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Reg. No. :

Question Paper Code: 55P22

Ph.D COURSE WORK EXAMINATION, APRIL 2019

Elective

CAD / CAM

15PCD522 - DESIGN AND ANALYSIS OF EXPERIMENTS

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1. (a) Prove a necessary and sufficient condition of estimability. If $e0\beta$ and $m0\beta$ are estimable, find $V(e0\hat{\beta})$ and covariance $(e0\beta, m\hat{\,}0\hat{\beta})$, where $\hat{\beta}$ is the least square estimate of β.   CO1-Ana   (20)

Or

   (b) Let $X_1, X_2, \ldots, X_N$ be independent, uniformly distributed, random k digit integers (that is, less than $10k$). Find the probability of having no duplicates in N draws.   CO1-Ana   (20)

2. (a) An experimenter randomly allocated 125 male turkeys to five treatment M groups: control and treatments A, B, C, and D. There were 25 birds in each group, and the mean results were 2.16, 2.45, 2.91, 3.00, and 2.71, respectively. The sum of squares for experimental error was 153.4. Test the null hypothesis that the five group means are the same against the alternative that one or more of the treatments differs from the control.   CO2-App   (20)

Or

   (b) Consider replicating a six by six Latin Square three times, where we use the same row blocks but different column blocks in the three replicates. The six treatments are the factorial combinations of factor A at three levels and factor B at two levels. Give the sources and degrees of freedom for the Analysis of Variance of this design.   CO2- U   (20)

3. (a) Explain Yates procedure for obtaining the various effect total in a 23 factorial experiment.   CO3-U   (20)

Or

(b) Describe the experimental procedure for 2^K factorial experiments.   CO3-U   (20)

4. (a) Consider the data in problem 14 a. Suppose AC is confounded in replicate and ABC confounded in replicate R2 . Analyze the data and draw conclusions.   CO4-Ana   (20)

Or

(b) Explain response surface methodology? Discuss approximate F test.   CO4-Ana   (20)

5. (a) Let $y = X\beta + \varrho$, where ϱ is iid $N(0, \sigma2)$; y is N by 1, X is N by p, and β is p by 1. Let g be any N by 1 vector. What is the distribution of $(g'y)2$? What, if anything, changes when $g'X$ is zero.   CO5-App   (20)

Or

(b) Develop the analysis of covariance for randomized block design with one concomitant variable, stating clearly the assumptions.   CO5-App   (20)

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