Indian Statistical Institute, Bangalore
MS (QMS) First Year
Second Semester - Statistics for Decision Making II

Final Exam — Date: May 08, 2019
Maximum marks: 50 — Duration: 3 hours

Note: This paper carries 60 marks. You may answer as many questions as you like, but your maximum score will be limited to 50. Marks allotted to each question is indicated in the right hand margin.

You may make any necessary assumption(s), wherever required.

1. What is a Statistical Test of Hypothesis? Give the basic steps for conducting a statistical test of Hypothesis. [10]

2. The diameters of steel shafts produced by a certain manufacturing process are known to have a standard deviation of 0.0001 inch. A random sample of 10 shafts has an average diameter of 0.2545 inches. Test the hypothesis that the true mean diameter equals 0.255 at 5% significance level. Construct a 90% confidence interval for the mean. [7 + 5 = 12]

3 The length of a product produced in Machine A has estimated mean 107 mm and estimated standard deviation 10 mm, on the basis of a random sample of size 16. The corresponding mean and standard deviation calculated from a random sample of size 14 from machine B are 112 mm and 8 mm. Test the hypothesis that two machines have equal mean [8]

4 A paper manufacturer has a new method of coating paper. The less variation in the weight of this coating, the more uniform and better the product. The following 10 sample coatings were obtained by the new method (data are given as coating weights per unit area x 100):

223, 215, 220, 238, 230, 234, 229, 223, 235, 227

If the standard deviation in the past was 9.3, is the proposed method any better? Should they switch to this method ? [8]

5 Two hundred bolts were selected at random from each of the four machines. The number of defective bolts found were 2, 9, 10, and 3. Determine whether there is a significant difference between the machines, using a significance level of 0.05 [10]

6. following table gives the data on *brightness* of dyed synthetic fabrics processed in a textile mill, collected under three different processing temperatures and two different processing times. Two observations are taken at each combination of temperature and time.

Time	Temperature		
	350^{o}C	370^{o}C	390^{o}C
40	38, 32	35, 40	39, 43
50	45, 40	42, 46	48,47

Construct the ANOVA table and conduct tests for Significance of

(i) Temperature effect
(ii) Time effect and
(iii) Interaction effect between temperature and time.

Chose level of significance = 0.05. [12]

*****