Duration: 3hrs **[Max Marks: 80]**

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) **Assume suitable data, if required and state it clearly**.

Q.1) Explain any four of the following. **20**

1. Write briefly guidelines for Design of Experiment.
2. Explain Signal to Noise ratio.
3. How will you test Hypothesis using T-Test.
4. Explain One Half fraction of 2^k Design.
5. Explain Taguchi Loss Function.

Q.2) Explain the following. **20**

1. The following are the burning times (in minutes) of chemical flares of two different formulations. The design engineers are interested in testing the mean burning times of both the flares. Test the hypothesis that the mean burning times are equal. Use $\alpha = 0.05$.

Type 1		Type 2	
65	82	64	56
81	67	71	69
57	59	83	74
66	75	59	82
82	70	65	79

2. Explain the Addition of center Points to the 2k Design.

Q.3) Explain the following. **20**

1. Explain the Taguchi Methodology in details.
2. Define Latin square design. Give an example of Latin square of order 4. Mention the Advantages and disadvantages of a Latin square design.

Q.4) Explain the following. **20**

1. The breaking strength of a fiber is required to be at least 150 psi. Experience has indicated that the standard deviation of breaking strength is $\sigma = 3$ psi. A random sample of four specimens is tested. The results are y1=145, y2=153, y3=150 and y4=147.State the hypotheses that you think should be tested in this experiment. Test these hypotheses using $\alpha = 0.05$. What are your conclusions? Construct a 95 percent confidence interval on the mean breaking strength.
2. Explain Response Surface Methodology.

Q.5) Explain the following. **20**

1. List the Various types of Shainin Tools. Explain Any one of them in Details.
2. Explain a Single Replicate of 2k Design.

Q.6) Explain the following. **20**

1. Explain in details procedure for testing the Hypothesis.
2. Explain Multiple linear regression model.

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