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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April/May – 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 | 0 | 1 | 2 | 3 | 4 | | Y | 1 | 1.8 | 1.3 | 2.5 | 6.3 | | CO3 | 10 |
| b. | Fit a parabola to the following data   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | Y | 2 | 6 | 7 | 8 | 10 | 11 | 11 | 10 | 9 | | CO3 | 10 |
| (OR) | | | | |
| 2. | 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.     |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Rank in X | 1 | 6 | 5 | 10 | 3 | 2 | 4 | 9 | 7 | 8 | | Rank in Y | 3 | 5 | 8 | 4 | 7 | 10 | 2 | 1 | 6 | 9 | | CO3 | 10 |
| 3. | a. | In a sample of 1000 people, 540 are vegetarians and the rest are non vegetarians. Can you say that both habits of eating are equally popular in the city at (i)1%LOS (ii)5% LOS. | CO3 | 10 |
|  | b. | 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 |
| (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 table below gives the number of aircraft accidents that occurred during the various days of the week. Test whether accidents are uniformly distributed over the week.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Days of the week | MON | TUE | WED | THURS | FRI | SAT | | Number of accidents | 14 | 18 | 12 | 11 | 15 | 14 | | 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.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | Machines | | | | | Workers | A | B | C | D | | 1 | 44 | 38 | 47 | 36 | | 2 | 46 | 40 | 52 | 43 | | 3 | 34 | 36 | 44 | 32 | | 4 | 43 | 38 | 46 | 33 | | 5 | 38 | 42 | 49 | 39 |   Analyse the variance and discuss the difference between  a. Workers. b. Machines. | 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. | 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 | 43 | 49 | 37 | 44 | 45 | 37 | 51 | 46 | 43 | 47 | | Range | 5 | 6 | 5 | 7 | 7 | 4 | 8 | 6 | 4 | 6 | | CO3 | 15 |
|  | b. | Explain (i) Chance variation (ii) Assignable variation with example. | CO3 | 5 |
| (OR) | | | | |
| 8. |  | 15 samples of 200 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 |  | | Number of defectives | 12 | 15 | 10 | 8 | 19 | 15 | 17 |  | | Sample number | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | Number of defectives | 11 | 13 | 20 | 10 | 8 | 9 | 5 | 8 | | CO3 | 20 |
|  | | **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 MTTF. | CO2 | 10 |
|  | b. | .85  0.9  .95  0.9  0.95  0.9  Find Reliability of the system whose block diagram is given above. | CO2 | 10 |