



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, M.Tech. - Mechanical Engineering (MCIM)

Semester End Examination; May / June - 2019

Statistical Modeling and Experimental Design

Time: 3 hrs

Max. Marks: 100

Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. Discuss the normal distribution with a neat sketch. 10
- b. Compare the population with sample. 10
- 2 a. Explain the various measures of control tendency with appropriate formula. 10
- b. Determine the average, median, mode range and standard deviation for the height of seven people. Data are: 1.83, 1.91, 1.78, 1.80, 1.83, 1.85, 1.87 meters. 10

UNIT - II

- 3 a. What are the primary statistical tools that cover all facets of design, testing and production? Explain them briefly. 10
- b. Explain the strategy of experimentation in detail. 10
- 4 a. What are the different applications of experimental design? Briefly explain. 10
- b. Discuss the three basic principles of experimental design. 10

UNIT - III

- 5 a. Define the following terms : 10
 - i) Factor
 - ii) Level
 - iii) Replicate
 - iv) Randomization
 - v) Orthogonal array
- b. Discuss the advantages of factorial design. 10
6. Consider an experiment on the volatility of a fluid with two factors, concentration (Factor A) and temperature (Factor B). Determine the significance of each factor for a level of $\alpha = 0.05$. The results of the experiment are given in the following table :

Factor A levels	Factor B levels		
	1	2	3
1	41,38	43,49	46,47
2	42,43	46,45	48,49

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UNIT - IV

7. Explain the linear regression with appropriate equations. 20

8. A firm believes that its annual profit depends on its expenditures for research. The information for the preceding six year is given below. Estimate the profit when the expenditure is 6 units.

Year	Expenditure for Research (x)	Annual Profit (y)
1989	2	20
1990	3	25
1991	5	34
1992	4	30
1993	11	40
1994	5	31
1995	6	?

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UNIT - V

9. What is S/N ratio? Discuss the different S/N ratios in brief.
10. A bread-staffing producer is comparing the calorie content of the original process with a new process. Which has the lower content and what is the difference?

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Results are :

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Original 130 135 128 127

Light 115 112 120 113

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