Register Number .....

M.TECH. DEGREE EXAMINATIONS: DECEMBER 2009

First Semester

TEXTILE TECHNOLOGY

TTX505: Statistical Applications in Textile Engineering

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

1. Define probability.
2. Write short notes about binomial distribution.
3. Differentiate null and alternate hypothesis.
4. Write short notes about single and two tail tests with suitable example.
5. Write short notes about randomization in ANOVA.
6. Write short notes about repeatability and reproducibility in ANOVA.
7. What are the principles of control charts?
8. Briefly explain the control charts for averages and ranges.
9. Write the regression model for 2^k design.
10. Write the equation for second order response surface model.

PART B (5 x 16 = 80 Marks)

11. (a) A manufacturers supplies large batches of articles. When a batch is ready for dispatch to a customer, it is inspected for defectives. It is too expensive to inspect every article in the batch, and it has been suggested that a sample of 50 articles should be randomly chosen from each batch and inspected and that it two or more defectives are found in the sample, the batch should be rejected. Past experience has shown that the manufacturing process usually produces 2.7% defectives, and this is considered acceptable. Is the suggested scheme a sensible one?

(OR)

(b) The following are the results of extension tests carried out on two types of yarn (percentage extension at break).

Yarn A: 14.1, 14.7, 15.1, 14.3, 15.6, 14.8

Yarn B: 16.9, 16.3, 15.9, 15.7, 15.7

Do the results suggest that one yarn is significantly more extensible than that other?

12. (a) A finisher buys a certain chemical on the understanding that it should not contain more than 3% impurities. When a batch is delivered, five independent determinations of percentage impurity are made, with the following results

3.2, 3.4, 2.8, 3.1, 3.1

The mean of the results is 3.12% is this sufficient evidence to conclude that the batch contains too much impurity?

(OR)

(b) Two catalysts are being analysed to determine how they affect the mean yield of a chemical process. Specifically, catalyst 1 is currently in use, but catalyst 2 is acceptable. Since catalyst 2 is cheaper, it should be adopted, providing it does not change the process yield. A test is run in the pilot plant and results in the data shown below. Is there any difference between the mean yields? Use $\alpha = 0.05$. Assume equal variances.

Observation no.	1	2	3	4	5	6	7	8
Catalyst 1	91.5	94.18	92.18	95.39	91.79	89.07	94.72	89.21
Catalyst 2	89.19	90.95	90.46	93.21	97.19	97.04	91.07	92.75

13. (a) Explain in details the methods of analysis of variance (ANOVA).

(OR)

(b) The data below show the percentage moisture content remaining in four different fabrics after each of three drying process. Carry out an analysis of variance on these data.

Fabric	Hydro	suction	mangle
Worsted	45	54	56
Barathea	35	57	56
Twill	47	79	61
Melton	42	86	65

14. (a) Explain in detail about the control charts for defectives and control charts for defects.

(OR)

(b) A Chart to control the mean linear density of the yarn produced by a spinning process is being set up. The nominal linear density of the yarn is 36 tex, and a standard linear density test is deemed acceptable if its value lies with in the tolerances 36 ± tex. Twenty samples have taken at regular intervals, each sample consisting of sufficient yarn to make five standard linear density tests. The average range of these tests was found to be 0.68 tex. Calculate appropriate action limits for the chart.

15. (a) Explain in detail about various steps of multiple regression analysis.

(OR)

(b) The following data show the relation between the relative viscosity of dye liquor and the dye uptake on a certain fabric.

Relative viscosity	0	3	5	6	8	11
Dye uptake	1	2	6	7	8	12

Calculate an equation for estimating the mean dye uptake when the relative viscosity is known. What are the 95% confidence limits for the mean dye uptake when the relative viscosity is 4?

****