M. Tech.-III (Mechanical CAD/CAM) (CBCS – 2015 Course) :
WINTER - 2018
SUBJECT: ELECTIVE-II (D) DESIGN OF EXPERIMENT

Day : Thursday
Date : 06/12/2018

W-2018-3259

Time: 11.00 AM TO 02.00 PM
Max. Marks: 60.

N.B.:

1) All questions are **COMPULSORY.**
2) Figures to the **RIGHT** indicate full marks.
3) Draw neat labeled diagrams **WHEREVER** necessary.
4) Both the sections should be written in **SEPARATE** answer books.

SECTION-I

Q.1 Explain with block diagram general model of a process or system. **(10)**

OR

Explain with suitable example, mechanistic model and empirical model.

Q.2 Suppose that we are testing $H_0 : \mu_1 = \mu_2$ versus $H_0 : \mu_1 \neq \mu_2$ where the two sample sizes are $n_1 = n_2 = 12$. Both sample variances are unknown but assumed equal. Find bounds on the P-value for the following observed values of the test statistic. **(10)**

a) $t_0 = 2.30$ **(b)** $t_0 = 3.41$ **(c)** $t_0 = 1.95$ **(d)** $t_0 = -2.45$

OR

Explain the terms discrete, continuous probability distributions, Mean, Variance and expected values.

Q.3 Describe Decomposition of the Total Sum of Squares: **(10)**

OR

An experiment was run to determine whether four specific firing temperatures affect the density of a certain type of brick. the experiment led to the following data:

Temperature	Density				
100	21.8	21.9	21.7	21.6	21.7
125	21.7	21.4	21.5	21.4	-
150	21.9	21.8	21.8	21.6	21.5
175	21.9	21.7	21.8	21.4	-

P.T.O.

SECTION-II

Q.4 Does the firing temperature affect the density of the bricks? Use α = 0.05. The factors that influence the breaking strength of a synthetic fiber are being studied. Four production machines and three operators are chosen and a factorial experiment is run using fiber from the same production batch. The results are as follows: **(10)**

Operator	Machine			
	1	2	3	4
1	109	110	108	110
	110	115	109	108
2	110	110	111	114
	112	111	109	112
3	116	112	114	120
	114	115	119	117

Analyze the data and draw conclusions. Use $\alpha = 0.05$.

OR

Explain the statistical analysis of fixed effect model.

Q.5 Explain the term R^2 and PRESS statistics. **(10)**

OR

Construct a 2^{7-2} design by choosing two four-factor interactions as the independent generators. Write down the complete alias structure for this design. Outline the analysis of variance table. What is the resolution of this design?

Q.6 Explain the method of Steepest Ascent. **(10)**

OR

Write short note on location of the Stationary Point.

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