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Question Paper Code: 52103

M.E. DEGREE EXAMINATION, MAY 2017

Elective

CAD / CAM

15PCD522 - DESIGN AND ANALYSIS OF EXPERIMENTS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

(5 x 20 = 100 Marks)

1. (a) What is the name of a Design of experiments in which all levels of a given factor are combined with all levels of every other factor in the experiment (all possible Combinations of the levels of the factors are investigated.). (20)

Or

- (b) Let X_1, X_2, \dots, 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. (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. (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. (20)
3. (a) In the case of two associate class PBIBD, define the parameters and develop the intra-block analysis using a suitable model. (20)

Or

- (b) Explain Yates procedure for obtaining the various effect total in a 2^3 factorial experiment. (20)
4. (a) Explain response surface methodology? Discuss approximate F test. (20)

Or

- (b) Yellow perch and ruffe are two fish species that compete. An experiment is run to determine the effects of fish density and competition with ruffe on the weight change in yellow perch. There are two levels of fish density (low and high) and two levels of competition (ruffe absent and ruffe present). Sixteen tanks are arranged in four enclosures of four tanks each. Within each enclosure, the four tanks are randomly assigned to the four factor-level combinations of density and competition. The response is the change in the weight of perch after 5 weeks (in grams, data from Julia Frost). Analyze these data for the effects of density and competition. (20)

Ruffe	Density	Enclosure			
		1	2	3	4
Absent	Low	.0	.4	.9	-.4
	High	.9	-.4	-.6	-1.2
Present	Low	.0	-.4	-.9	-.9
	High	-1.2	-1.5	-1.1	-.7

5. (a) Construct a 2^5 design in blocks of 8 plots confounding ABC, ADE and BCDE. Give the analysis of such a design with r replications. (20)

Or

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