TIME:3 Hours   **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 is Taguchi's Robust Design?

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

(c)   What is Strategy of Experimentation?

(d)   What are factorial experiments? Define main effects and interaction effects?

(e)   Give Typical applications of Experimental Design. What is Design of Experiments?

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

x	20	40	50	90	100
y	50	70	100	120	200

a) Find the least square regression line $y = a x + b$.
b) Estimate the value of y when $x = 320$.

(b)   Discuss the procedure of testing factorial effects A, B and AB in 2^2 (10)
experiment

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

(b)   With suitable illustrations, explain how will you conduct single factor   (10)
experiment?

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

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

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A	B	Reading 1	Reading 2
1	1	189	189
1	2	155	155
1	3	175	189
2	1	178	155
2	2	189	175
2	3	155	178
3	1	175	155
3	2	175	175
3	3	175	153

(b)   Explain: multiple regression Analysis and its applications   (10)

Q. 5. (a) Discuss on : Residual plots in Regression Analysis.   (10)

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

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

(a) List potential sources of variability in Scoring higher marks in exams that would impact the response..

(b) Give the differences between Replication, Randomization and Blocking in Experimental Design

(c) Show the design of one-half fraction of 2k design

(d) Explain: Confidence intervals in regression

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