

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - III EXAMINATION - WINTER 2025

Subject Code: 3132908

Date: 31-12-2025

Subject Name: Statistics for Textile Engineering

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

Q.1 (a) Explain regression analysis. State properties of regression co efficient. **Marks 03**

(b) Define term: 1. Standard Deviation 2. Median 3. CV% 4. Linear correlation **04**

(c) Find the Q1, Q3, D7 and P85 from the following data. **07**

Weight in lbs	115	120	130	140	145
No. of men	8	20	35	24	12

Q.2 (a) Explain frequency distribution briefly. **03**

(b) What is correlation? Explain positive and negative correlation. **04**

(c) Five strength tests each carried out on the two fabrics have shown the following results. **07**

Fabric A	15.2	15.5	15.0	15.4	15.6
Fabric B	15.0	14.8	13.6	15.5	15.2

Find CV% for both and decide which fabric is more consistent?

OR

(c) A sample of 10 leas has shown lea weight as follows: **07**

14.2, 15.0, 14.9, 15.7, 15.4, 14.6, 14.5, 15.0, 15.4, 15.2

On the basis of the above results, can we say that this sample is selected from the population having mean lea weight 15 units and variance of lea weight 1 unit? (using chi-square (χ^2) Test)

Q.3 (a) What is central tendency? What are the different measures of central tendency? **03**

(b) Explain Poisson distribution with their properties. **04**

(c) The following data are related to the percentage of humidity and the warp breakage rate recorded in a loom shed: **07**

% Humidity	54	85	86	50	42	75	65	56
Warp breakage	2.45	1.21	1.20	2.84	3.25	1.86	1.90	2.32

Find Karl Pearson's co efficient and correlation and comment on it.

OR

- (a) What is probability distribution? What are its types? 03
- (b) State the properties of normal distribution. 04
- (c) Five knitted garments each were selected at eight different times during the production and following results of number of defective garments were obtained: 07

Sample No.	1	2	3	4	5	6	7	8
No. of defective garments	0	2	1	1	2	0	0	0

Draw the np-chart and p-chart from the above data and comment on each of them.

- Q.4 (a) Describe various types of scatter diagram. 03
- (b) Explain Binomial distribution with their properties 04
- (c) If the value of the correlation coefficient between the two variables X and Y is 0.83, find the equation of regression of X on Y and Y on X using following data 07

	Variables	
	X	Y
Mean	112	65
Standard deviation	2.5	3.2

OR

- (a) Describe analysis of variance technique. 03
- (b) What is the testing of hypothesis? Explain the test for the equality of population proportion of two different populations. 04
- (c) Five strength tests carried out on fabric woven with same raw material on two different looms have shown following results of strength. 07

Fabric of loom - I	123	122	130	125	128
Fabric of loom - II	125	127	132	130	132

From the above results, is there any evidence that the strength of fabric woven on second loom is more than that of first? (find using F-test, At 5% $F_{14,9,0.05} = 6.39$)

- Q.5 (a) Briefly explain about 2^3 factorial experiments. 03
- (b) Explain the term: (1) Assignable causes (2) Chance causes 04
- (c) Following data represents average & range of linear density of the yarn obtained from eight different samples each of size five, selected during a spinning process. 07

Sample no.	1	2	3	4	5	6	7	8
Average linear density	19.6	20.1	20.5	19.4	22.3	21.7	20.3	19.9
Range®	1.2	2.1	1.6	1.8	2.0	1.7	2.0	1.8

Draw X bar and R chart for the above and write a conclusion about the state of the process. (Table value : $A_2 = 0.577$, $D_3=0$, $D_4=2.155$)

OR

- (a) State the steps in planning of an experiment. **03**
- (b) Briefly explain about the small sample t-test. **04**
- (c) An experiment was carried out to study the effect of the speed of the ring frame on the number of end breakages, and the following results were obtained by taking five readings at each speed. (One way ANOVA) **07**

	Speed (rpm)			
	15000	16000	17000	18000
End Breakages	18	22	23	30
	20	20	23	32
	18	21	25	28
	15	18	24	28
	17	23	23	35

Analyze the above data and write the conclusion

[F table value for 3, 16 degrees of freedom at 5% level = 3.24]
