

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2024****Subject Code:3132908****Date:16-07-2024****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.

- Marks**
- Q.1 (a)** AM of weights of 100 boys is 50 kg and the AM of weight of 50 girls is 45 kg. Calculate AM of weights of combined group of boys and girls. **03**
- (b)** Ten strength test made on certain yarn have shown the following results; 22.8, 23.2, 22.9, 22.6, 23.4, 23.0, 23.1, 23.0, 22.9, 23.0
Find the median for the above data and comment on it. **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)** Describe various types of scatter diagram. **03**

- (b)** Ten count test made on certain yarn have shown following results. **04**

22.8, 23.2, 22.9, 22.6, 23.4, 23.0, 23.1, 23.0, 22.9, 23.0

Calculate mean deviation about mean using the above data and comment about the variation of the data.

- (c)** The following data are related to the numbers of defective garments produced by a group of workers in an industry. **07**

No. of defective garment	28	32	40	50	58	62	Total
No. of days	5	10	12	20	10	3	60

Find the quartile deviation for the above data and comment about the variation of the data.

OR

- (c)** Following are the results of count tests made on the production of two shifts. **07**

Shift I	11.7	12.2	12.0	11.6	10.9	13.0	11.0	12.8	11.5	12.0
Shift II	12.2	11.6	12.0	12.1	12.0	12.3	11.8	11.6	11.8	12.0

Using CV% decide which production is more consistent.

- Q.3 (a)** State the steps in planning of an experiment. **03**

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

- (c)** Compute karl pearson's coefficient of correlation from following data of percentage humidity and warp breakages were recorded from a weaving factory and comment on it. **07**

% Humidity	60	62	59	70	56	58	75
Warp Breakages	112	110	120	102	122	118	90

OR

- Q.3 (a)** Explain about relative measures of dispersion. **03**

- (b)** Explain Normal distribution with their properties. **04**

- (c)** Find the equation of regression lines from the following data and also estimate Y for X=1 and X for Y=4 **07**

X	3	2	-1	6	4	-2	5	7
Y	5	13	12	-1	2	20	0	-3

- Q.4 (a)** Enlist the various process control chart and state the formula for CL, LCL and UCL of $\bar{x}$ chart **03**
- (b)** Explain Poisson distribution with their properties. **04**
- (c)** Find the spearman's rank correlation coefficient for the following data of marks in physics and textile testing and comment on it. **07**

Marks in physics	70	60	65	50	58	75	68
Marks in textile testing	74	62	70	40	45	78	56

OR

- Q.4 (a)** Explain the term: (1) Assignable causes (2) Chance causes (3) Correlation **03**
- (b)** Explain Binomial distribution with their properties **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.

- Q.5 (a)** Briefly explain about the small sample t-test. **03**
- (b)** Explain significance of control chart. **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 $\bar{X}$ bar and R chart for the above and write conclusion about the state of the process. (Table value: $A_2 = 0.577$, $D_3 = 0$, $D_4 = 2.155$).

OR

- Q.5 (a)** What is central tendency? What are the different measures of central tendency? Describe any one. **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)** 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]
