

Enrollment No./Seat No.:

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

Subject Code: BE03029041

Date: 22-12-2025

Subject Name: Statistical Techniques 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) AM of weights of 100 boys is 50 kg and the AM of weights of 50 girls is 45 kg. Calculate AM of weights of combined group of boys and girls. **Marks**
03

(b) Discuss Normal distribution briefly. **04**

(c) Calculate the mean deviation of the following values about the mean and median in respect of the following data. **07**
18, 25, 63, 59, 29, 72, 17, 25, 105, 87

Q.2 (a) Define the terms: i) Standard Deviation ii) Median iii) CV% **03**

(b) Explain Binomial probability distribution with their properties. **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

OR

(c) Find out Quartile deviation of the following data and its relative measure. **07**

Value	10	15	20	25	30	35	40
Frequency	5	10	16	20	14	8	4

Q.3 (a) Describe various types of scatter diagrams. **03**

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

(c) Compute Karl Pearson's coefficient of correlation from the following data of price of garment (in Rs.) and number of garments sold and comment on it. **07**

Price of garment	100	105	110	115	120	125	130
No. of garments sold	85	80	70	75	65	60	60

OR

(a) Enlist the various process control chart and state the formula for CL, LCL and UCL of \bar{x} chart **03**

(b) State the properties of normal distribution. **04**

- (c) Two judges in a fabric assessment rank 6 fabric samples in the following order. Find out spearman's rank correlation coefficient. 07

Sample	A	B	C	D	E	F
Judge A	2	1	5	6	4	3
Judge B	3	2	6	4	5	1

- Q.4 (a)** Explain about relative measures of dispersion. 03

- (b) 24 ring bobbins are tested for count and the mean found to be 52.4 Ne, The standard deviation of the sample is 4.1. if the nominal count is 50 Ne, is the yarn too fine? (find using t-test, $n < 30$, At 5% $t_{23} = 2.069$) 04

- (c) Following are the results of the fabric strength (in 10 gm) obtained from the sample of two different fabrics. 07

Fabric A	22.0	21.5	22.8	21.0	23.0	20.9	21.6	22.0	22.8	21.2
Fabric B	22.3	21.6	22.0	22.1	22.0	22.3	21.8	21.8	21.6	21.8

Calculate CV% for both fabrics and state which fabric is more consistent in terms of strength?

OR

- (a) Explain frequency distribution briefly. 03

- (b) Explain significance of control chart. 04

- (c) Sample of five ring bobbins each selected from a ring frame for eight shifts have shown following results of count CV%. 07

Sample no.	1	2	3	4	5	6	7	8
Average	4.16	4.22	4.08	3.96	3.99	4.03	4.02	3.91
Range	0.32	0.38	0.11	0.19	0.12	0.13	0.22	0.11

Draw X bar and R chart for the above data and write conclusion about the state of the process. [Table value: $A_2 = 0.577$, $D_3 = 0$, $D_4 = 2.12$]

- Q.5 (a)** Briefly explain about the small sample t-test. 03

- (b) Briefly discuss about the Assignable causes and Chance causes. 04

- (c) The following data are related to the percentage of humidity and the warp breakage rate recorded for a week in a loom shed. 07

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

Using equation of line of regression, find warp breakage rate if humidity percentage on a specific day is 60 for given data.

OR

- (a) State the steps in planning of an experiment. 03

- (b) A sample of 10 leas has shown lea weight as follows: 04

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)

- (c) An experiment was conducted to study the effect of a dye produced by four different companies (A, B, C and D) on the strength of the fabric and following results were obtained.

	Dye			
	A	B	C	D
Fabric strength	250	225	250	300
	275	250	275	250
	275	225	250	275
	300	300	250	300

Carry out the analysis (One way ANOVA) of above data and write the conclusion. (Table value of F for 3, 12 degree of freedom at 5% level = 3.49)
