes and food expenditures of seven households.

- Q5 Fifteen fourth-grade students were randomly assigned to three groups to experiment with three different methods of teaching arithmetic. At the end of the semester, the same test was given to all 15 students. The following table gives the scores of students in the three groups. 5

Method I	Method II	Method III
48	55	84
73	85	68
51	70	95
65	69	74
87	90	67

At a 1% significance level, can we reject the null hypothesis that the mean arithmetic score of all fourth-grade students taught by each of these three methods is the same? Assume that all the assumptions required to apply the one-way **ANOVA** procedure hold true.

- Q.6 In March 2005, the New England Journal of Medicine published the results of a 10-year clinical trial of low-dose aspirin therapy for the cardiovascular health of women (Time, March 21, 2005). The study was based on 40,000 healthy women, most of whom were in their 40s and 50s when the trial began. Half of these women were administered 100 mg of aspirin every other day, and the others were given a placebo. Assume that the women were assigned randomly to these two groups. 5
- a. Is this an observational study or a designed experiment? Explain.
- b. From the information given above, can you determine whether or not this is a double-blind study? Explain. If not, what additional information would you need?