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**E Reg. No. :**

**Question Paper Code: 57P12**

Ph.D COURSE WORK EXAMINATION, NOV 2017

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)

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| 1. | (a) | From a production line 4 roller bearings were selected randomly and their diameters were measured. The results in cm were as follows: 1.0250 1.0252 1.0249 1.0249  Compute the sample standard deviation *s*. Compute the sample standard deviation of the mean *X*. | CO1-Ana | (20) |
|  |  | Or |  |  |
|  | (b) | Five groups of students in a class measured the distance between two points in the land-scape. The results were (meters):   * 1. 421.0 421.0 420.7 420.8   Find a 95%-con\_dence interval for the distance and state your assumptions made in doing this. | CO1-Ana | (20) |
|  |  |  |  |  |
| 2. | (a) | We wish to evaluate a new textbook for a statistics class. There are seven sections; four are chosen at random to receive the new book, three receive the old book. At the end of the semester, student evaluations show the following percentages of students rate the textbook as “very good” or “excellent”: Section 1 2 3 4 5 6 7  Book N O O N N O N  Rating 46 37 47 45 32 62 56  Find the one-sided randomization p-value for testing the null hypothesis that the two books are equivalent versus the alternative that the new book is better (receives higher scores). | CO2- U | (20) |
|  |  | Or |  |  |
|  | (b) | Park managers need to know how resistant different vegetative types are to trampling so that the number of visitors can be controlled in sensitive areas. The experiment deals with alpine meadows in the White Mountains of New Hampshire. Twenty lanes were established, each .5 m wide and 1.5 m long. These twenty lanes were randomly assigned to five treatments: 0, 25, 75, 200, or 500 walking passes. Each pass consists of a 70-kg individual wearing lug soled boots walking in a natural gait down the lane. The response measured is the average height of the vegetation along the lane one year after trampling. Data based on Table 16 of Cole. | CO2- U | (10) |
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| 3. | (a) | Explain the two factor factorial design? | CO3-U | (10) |
|  |  | Or |  |  |
|  | (b) | Describe the experimental procedure for 2K 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 | (10) |
|  |  | Or |  |  |
|  | (b) | Explain response surface methodology? Discuss approximate F test? | CO4-Ana | (20) |
|  |  |  |  |  |
| 5. | (a) | Let y = Xβ + ǫ, where ǫ is iid N(0, σ2); 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- U | (10) |
|  |  | Or |  |  |
|  | (b) | Construct a 25 design in blocks of 8 plots confounding ABC, ADE and BCDE. Gie the analysis of such a design with r replications. | CO5-App | (20) |
|  |  |  |  |  |