GUJARAT TECHNOLOGICAL UNIVERSITY ME – SEMESTER-1 (NEW) EXAMINATION – WINTER 2016

Subject Code: 2712507 Date:03/01/2017 Subject Name: Statistical Techniques & Design of Experiment Time: 2:30 pm to 5:00 pm **Total Marks: 70 Instructions:**

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 State the steps in planning of an experiment. Following table gives 14 cotton yield for the fertilizer treatment arranged in latin square design. Test for significance of column, row & treatment effect at 5% & 1% level. It is a(5X5) latin square design, Origin is 35

		Colum	ns		
Rows	1	2	3	4	5
1	-1 (C)	-14 (A)	17 (E)	-11(B)	05 (D)
2	-2 (B)	10 (E)	12 (D)	-9 (C)	10 (A)
3	-4 (A)	03 (C)	-1 (B)	04 (D)	03 (E)
4	09 (E)	06 (D)	-3 (C)	-18 (A)	04 (B)
5	-2 (D)	00 (B)	-9 (A)	11 (E)	00 (C)

Table value for 5% is 3.26 & 1% level is 5.41. Offer your conclusion

Q.2 A large no. of warp cones was tested for quality for 10 days. Nearly 07 (a) 200 cones were selected at random for each day. Inspection results are as follows:

Day	1	2	3	4	5	6
No. of defective cones	8	11	5	4	7	11
Day No. of defective cones	7 23	8 12	9 10	10 5		

Construct suitable control chart and give your comments.

- State the properties of normal distribution. 07 **(b)** (i) (ii)
 - Define treatment & replication.

OR

- Define producer risk and consumer risk. **(b)** (i) 07 State the properties of OC curve. (ii)
- Following table gives values for weight loss for a polyester staple fiber Q.3 07 (a) treated with base hydrolysis. Examine using ANOVA(one way) whether the base concentration has any influencing effect on weight loss percent.

	Base Concentration				
	2%	4%	6%		
Observation no.					
1	8	7	12		
2	6	5	14		
3	5	5	12		
4	7	6	10		
5	7	6	14		

F value at 5% is 3.88 & at 1 % is 6.93

(b) Draw the AOQ (Average out going quality) curve and calculate 07 required constant from following data:

P= 0.01,	P2 = 0.02
$\alpha = 0.10$	$\beta = 0.10$
h1=h2=1.32,	S = 0.025

ОП

Q.3	(a)	OR Following table shows lea strength in lbs with origin as 70 lbs.						07			
		Mixing									
				Α		В		С	D		
		Ring Frame									
		1		1	1	9		14	8		
		2		13	3	9		13	8		
		3		1()	11		14	7		
		4		1	1	11		11	6		
		5		12	2	8		15	7		
		6		1	1	8		14	8		
		Conduct AN differ signifi ring frame. Table values	OVA (cantly i for (3,1 (5,15	Two wa n terms 5 d.f.) fo d.f.) fo	ay class s of lea for 5% i r 5% is	sificatio strengt s 3.29 & 2.90 &	n) and h. Alsc & for 1% for 1%	test wh o check 6 is 5.42 is 4.56	ether n the eff 2	ect of	
	(b)	Define PMD strength for	, SD an 10 samp	d CV%. les:	. Calcul	ate SD	from fo	llowing	g data of	f cloth	07
		42, 39, 4	5, 47,	38,	39, 40	5, 44,	41,	37			
Q.4	(a)	Give the reg change in ter	ression sion fro	equatio m follo	on for the wing:	ne data	of char	nge in 1	nodulus	s with	07
		$\frac{1}{2} \frac{1}{2} \frac{1}$	J 20.1	/ 22.1	9	10	24.0	12	15		
	(b)	Find coeffici	50.1	32.1 orrolotic	52.2	32.9 oon foll	54.9 owing t	54.7	55.5		07
	(D)				on betw		owing t	wo proj	perties 70	70	07
		A 09 00 D 92 01 5	74 97	05 75	03 72 5	05	00 70 5	07 75	12 77 5	79 01	
		D 62 91.3	04	15	/3.5		70.5	15	11.5	04	
Q.4	(a)	Define correlation and regression. What are the types of correlation? Also write on its properties.							07		
	(b)	Derive the Karl Pearson equation for coefficient of correlation r 07									07
Q.5	(a)	 200 single thread strength tests are made on a yarn. The mean strength is 220 grms and the SD is 30. Calculate: (i) CV% (ii) The no. of specimen having strength between the limit mean of ± 1.96 SD (95%) (iii) The no. of specimen having strength below the value mean of ± 1.06 SD 							07		
	(b)	Write notes of	$n 2^n$ fac	ctor exp	eriment	•					07
Q.5	(a)	OR Following are the mean and R values of subgroup of 5 readings.							07		
		Subgroup	1	2	3	4	5	6	7		
		Mean	34	31.6	30.8	33	35	32.2	33		
		R	4	4	2	3	5	2	5		
		Subgroup	8	9	10	11	12	13	14		
		Mean	32.6	33.8	37.8	35.8	38.4	34	35		
		R	13	19	6	4	4	14	4		

Subgroup	15	16	17	18	19	20
Mean	33.8	31.6	33	28.2	31.8	35.6
R	7	5	5	3	9	6

Determine control limit or mean and R chart. Eliminate all out of control points.

(b) Explain randomized block design. Why Latin square design is better 07 than randomized block design?
