Register Number.....

M.TECH. DEGREE EXAMINATIONS: JANUARY 2009

First Semester

TEXTILE TECHNOLOGY

P07TX 105 Statistical Applications in Textile Engineering

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

Answer ALL Questions:-

PARTA (20 x 1 = 20 Marks)

1. Area under normal curve is

a) X-μ/SD b) (X-μ) SD c) (X-μ) + SD d) X+ μ/SD

2. Poisson Distribution P (r) can be calculated by

a) $e^{m} m^{r}/r^{2}$ b) $e^{-m} m^{r}/r^{2}$ c) $e^{-m} m^{r}/r!$ d) $e^{-r} m^{r}/m!$

3. The peak point Normal Distribution is

a) Mode b) Mean c) SD d) Median

4. The value for the 99% confidence level is

a) 1.56 b) 2.6 c) 1.93 d) 2.58

5. Chi square test is calculated by

a) $(O+E)^2/E$ b) $(O+E)^3/E$ c) $(O-E)^2/E$ d) $(O-E)^2/O$

6. "F" test canbe assessed by

a) Larger sample variance/ Smaller sample variance

b) Larger sample variance x smaller sample variance

c) Larger sample variance- Smaller sample variance

d) Smaller sample variance/ Larger sample variance

7. Type I Error Means

a) Accept the hypothesis b) Reject the false hypothesis

c) reject the true hypothesis d) Null hypothesis

8. "T" test can be estimated by

a) (Mean + μ / S)√n b) (Mean − μ / S)√n

c) (Mean x μ / S)√n d) (Mean − μ / n)√S

9. The Null hypothesis (H_o) for one way classification in ANOVA is

a) $\mu_1 = \mu_2 = \ldots = \mu_k$ b) $\mu_1 / \mu_2 / \ldots / \mu_k$

c) $\mu_1 + \mu_2 + \ldots + \mu_k$ d) $\mu_1 - \mu_2 - \ldots - \mu_k$

10. Degrees of freedom for one way ANOVA is

a) (n-1) b) (n+1) c) (n^2-1) d) (n^2+1)

11. Degrees of freedom for two way ANOVA is

a) (r+1)(c+1) b) (r-1)+(c-1) c) (r-1)(c-1) d) (r-1)/(c-1)

12.The sum of squares for the source "residual" (SSE) is obtained by

a) SST – (SSC –SSR) b) SST – SSC –SSR

c) SST + (SSC –SSR) d) SST – (SSC + SSR)

13.The 2^K Factorial Designs is based on

a) ANOVA b) "T" Distribution

c) Null hypothesis d) Yate's algoritham

14. "Rotatable Design" is invented by

a) Fisherman b) Box- Benson c) Box- Hunter d) Box – William

15. The correlation value lies between

a) 0 to 1 b) – 1 to + 1 c) – 1 to 0 d) – 1 to + 2

16.The regression equation based on the assumption

a) Exponential function b) Weibull distribution

c) Correlation d) Least square

17. Thresold value means

a) Mean of the population b) The maximum value in population

c) The most occurring value in population d) The minimum value in population

18. Weibull distribution based on

a) Linear regression models b) Extreme value modeling concept

c) Exponential function d) Normal distribution

19. Weibull distribution (∂_E) can be estimated by

a) $(\partial_I)/n^{1/\lambda}$ b) $(\partial_I)(n^{1/\lambda})$ c) $(\partial_I)/n^{\lambda}$ d) $(\partial_I + n^{1/\lambda})$

20. The standard error from the given sample "n" at 95% confidence limit is

a) ± 2 C.V % / √n b) ± 2 C.V % x √n

c) ± 2 C.V % + √n d) ± 2 C.V % – √n

PART-B (5 x 16 = 80 Marks)

21. a) i) Explain in detail about discrete distribution and continuous distribution with suitable examples (8)

ii) In a loom shed the average loom stoppage rate is 5.5 looms per day. If a fitter can attend 7 break down per shift of 8 hours. The fitter's capability to attend the break down is up to 6 stoppages, if more than this will be counted as over time. What is the average number of days that the fitter works per month of 25 working days? (8)

(OR)

21. b) i) Discuss in detail the applications of Hyper geometric distributions and Normal distributions with suitable examples. (8)

ii) Wearing trail was carried out to estimate the average life of a certain type of garment. Hundred people were given garment and asked to wear it for 12 hours a day consists of 6 days a week. At the end of 4^{th} week 5 wearers reported their garments were worn out. After 5^{th} week further 20 wearers reported that their garments were worn out. Assuming the life of garment is normally distributed, estimate the mean and SD of the garment's life. Also estimate the proportion of the garments with lives longer than 400 hours. (8)

22.a) i) Discuss the concept of hypothesis testing and the errors in hypothesis testing. (8)

ii) A process modification has been made in the filament production process with the objective of increasing the extension at break. The results of the extension tests in % of the original filamrnt and modifies filament were given below

	Test results of extension in %					
Before modification	14.3	15.2	14.7	14.4	15.6	14.5
After Modification	17.1	16.2	16.8	15.9	17.2	16.7

Calculate 95% confidence level for the increase in extension % caused by the modification. (8)

(OR)

22.b) i) Explain in detail the selection of sample size and significance levels with relevance to textile applications. (8)

ii) Two laboratories A and B carried out the estimation of TDS content, for the same 10 batch samples of the effluents comes out from the wet processing unit. The test results obtained two laboratories are given below.

Details	TDS Value of the effluents									
Batch NO:	1	2	3	4	5	6	7	8	9	10
Lab A	9	4	7	8	6	5	5	4	7	8
Lab B	8	7	6	6	5	7	7	5	6	9

Assess is there any significant difference between the mean salt content obtained by the lab A & B? (8)

23. a) i) Discuss in detail with suitable example about " One way" & "Two way" ANOVA (8)

ii) In a textile mill four machines (M1, M2, M3 & M4) productions were tabulated for five different employers (E1, E2, E3, E4 & E5). Use ANOVA to test the hypothesis that the mean production is same for four machines. And also test the hypothesis that the employees do not differ with respect to mean productivity. (8)

Machines / Employees	M1	M2	M3	M4
E1	40	38	42	36
E2	38	42	48	43
E3	38	35	33	40
E4	36	35	45	42
E5	42	45	38	40

(OR)

23 b) i) Explain in detail the objective of analysis of variance and also give experimental design for ANOVA. (8)

ii) Four different fabrics namely worsted, satin, Twill and crape were dried using three different drying processes namely hydro extraction, Suction, and Mangling. The moisture content of the fabric after drying was tabulated below. Using ANOVA asses the performance differences of driers and moisture content of the fabrics. (8)

Fabric Details	Drying Techniques		
	Hydro Extraction	Suction	Mangling
Worsted	30	44	52
Satin	38	50	60
Twill	40	57	58
Crape	32	54	56

24.a) i) Discuss in detail the importance of experimental design and also explain its classification (8)

ii) The following table shows the extension modulus of Knitted fabrics considering 2^3 factorial design data. Analyze these data and discuss about the factors which influences the extension modulus of the knitted fabric. (8)

Details	A_- Fabric set		A_+ Fabric unset	
	B_- Separator used	B_+ Separator unused	B_- Separator used	B_+ Separator unused
Tightness Factor Low C_-	32.8	19.5	5.8	6.1
Tightness Factor High C_+	30.7	22.0	6.2	7.3

(OR)

24. b) i) Explain in detail the design and analysis of second order composite designs. (8)

ii) A Knitting Machine is running at 100 rpm to produce RIB knitted fabric using P/C blended yarn. There are four knitting machine parameters decide the dimensional stability of knitted fabric and the values are tabulated. Design a 2^K experiment and also investigate the influence of machine parameters on dimensional stability of RIB fabric. (8)

Details		Dial Height Low A -		Dial Height High A +	
		Take down tension Low B -	Take down tension High B +	Take down tension Low B -	Take down tension High B +
Stretcher board width Low C -	Needle timing delay Low D -	1	35	25	27
	Needle timing delay High D +	3	40	10	32
Stretcher board width High C +	Needle timing delay Low D -	19	30	12	22
	Needle timing delay High D +	25	26	15	20

25. a) i) Explain in detail the application of WEIBULL distribution in extreme value modeling for yarn strength. (8)

ii) The relationship between the relative viscosity of dye liquor and the dye uptake on a cotton fabric are tabulated below. Calculate an equation for estimation of mean dye uptake for the known relative viscosity of dye liquor. And also test the equation for its goodness for fit. (8)

Relative Viscosity of dye liquor	1	4	6	8	12	16
Dye Uptake of the Cotton fabric	2	4	7	6	12	15

(OR)

25. b) i) Discuss in detail about the properties of model in view of the characteristics smallest value and two parameter case with suitable example.

ii) In the manufacturing of tyre cord the data were taken for the processing tension and the modulus values which were tabulated below. Find the regression equation for processing tension on modulus. And also test the equation for its goodness for fit. (8)

Processing Tension	7	9	11	13	15	17
Modulus Value	25.7	27.3	29.7	30.1	32.8	35.5

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