Roll No. | | | | | | | | | | | | Total No. of Pages : 03

Total No. of Questions : 08

M.Tech. (ME) (Sem–2)

RESEARCH METHODOLOGY

Subject Code : MTME-201

M.Code : 74977

Date of Examination : 07-06-2023

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. a) Enlist various objectives of research. Discuss the steps involved in writing such a research report.

   b) Give various methods for calculating the sample size. Distinguish between restricted and non-restricted sampling.

2. a) Classify the various research designs with the help of examples.

   b) Give the significance of literature review in research. Distinguish clearly between primary and secondary data.

3. a) Differentiate between replication, randomization and blocking.

   b) Explain the statistical model for the two-factor factorial design.

4. a) How can SPSS help in documenting the data?

   b) Give the procedure for comparison of regression coefficients between two groups in SPSS?

   c) What is "IF function" in Excel?

   d) Explain few useful functions in Excel.

5. An experiment was conducted with seven main factors (A, B, C, D, E, F and G) using L_8 OA and the following data was collected (Table below). Assuming larger-the better type quality characteristic, compute S/N ratios and identify optimal levels for the factors. The results (response) from two replications are given in table below.

Trial No.	Factors/Columns							Results		
	A	B	C	D	E	F	G	R_1	R_2	R_3
	1	2		4	5	6	7			
1	1	1	1	1	1	1	1	11	4	11
2	1	1	1	2	2	2	2	4	4	4
3	1	2	2	1	1	2	2	4	1	14
4	1	2	2	2	2	1	1	4	0	8
5	2	1	2	1	2	1	2	9	8	4
6	2	1	2	2	1	2	1	4	1	1
7	2	2	1	1	2	2	1	1	4	4
8	2	2	1	2	1	1	2	14	4	8

Determine the average response for each factor level and identify the significant effects.

6. An experiment was conducted to study the effect of seven main factors (A, B, C, D, E, F and G) each at two levels using L_8 OA. The results (response) from two replications are given in table below.

Trial No.	Factors/Columns							Results	
	A	B	C	D	E	F	G	R_1	R_2
	1	2	3	4	5	6	7		
1	1	1	1	1	1	1	1	11	11
2	1	1	1	2	2	2	2	4	4
3	1	2	2	1	1	2	2	4	10
4	1	2	2	2	2	1	1	4	8
5	2	1	2	1	2	1	2	9	4
6	2	1	2	2	1	2	1	4	3
7	2	2	1	1	2	2	1	1	4
8	2	2	1	2	1	1	2	10	8

Determine the average response for each factor level and identify the significant effects.

7. Use the data from table below 2^3 design and fit a first-order model.

Factors			
X_1	X_2	X_3	Y
-1	-1	-1	31
-1	-1	-1	43
-1	1	-1	34
-1	1	-1	47
-1	-1	1	45
-1	-1	1	37
-1	1	1	50
1	1	1	41

8. **Write short note on :**

a) Salient features of a MATLAB software

b) Response, Effect, Factor, Treatment in DOE

c) Intellectual Property Rights

d) Plagiarism tools

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.