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



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

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| **Code :** | **14MA3011** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BIOSTATISTICS AND QUALITY CONTROL** | **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. | Calculate mean median and mode of the following frequency distribution:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | CI | 0 -10 | 10 -20 | 20 - 30 | 30 - 40 | 40 - 50 | 50 - 60 | 60-70 | | Freq | 7 | 12 | 18 | 25 | 16 | 14 | 8 | | CO1 | 8 |
| b. | From the prices of shares of X and Y, find out which is more stable in value.   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 35 | 54 | 52 | 53 | 56 | 58 | 52 | 50 | 51 | 49 | | Y | 108 | 107 | 105 | 105 | 106 | 107 | 104 | 103 | 104 | 101 | | CO1 | 8 |
| c. | Find the harmonic mean of the following data   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | CI | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | | f | 4 | 6 | 10 | 7 | 3 | | CO1 | 4 |
| (OR) | | | | |
| 2. | a. | The incidence of a certain disease is such that, on the average of 20% of workers suffer from it. If 10 workers are taken at random, find the probability that i. atleast 2 workers suffer from the disease ii. not more than 2 workers suffer from the disease. | CO1 | 6 |
| b. | The distribution of typing mistakes committed by a typist is given  below. Assuming a Poisson mode, find out the expected frequencies:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | No. of mistakes per page | 0 | 1 | 2 | 3 | 4 | 5 | | No. of pages | 142 | 156 | 69 | 27 | 5 | 1 | | CO1 | 7 |
| c. | 1000 light bulbs with a mean life of 120 days are installed in a new factory; their length of life is normally distributed with standard deviation 20 days. How many bulbs will expire i. in less than 90 days ii. more than 90 days iii. between 75 and 90 days? | CO1 | 7 |
| 3. | a. | Random samples of 400 men and 600 women were asked whether they would like to have a school near their residence. 200 men and 325 women were in favour of the project. Test the hypothesis that the proportion of men and women in favour of the project are the same at i.1% ii. 5% level of significance. | CO2 | 10 |
|  | b. | A simple sample of heights of 6400 English men has a mean of 170 cm and standard deviation of 6.4 cm, while a simple sample of heights of 1600 Americans has a mean of 172 cm and an standard deviation of 6.3 cm. Do the data indicate that Americans are, on the average, taller than the English men? | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Two samples are drawn from two normal population. From the following data, test whether the two samples have the same variance at 5 % level:   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Sample1 | 17 | 27 | 18 | 25 | 27 | 29 | 27 | 23 | 17 | | Sample2 | 16 | 16 | 20 | 16 | 20 | 17 | 15 | 21 | - | | CO2 | 10 |
|  | b. | A manager of pizza hut was interested to determine whether sales of pizza is greater on one day of the week than another. His records from the past, shows the following result. Test whether sales of pizza is uniformly distributed over the week.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Days of the week | Mon | Tue | Wed | Thu | Fri | | No. of pizzas sold | 66 | 57 | 54 | 48 | 75 | | CO2 | 10 |
| 5. | a. | The following data represent the number of units of production per day turned out by 5 different workers using 4 different types of machines:  A B C D  1 44 38 47 36  2 46 40 52 43  Workers 3 34 36 44 32  4 43 38 46 33  5 38 42 49 39     1. Test whether the five men differ with respect to mean productivity. 2. Test whether the mean productivity is the same for the four different machine types. | CO2 | 15 |
|  | b. | Compare Randomised Block Design and Latin Square Design. | CO2 | 5 |
| (OR) | | | | |
| 6. | a. | Analyze the following results of a Latin square experiment :   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Column  Row | 1 | 2 | 3 | 4 | | 1  2  3  4 | A(12)  D(18)  B(12)  C(16) | D(20)  A(14)  C(15)  B(11) | C(16)  B(11)  D(19)  A(15) | B(10)  C(14)  A(13)  D(20) | | CO2 | 20 |
| 7. | a. | Briefly explain the types of control charts. | CO3 | 6 |
|  | b. | Construct  and R charts for the following data.   |  |  |  |  | | --- | --- | --- | --- | | Sample number | Observations | | | | 1 | 32 | 37 | 42 | | 2 | 28 | 32 | 40 | | 3 | 39 | 52 | 28 | | 4 | 50 | 42 | 31 | | 5 | 42 | 45 | 34 | | 6 | 50 | 29 | 21 | | 7 | 44 | 52 | 35 | | 8 | 22 | 35 | 44 |   (Given : for n = 3, A2 = 1.023, D3 = 0, D4 = 2.575) | CO3 | 14 |
| (OR) | | | | |
| 8. | a. | Discuss the advantages and disadvantages of Statistical Quality Control. | CO3 | 8 |
|  | b. | 20 pieces of cloth out of different rolls contained respectively 1,4,3,2,4,5,6,7,2,3,2,5,7,6,4,5,2,1,3,and 8 imperfections. Draw the appropriate control chart for defectives. Ascertain whether the process is in a state of statistical quality control. | CO3 | 12 |
|  | | **Compulsory:** |  |  |
| 9. | a. | For a sampling plan N = 1200, n = 64 and c = 1, determine the probability of acceptance of the following lots:  i. 0.5 % defective ii. 0.8 % defective iii. 1 % defective iv. 2% defective v. 4 % defective vi. 10 % defective. Also draw an OC curve. | CO3 | 10 |
|  | b. | The following is a double sampling plan:  where = the size of the lot, = the size of the first sample, = the maximum allowable number of defectives for acceptance on the basis of the first sample,  = the size of the second sample,  = the maximum allowable number of defectives for acceptance on the basis of two samples. Interpret the above plan and point out its superiority over a single sampling plan. | CO3 | 10 |

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