Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I• EXAMINATION – WINTER 2014

Subject Code: 2712507 **Date:06/01/ 2015**

Subject Name: Statistical Techniques & Design of Experiment

Time:02:30 p.m. to 05:00 p.m. **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 Four warp beams were prepared & given different treatments. These beams were mounted on four looms. A design was prepared. The beams were interchanged between four experimental looms in such a way that after experiment, each warp beam had been worked on each loom for one day. Data about warp breakage rate is as given below: **14**

	Days			
Looms	1	2	3	4
I	(P) 5.52	(S) 9.16	(R) 5.77	(Q) 5.07
II	(S) 6.69	(R) 5.14	(Q) 2.91	(P) 6.09
III	(Q) 2.87	(P) 6.02	(S) 6.53	(R) 2.83
IV	(R) 9.76	(Q) 6.25	(P) 8.90	(S) 9.77

(i) Identify the design

(ii) Conduct the ANOVA and check whether the warp beam treatment has any effect on breakage rate. Also check the effect of days & loom. Give your conclusion.

Table value for F Test at 5% level is 4.75

Table value for F Test at 1% level is 9.78

Q.2 (a) A set of travelers were subjected to inspection. A set consists of 5 travelers and there are 20 subgroups. The inspection data obtained is as follows: **07**

Group No.	1	2	3	4	5	6	7	8
No. of defects	77	64	75	93	45	61	49	65

Group No.	9	10	11	12	13	14	15	16
No. of defects	45	77	59	54	41	87	40	22

Group No.	17	18	19	20
No. of defects	92	89	55	25

Draw the control chart for number of defects.

(b) (i) State the steps in planning of an experiment **07**

(ii) Draw the normal frequency curve. Give examples of normally distributed variate from textile.

(iii) Define producer risk and consumer risk.

OR

(b) (i) Define randomization & treatment **07**

(ii) Write on advantages of acceptance sampling.

(iii) What will be the relationship of two variables if coefficient of correlation r = -1

Q.3 **(a)** Find the coefficient of correlation between ends per inch(X) and picks per inch(Y) if the values are as given below: **08**

X	23	27	28	28	29	30	31	33	35	36
Y	18	20	22	27	21	29	27	29	28	29

(b) A Count test was carried out on 4 leas from each bobbin. Total 6 bobbins were there. Conduct ANOVA(one way classification) from following data. State whether the count differs between bobbins. **06**

	Bobbin No.					
	1	2	3	4	5	6
Lea no.						
1	12	13	14	11	10	09
2	11	10	12	13	14	09
1	10	09	11	10	12	13
1	08	14	10	09	12	14

Table Values for 5,18 d.f. at 5% level = 2.77 & 1% = 4.95
Table Values for 3,18 d.f. at 5% level = 3.16 & 1% = 5.09

OR

Q.3 **(a)** Draw the operating characteristic curve and calculate required constant from following data: **08**

P= 0.01, P2= 0.05
α= 0.10 β= 0.10
h1=h2=1.32, S= 0.025

(b) Following data has been collected from 160 cards. Calculate coefficient of correlation between x & y **06**

Sum of x values = 548
Sum of y values = 156
Sum of square of x = 21522
Sum of square of y = 1675
Sum of product of x & y = 4883

Q.4 **(a)** Tensile strength of 36s combed yarn is 56 lbs and SD is 5.5 lbs. Calculate: **08**

(i) % of yarn having strength below 50.5 lbs
(ii) % of yarn having strength above 63.0 lbs
(iii) % of yarn having strength between 50.5 & 63.0 lbs

t table at -1 = 0.159, 1.2= 0.885 & 1.3 = 0.903

(b) (i) State the characteristics of OC curve **06**
(ii) State the properties of normal distribution

OR

Q.4 **(a)** No. of defective cones while inspecting 250 no.s in each sample is as given below: **08**

Spdl No.	1	2	3	4	5	6	7	8
No. of defective	3	2	6	9	5	1	0	0
Spdl No.	9	10	11	12	13	14	15	16
No. of defective	12	3	2	1	1	1	9	5
Spdl No.	17	18	19	20	21	22	23	24
No. of defective	4	2	6	3	1	0	0	2
Spdl No.	25	26	27	28	29	30		
No. of defective	2	3	2	1	6	4		

Draw the control chart.

(b) Following data is available: **06**

Mean Count = 36.2, SD = 0.5 No. of tests = 40, Calculate

(i) No. of tests having count < 35.5

(ii) No. of tests having count > 36.9

(iii) No. of tests having count between 35.5 & 36.9

t table at -1.4 = 0.081, +1.4 = 0.919

Q.5 **(a)** (i) Why ANOVA is considered the most powerful tool for testing the significance of several means? **07**

(ii) Why Latin square design is better than randomized block design?

(iii) Define random sample and stratified random sample.

(b) 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

OR

Q.5 **(a)** Derive an equation of Coefficient of Correlation (r) **07**

(b) Write in short on various types of statistical designs of experiment used along with merits. **07**

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