U.S.N [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

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

(An Autonomous Institution affiliated to VTU, Belgaum)

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

Semester End Examination; Dec - 2016/Feb - 2017

Statistical Modeling and Experimental Design

Time: 3 hrs   *Max. Marks: 100*

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.
    ii) Use of Statistical Table is permitted.
    iii) Assume missing data, if any.

UNIT - I

1. Prove that given frequency distribution is symmetrical by proving Mean, Median and Mode is same for the following data.   20

Classes	02 - 06	06 - 10	10 - 14	14 - 18	18 - 22	22 - 26	26 - 30
Frequency	2	8	12	20	12	8	2

2. Explain the concepts of,   20

    i) Random variable   ii) Sample and Population   iii) Sampling and Non-Sampling Error.

UNIT - II

3. Discuss the applications of experimental design.   20

4. Detail guidelines for designing experiments.   20

UNIT - III

5. Discuss the advantages of factorial design.   20

6. The data table presented below represents tire wear in units of 10,000 units. Test is there any significant difference speed and wear. The randomized block design may be carried out with $\alpha = 0.01$.   20

Supplier	Speed		
	Slow	Medium	Fast
1	3.7	4.5	3.1
2	3.4	3.9	2.8
3	3.5	4.1	3.0
4	3.2	3.5	2.6
5	3.9	4.8	3.4

UNIT - IV

7.   Explain the linear and multiple regression analysis with suitable examples.   20

8.   During the reliability study, the sample usage of all bearings (in hours) and surface wear (TIR in units) is presented in below Table. Develop the linear regression line using least square method. Also estimate the surface wear if the usage of ball bearings (in hours) is 85 hours.

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Usage (Hours)	23	29	29	35	42	46	50	54	64	66	76	78
Surface Wear (TIR in units)	69	95	102	118	126	125	138	178	156	184	176	225

UNIT - V

9.   Explain S/N Ratios for Static problems.   20

10. Explain S/N Ratios for Dynamic problems.   20

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