Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14MA2009** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STATISTICAL DATA ANALYSIS AND RELIABILITY ENGINEERING** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Find Correlation coefficient between X and Y.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 72 | | Y | 67 | 68 | 65 | 68 | 72 | 72 | 69 | 71 | | CO3 | 10 |
| b. | Fit a straight line to the following data and find the value of y at  x = 30.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | X | 5 | 10 | 15 | 20 | 15 | | Y | 15 | 19 | 23 | 26 | 30 | | CO3 | 10 |
| **(OR)** | | | | |
| 2. | a. | Fit a curve of the form y = abx to the following data.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X | 1 | 2 | 3 | 4 | 5 | 6 | | Y | 151 | 100 | 61 | 50 | 20 | 8 | | CO3 | 10 |
| b. | Find the two Regression Lines from the following data.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Y | 9 | 8 | 10 | 12 | 11 | 13 | 14 | | CO3 | 10 |
|  |  |  |  |  |
| 3. | a. | The heights of college students in a city are normally distributed with standard deviation 6cms. The mean height of a sample of 100 students is 158cms. Test whether the mean height of college students in the city is 160cms. | CO3 | 10 |
| b. | A sample of 1000 persons were taken and out of them 540 are vegetarians and the rest are Non vegetarians. Can we say that both habits of eating are equally popular in the city? | CO3 | 10 |
| **(OR)** | | | | |
| 4. | a. | A group of five patients treated with medicine A and their weights are 42,39,48,60 and 41. Second group of 7 patients were treated with medicine B and their weights are 38,42,56,64,68,69 and 62 kgms. Do you agree with the claim that on the average medicine B increases the weight significantly? | CO3 | 10 |
| b. | From the following table test whether consumption of tea and nationality are independent.   |  |  |  | | --- | --- | --- | |  | Indian | Non Indian | | Families consuming tea | 1236 | 164 | | Families not consuming tea | 564 | 36 | | CO3 | 10 |
|  |  |  |  |  |
| 5. |  | The following data represent the number of units of production per day turned out by 4 different workers using 4 different  machines. Analyze the variance and discuss the difference between a. Workers. b. Machines.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Workers | Machines | | | | | M1 | M2 | M3 | M4 | | E1 | 40 | 36 | 45 | 30 | | E2 | 38 | 42 | 50 | 41 | | E3 | 36 | 30 | 48 | 35 | | E4 | 46 | 47 | 52 | 44 | | CO1 | 20 |
| **(OR)** | | | | |
| 6. |  | Analyze the variance from the following Latin square Design.   |  |  |  | | --- | --- | --- | | A16 | B17 | C20 | | B16 | C21 | A15 | | C15 | A12 | B13 | | CO1 | 20 |
|  |  |  |  |  |
| 7. |  | The following table gives the sample mean and range of 10 samples, each of size 5 in a production process. Construct control charts of Mean and Range. Also comment on the nature of control of the process.   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Sample No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | Mean | 52 | 50 | 50 | 51 | 47 | 52 | 49 | 54 | 51 | 54 | | Range | 6 | 7 | 6 | 5 | 6 | 9 | 8 | 7 | 7 | 4 | | CO3 | 20 |
| **(OR)** | | | | |
| 8. |  | 10 samples each of size 50 were inspected and the numbers of defectives in the inspection were 2,1,1,2,3,5,5,1,2,3. Construct  p-chart and np- chart and comment on state of control of the process. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | The density function of time to failure of an appliance is  , t > 0 in years.  (i) Find the Reliability function.  (ii) Find failure rate.  (iii) Compute the mean time to failure. | CO2 | 10 |
| b. | Find Probability of acceptance of single sampling plan with n=64, c=1 , for the following lots  (i) p=1% defectives.  (ii) p=3% defectives.  (iii) p=5% defectives.  (iv) p=10% defectives. | CO3 | 10 |