Seat No.:	Enrolment No.
JCUL 110.1	Lili dilicit no

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E SEMESTER – I • EXAMINATION – WINTER • 2014				
Subject code: 710906N Subject Name: Robust Design Time: 10:30 am - 01:00 pm Total Ma Instructions:		-2014		
		0:30 am - 01:00 pm Total Mark	Marks: 70	
inst	1. 2.	Attempt all questions.		
Q-1	(a)		07	
	(b)	blockingö inthe context of design of experiments õThough either a two level full factorial or a two level half fractional factorial design can be used as a screening experiment fractional factorial design is preferred.ö Evaluate this statement. Explain, with the help of a suitable example, why central points are added to a 2 ^k experimental design?	07	
Q-2	(a)	With the help of a suitable example explain the following terms: (a) Main effects (b) interaction	07	
	(b)	With the help of a suitable example explain the following terms: (a) Characterizing a process (b) Optimizing a process OR	07	
	(b)	Write down the one half fraction of the 2 ³ factorial design taking ABC as the generator. What you mean by aliases? Write down all the aliases of the 2 ³⁻¹ fractional design.	07	
Q-3	(a)	An article in Solid State Technology describes the application of factorial designs in developing a nitride etch process on a single wafer plasma etcher . The process uses C_2F_6 as the reactant gas. It is possible to vary the gas flow, the power applied to the cathode, the pressure in the reactor chamber, and the spacing between the anode and the cathode (gap). Response is etch rate in (A^0 /min). There is an original unreplicated 2^4 design to which 4 center points have been added. Average of reponses at four centre points is 752.75 and average of 16 factorial points is 776.0625. Mention the DOE table and estimate the	07	
	(b)	curvature sum of squares. With the help of a suitable example explain the term õTaguchi Lossfunctionö. How significant is this concept in the context of ensuring quality of the product	07	
Q-3	(a)	What is loss function? With the help of suitable examples explain the following loss functions with regards to Taguchi philosophy:	07	
	(b)	(i)Nominal is the best (ii) lower is better (iii) higher is better What is signal-to-noise ratio? Explain the terms (i) inner array (ii) outer array (iii) crossed array design.	07	

Q-4	(a)	Explain the following terms citing suitable examples:	07
		(i) full factorial design (ii) one-half factorial design	
	(b)	Explain the meaning and significance of each entity of ANOVA table.	07
		OR	
Q-4	(a)	Explain the procedure to be adopted, in detail, to identify the optimal	07
		region for a response surface model	
	(b)	Explain Blocking and Confounding in 2 ^k design	07
Q-5	(a)	Explain the response surface approach to robust design	07
	(b)	What is six sigma approach? Explain about six sigma project teams	07
		OR	
Q-5	(a)	Explain simple linear regression model. Explain how can one estimate	07
		regression parameters for this model?	
	(b)	Explain about the principles of six sigma implementation	07
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