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



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

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| **Code :** | **16MA1004** | **Duration :** | **3hrs** |
| **Sub. Name :** | **APPLIED MATHEMATICS – 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. | In how many different ways can the letters of the word 'ENGINEERING' be arranged such that the vowels must always come together? | CO1 | 10 |
| b. | A bag contains 2 white balls, 3 black balls and 4 red balls. In how many ways can 3 balls be drawn from the bag, if at least one red ball is to be included in the draw? | CO1 | 10 |
| **(OR)** | | | | |  |  | (OR) | (OR) |
| 2. | a. | Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed? | CO1 | 10 |
| b. | How many numbers divisible by 5 and lying between 5000 and 6000 can be formed from the digits 5,6,7,8 and 9? | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Out of 800 families with 4 children each, how many families would be expected to have i) 2 boys and 2 girls ii) at least one boy? Assume equal probabilities for both boys and girls. | CO4 | 10 |
| b. | A problem is given to three students whose chances of solving it are 1/2 , 1/3 and 1/4 respectively. What is the probability that (i) only one of them solves the problem and (ii) the problem is solved? | CO4 | 10 |
| **(OR)** | | | | |  |  | (OR) | (OR) |
| 4. | a. | A bolt is manufactured by 3 machines A, B and C. A turns out twice as many items as B, and machines B and C produce equal number of items. 2% of bolts produced by A and B are defective and 4% of bolts produced by C are defective. All bolts are put into 1 stock pile and 1 is selected at random. What is the probability that it is defective? | CO4 | 10 |
| b. | A lot consists of 10 good articles, 4 with minor defects and 2 with major defects. Two articles are chosen from the lot at random (without replacement). Find the probability that (i) both are good, (ii) both have major defects, (iii) at least 1 is good and (iv) exactly 1 is good. | CO4 | 10 |
|  |  |  |  |  |
| 5. | a. | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Fit a Poisson distribution for the following data:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | | f(x) | 142 | 156 | 69 | 27 | 5 | 1 | | | CO2 | 10 |
| b. | In a large consignment of electric bulbs 10% are defective. A random sample of 20 is taken for inspection. Find the probability that (i) all are good and (ii) at most 3 defective bulbs using binomial distribution. | CO4 | 10 |
| **(OR)** | | | | |  |  | (OR) | (OR) |
| 6. | a. | The weekly wages of 1000 workmen are normally distributed around a mean of Rs.70 with a S.D of Rs.5. Estimate the number of workers whose weekly wages will be (i) between Rs. 69 and Rs. 72 and (ii) less than Rs.69. | CO4 | 10 |
| b. | In a normal distribution, 7% of the items are under 35 and 11% are over 63. Find the mean and standard deviation. | CO4 | 10 |
|  |  |  |  |  |
| 7. | a. | Calculate mean, median and mode of the following:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Marks | 10-25 | 25-40 | 40-55 | 55-70 | 70-85 | 85-100 | | frequency | 6 | 20 | 44 | 26 | 3 | 1 | | CO3 | 10 |
| b. | Draw the histogram, frequency polygon, frequency curve for the following distribution of marks obtained by 49 students:   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Class | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 35-40 | 40-45 | 45-50 | | Frequency | 5 | 6 | 15 | 10 | 5 | 4 | 2 | 2 | | CO3 | 10 |
| **(OR)** | | | | |  |  | (OR) | (OR) |
| 8. | a. | Calculate standard deviation for the following.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Age | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | | No. of members | 3 | 61 | 132 | 153 | 140 | 51 | 2 | | CO3 | 10 |
| b. | Calculate the Quartile deviation of the marks of 39 students given below:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Marks | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | | No. of students | 4 | 6 | 8 | 12 | 7 | 2 | | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Find the rank correlation coefficient from the following data:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Rank in X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Rank in Y | 4 | 3 | 1 | 2 | 6 | 5 | 7 | | CO5 | 10 |
| b. | The two lines of regression are 8x-10y+66=0 and 40x-18y-214=0. The variance of x is 9. Calculate . | CO5 | 10 |