Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 08

M.Tech. (Mechanical Engineering) (Sem.–2)

RESEARCH METHODOLOGY

Subject Code : MTME-201

M.Code : 74977

Date of Examination : 24-12-22

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. Describe in detail with the help of a flowchart the different steps involved in a research process.

2. Investigate in detail the various methods of datacollection.

3. Explain the terms: Response, Effect, Factor, Treatment in the context of Design of Experiments. Differentiate between Replication, Randomization and Blocking.

4. a) Enlist the steps to perform ANOVA contrasts in SPSS.

   b) Give the procedure to see the number of missing values and patterns of missing values in the data file.

   c) Give the concept of function and formula in MS-Excel.

   d) State the significance of "*IF function*" in Excel.

5. Using the data from the Table given below, 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

6. An industrial engineer wants to study a manual welding process with factors each at two levels. The factors are welding current (A), welding time (B), thickness of plates (C), type of welding (D), and operator (E). In addition, he wants to study interactions AB, AE, BD, BE, CE and DE. Design an Orthogonal Array (OA) experiment.

7. An engineer is interested in the effects of cutting speed (A), tool geometry (B), and cutting angle (C) on the life (in hours) of a machine tool. Two levels of each factor are chosen, and three replicates of a 2^3 factorial design are run. The results follows :

			Treatment	Replicate		
A	**B**	**C**	**Combination**	**I**	**II**	**III**
–	–	–	(1)	22	31	25
+	–	–	a	32	43	29
–	+	–	b	35	34	50
+	+	–	ab	55	47	46
–	–	+	c	44	45	38
+	–	+	ac	40	37	36
–	+	+	bc	60	50	54
+	+	+	abc	39	41	47

Estimate the factor effects. Which effects appear to be large?

8. Write short note on :

a) Research ethics

b) Reproducibility

c) Mini Tab software

d) Plagiarism tools

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.