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



**End Semester Examination – Nov/Dec - 2017**

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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)**

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| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Fit a straight line to the following data.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | X | 5 | 10 | 15 | 20 | 25 | | Y | 15 | 19 | 23 | 26 | 30 | | CO3 | 10 |
| b. | Fit a parabola to the following data .   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | X | 0 | 1 | 2 | 3 | 4 | | Y | 1 | 1.8 | 1.3 | 2.5 | 6.3 | | CO3 | 10 |
| (OR) | | | | |
| 2. | a. | Find equations of lines of Regression from the following data.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Y | 9 | 8 | 10 | 12 | 11 | 13 | 14 | | CO3 | 10 |
| b. | Find Rank correlation coefficient from the following data.   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 68 | 64 | 75 | 50 | 64 | 80 | 75 | 40 | 55 | 64 | | Y | 62 | 58 | 68 | 45 | 81 | 60 | 68 | 48 | 50 | 70 | | 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 heights of 6400 English men has mean of 170cms and standard deviation 6.4. While a sample of heights of 1600 Americans has a mean of 172cms and standard deviation 6.3. Do the data indicate that Americans are on the average taller than the Englishmen. | CO3 | 10 |
| (OR) | | | | |
| 4. | a. | Two independent samples of sizes 5 and 6 from a normal population have the following values of the variables. Do the estimates of population variance differ significantly at 5% level.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Sample I | 24 | 27 | 26 | 21 | 25 | | Sample II | 27 | 30 | 28 | 31 | 22 | 36 | | 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. |  | Four Doctors each test four treatments for a certain disease and observe the number of days each patient takes to recover. The results are given below. Analyse the variance to test the difference between i. Doctors ii. Treatments.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | Treatments | | | | | Doctor | I | II | III | IV | | A | 10 | 14 | 19 | 20 | | B | 11 | 15 | 17 | 21 | | C | 9 | 12 | 16 | 19 | | D | 8 | 13 | 17 | 20 | | CO1 | 20 |
| (OR) | | | | |
| 6. |  | Analyse the variance from the following latin square design and give your conclusion   |  |  |  | | --- | --- | --- | | A16 | B17 | C20 | | B16 | C21 | A15 | | C15 | A12 | B13 | | CO1 | 20 |
| 7. | a. | A machine fills boxes with dry cereal. 10 samples each of size 5 are taken randomly from the process and their mean and range are given below. Draw , R chart and comment on state of control.   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Sample number | 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 | | C03 | 15 |
|  | b. | Explain Six sigma quality with example. | CO3 | 5 |
| (OR) | | | | |
| 8. |  | A Sunflower oil manufacturing company has the following data during inspection of 10 samples of size 50 each from a lot. Sunflower oil is packed in packets and the packets with leakages are identified as defectives. Construct p-chart, np-chart and comment on state of control of the process   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Sample number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | Number of defectives | 2 | 1 | 1 | 2 | 3 | 5 | 5 | 1 | 2 | 3 | | CO3 | 20 |
|  | | **Compulsory:** |  |  |
| 9 | a. | The density function of time to failure in years of a product manufactured by a company is in years.   1. Derive the reliability function. 2. Compute failure rate. 3. Find MTTF. | CO2 | 10 |
|  | b. | 0.9  0.95  .85  0.9  .95  Find Reliability of the system whose block diagram is given above. | CO2 | 10 |

ALL THE BEST