Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER III (NEW) – EXAMINATION – WINTER-2016

Subject Code: 2732806 **Date:25/10/2016**

Subject Name: Design of Experiment

Time:02:30 pm to 05:00 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)**	Explain about the importance of Design of Experiment in Production Engineering.	**07**
	(b)	State the expressions for null and alternative hypothesis and interpret them.	**07**
Q.2	**(a)**	Give short note on random variables.	**07**
	(b)	Explain t-distribution in brief.	**07**
		OR	
	(b)	Explain normal distribution in brief.	**07**
Q.3	**(a)**	Give short note on Central Limit Theorem.	**07**
	(b)	An "ABC" company is making energy drink and filling 3 pound of energy drink in each energy drink can as per its label on can and historical data suggests the population standard deviation is 0.18 pound for the same. Now, a director of "XYZ" Trade Commission wants to conduct the test for the claims that "ABC" make about their product by using "p-value" approach. For the same a director of "XYZ" trade commission starts the test on the sample of 36 cans and found the mean weight as 2.92 pound. With 0.01 level of significance does the director has sufficient statistical evidence to do the claim on manufacturer of energy drink? Also find the observed level of significance. [$Z_{-2.67}$=0.0038]	**07**
		OR	
Q.3	**(a)**	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**
	(b)	Explain about Type-I and Type-II errors in hypothesis testing for the conclusions null hypothesis rejected and null hypothesis fail to reject.	**07**
Q.4	**(a)**	Explain citing suitable example, why fractional factorial designs are used instead of full factorial design.	**07**
	(b)	Explain about cross-sectional and time series data.	**07**
		OR	
Q.4	**(a)**	Differentiate between first order and second order models. When will you go for a central composite design?	**07**
	(b)	Explain about mandatory assumptions for Analysis of Variance.	**07**
Q.5	**(a)**	Explain the Box Behnken experimental design in factorial experiment.	**07**
	(b)	Explain about Blocking and Response surface in brief with neat sketches.	**07**
		OR	
Q.5	**(a)**	Giving suitable expressions, state how one can fit a regression model.	**07**
	(b)	Explain the procedure to be adopted in detail, to identify the optimal region for a response surface model.	**07**

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