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

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**End Semester Examination – Nov/Dec – 2018**

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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. | Find equations of lines of Regression from the following data.   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 25 | 28 | 35 | 32 | 31 | 36 | 29 | 38 | 34 | 32 | | Y | 43 | 46 | 49 | 41 | 36 | 32 | 31 | 30 | 33 | 39 | | 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 |
| (OR) | | | | |
| 2. | a. | 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 |
| b. | Fit a curve of the form y=axb to the following data.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | 1 | 2 | 3 | 4 | 5 | 6 | | y | 1200 | 900 | 600 | 200 | 110 | 50 | | CO3 | 10 |
|  |  |  |  |  |
| 3. | a. | In a random sample of 1000 persons from the city of Coimbatore, 400 were consumers of wheat. In a sample of 800 from the city of Madurai, 400 were consumers of wheat. Do these data, reveal a significant difference between the two cities so far as the proportion of wheat consumers is concerned. | CO3 | 10 |
| b. | The mean production of Rice of a sample of 100 fields is 200kg/acre and another sample of 150 fields gives the mean of 220 kg/acre. Assuming the S.D. of the population of the yield as11 kg.Test if there is any significant difference between means of the sample. | CO3 | 10 |
| (OR) | | | | |
| 4. | a. | Two independent samples of sizes 6 and 7 from a normal population have the following values of the variables. Do the estimates of population variance differ significantly at 5% level?   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Sample I | 20 | 16 | 26 | 27 | 23 | 22 | | Sample II | 27 | 33 | 42 | 35 | 32 | 34 | 38 | | CO3 | 10 |
| b. | The theory predicts the proportion of beans in the four groups A,B,C,D should be in the ratio 9:3:3:1. In an experiment with 1600 beans, the number in the four groups were 882,313,287 and 118. Does the experimental result support the theory? | 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.   |  |  |  |  | | --- | --- | --- | --- | | D122 | A121 | C123 | B122 | | B124 | C123 | A122 | D125 | | A120 | B119 | D120 | C121 | | C122 | D123 | B121 | A122 | | CO1 | 20 |
|  |  |  |  |  |
| 7. | a. | Construct and R chart from the following data. Comment on state of control of the process   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Sample Number | Measurements | | | | | | 1 | 46 | 45 | 44 | 43 | 42 | | 2 | 41 | 41 | 44 | 42 | 40 | | 3 | 40 | 40 | 42 | 40 | 42 | | 4 | 42 | 43 | 43 | 42 | 45 | | 5 | 43 | 44 | 47 | 47 | 45 | | CO3 | 15 |
| b. | Find Probability of acceptance of single sampling plan with n=64,c=1 (i) p=1% defectives (ii)5% defectives (iii)10% defectives | CO3 | 5 |
| (OR) | | | | |
| 8. | a. | 10 samples of 50 items each were drawn from the output of a process. The number of defective items in the samples are given below. Prepare ‘p’ chart and ‘np’ chart. 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 | 15 |
| b. | Draw flow chart of Double sampling plan. | CO3 | 5 |
|  | | **Compulsory**: |  |  |
| 9. | a. | The density function of time to failure in years of a product manufactured by a company is in years  i. Derive the reliability function.  ii. Compute failure rate.  iii. Find Mean Time to Failure. | CO2 | 10 |
| b. | Find Reliability of the system whose block diagram is given below.  C:\Users\PERSANAL\Desktop\reliab.png | CO2 | 10 |