Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I (OLD course)• EXAMINATION – SUMMER 2015

Subject Code: 710906 **Date: 16/05/2015**

Subject Name: ROBUST DESIGN

Time: 10:30 am to 1:00 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	**(a)**	With a suitable example explain the term óRobust Designô	**07**
	(b)	Explain the importance of quality in Engineering practice and what efforts can be made for improving the quality?	**07**
Q.2	**(a)**	Differentiate between first order and second order models.	**07**
	(b)	What do you mean by ANOVA? Explain various elements of the ANOVA table. How it could be used to establish significance of factors and interactions?	**07**
		OR	
	(b)	Explain, citing suitable example, why fractional factorial designs are used instead of full factorial design	**07**
Q.3	**(a)**	What is signal-to-noise ratio? Explain the terms (i) inner array (ii) Outer array (iii) crossed array design.	**07**
	(b)	Explain the following terms citing suitable examples: (i) full factorial design (ii) one-half factorial design.	**07**
		OR	
Q.3	**(a)**	Explain the terms (i) statistical hypothesis (ii) means model and effects Model.	**07**
	(b)	Citing suitable example explain the terms ñRandomization and blockingò in the context of design of experiments.	**07**
Q.4	**(a)**	What are the three stages of design developed by Taguchi for product development and explain any one of them giving a suitable example.	**07**
	(b)	What is loss function? With the help of suitable examples explain the following loss functions with regards to Taguchi philosophy: (i)Nominal is the best (ii) lower is better (iii) higher is better.	**07**
		OR	
Q.4	**(a)**	Explain Training Scheme and Measurement System.	**07**
	(b)	Explain the term six sigma quality with the help of frequency chart.	**07**
Q.5	**(a)**	Explain with a suitable example, how to create an on-half fraction of a 2^4 design. Also specify the principal and complimentary fraction.	**07**
	(b)	Explain split-plot design and nested design giving one appropriate example.	**07**

OR

Q.5	**(a)**	What do you understand by confounding? Explain its importance in design of experiments with the help of a appropriate example.	**07**
	(b)	Explain the meaning and significance of the ñThe Method of steepest Ascentò	**07**

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