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



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

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| **Code : 14MA2008** |  | **Duration:** | **3hrs** |
| **Sub.Name : PROBABILITY AND STATISTICS** |  | **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 the Mean, Median and Mode for the following data:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Class Interval | 0 -10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | | Frequency | 6 | 20 | 44 | 26 | 3 | 1 | | CO2 | 10 |
| b. | Find the quartile deviation for the following data:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Marks | 0 -5 | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | | No of Students | 4 | 6 | 8 | 12 | 7 | 2 | | CO2 | 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 | | CO2 | 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 | | CO2 | 10 |
|  |  |  |  |  |
| 3. | a. | In a shooting test the probability of hitting the target is  for A,  for B and for C. If all of them fire at the target, find the probability that (i) none of them hits the target (ii) atleast one of them hits the target (iii) exactly two of them hit the target | CO1 | 10 |
| b. | A and B alternately throw a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, show that his chance of winning is. | CO1 | 10 |
| **(OR)** | | | | |
| 4. | a. | A discrete random variable X has the following frequency distribution.   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | P(x) | a | 3a | 5a | 7a | 9a | 11a | 13a | 15a | 17a |   (i) Find the value of ‘a’ (ii) Find P(X<3), P(0<X<3), P(X≥3)  (iii) Find the distribution function of X (iv) Find the mean of X. | CO1 | 10 |
| b. | A continuous RV X that can assume any value between x = 2 and  x = 5 has a density function given by. Find (i) the value of k (ii) (iii) mean and variance | CO1 | 10 |
|  |  |  |  |  |
| 5. | a. | Fit a binomial distribution to the following data and find the expected frequencies:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | | f | 5 | 18 | 28 | 12 | 7 | 6 | 4 | | CO1 | 10 |
| b. | A manufacturer knows that the condensers he made contain on the average of 1% defective. He packs them in boxes of 100. Use Poisson distribution to find the probability that a box picked at random will contain (i) exactly 3 defectives (ii) atleast 3 defective (iii) atmost 3 defective condensers. | CO1 | 10 |
| **(OR)** | | | | |
| 6. | a. | Fit a poisson distribution to the following data and find the theoretical frequencies.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | | f | 122 | 60 | 15 | 2 | 1 | | CO1 | 10 |
| b. | In a test of 2000 electric lamps it was found that the life of a particular brand was normally distributed with average life of 2040 hours and standard deviation of 60 hours. Estimate the number of lamps likely to burn for (i) more than 2150 hours (ii) less than 1950 hours (iii) between 1950 hours and 2150 hours. | CO1 | 10 |
|  |  |  |  |  |
| 7. | 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. | CO3 | 10 |
| b. | 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 |
| **(OR)** | | | | |
| 8. | a. | A group of 10 rats fed on diet A and another group of 8 rats fed on a different diet B recorded the following increase in weight.  Diet A : 5 6 8 1 12 4 3 9 6 10  Diet B : 2 3 6 8 10 1 2 8  Find if the variances are significantly different. | CO3 | 10 |
| b. | The table below gives the number of aircraft accidents that happen during the days of the week. Test whether the accidents are uniformly distributed over the week:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Days | Mon | Tue | Wed | Thurs | Fri | Sat | | No of accidents | 14 | 18 | 12 | 11 | 15 | 14 | | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. |  | Four doctors each test four treatments for a certain disease and observe the number of days each patient takes to recover. The results are as follows: (recovery time in days)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Treatment: | | | | | | Doctor | 1 | 2 | 3 | 4 | | A | 10 | 14 | 19 | 20 | | B | 11 | 15 | 17 | 21 | | C | 9 | 12 | 16 | 19 | | D | 8 | 13 | 17 | 20 |   Discuss the difference between (i) doctors and (ii) treatments. | CO3 | 20 |