(3 Hours) **Total Marks: 80**

Note:

1. **Question No. 1 is compulsory**.
2. Attempt any **THREE** out of the remaining **FIVE** questions.
3. Assume suitable data if necessary.

Q. 1. Answer **any FOUR** of the following: (20)

(a) What are the key, main, and interaction effects in the process? Give an example.

(b) What is Strategy of Experimentation?

(c) Discuss on : Residual plots in Regression Analysis.

(d) What are the Applications of Response Surface Method?

(e) What is Design of Experiments? Describe in short the different factors and level selection for "Making Tea at home".

Q. 2. (a) The values of y and their corresponding values of y are shown in the table below: (10)

x	1	2	3	4
y	34	45	66	85

a) Find the least square regression line y = a x + b.
b) Estimate the value of y when x = 10.

(b) What is Hypothesis Testing? What are the types of errors in Hypothesis testing? (10)

Q. 3. (a) What is the procedure for estimating the parameters in Linear Regression Model? Explain with an example. (10)

(b) Develop the Analysis of Variance for a 3^3 Factorial design (10)

Q. 4. (a) An experiment was conducted in measurement of temperature using thermometer setup. There are two controllable variables viz. A(Current in (10)

A	B	Reading 1	Reading 2
1	1	100	175
1	2	150	126
1	3	180	155
2	1	185	122
2	2	190	153
2	3	220	180
3	1	250	185
3	2	290	190
3	3	300	220

Amp.) and B(Time of heating in min.) The response variable is the temperature measurement of heated wire whose readings are given in the above table.

1. Calculate average response of factors

2. Using robust design approach, find the optimal combination of factors. (Use Larger- the- Better) criteria.

(b) Write short notes on: OFAT designs and its advantages. (10)

Q. 5. (a) Give the differences between Replication, Randomization and Blocking in Experimental Design. (10)

(b) Explain general steps involved in the Taguchi Method. What is Taguchi's Loss Function? (10)

Q. 6. **Attempt the following:-** (20)

(a) Explain: Confidence intervals in regression

(b) Write short notes on: OFAT designs and its advantages.

(c) Give Typical applications of Experimental Design.

(d) Write short notes on Resolution III, IV and V Designs.

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