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



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

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| **Code :** | **18MA2007** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BASICS OF PROBABILITY AND STATISTICS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (10X1=10 MARKS)** | | | |
| 1. | If A and B are independent events then =\_\_\_\_\_\_ | CO1 | 1 |
| 2. | Let A and B be two events such that P(A)=0.3 and =0.8. If A and B are mutually exclusive events then find P(B). | CO1 | 1 |
| 3. | If X is a discrete random variable, then the variance of X is defined as\_\_\_\_\_\_\_\_\_\_. | CO2 | 1 |
| 4. | Find mean of a continuous random variable X. The pdf of X is given by | CO2 | 1 |
| 5. | If X and Y are independent discrete random variable then \_\_\_\_\_\_\_\_. | CO2 | 1 |
| 6. | The marginal density of X of the 2-dimensional continuous random variable (X,Y ) is given by \_\_\_\_\_\_. | CO2 | 1 |
| 7. | If n = 6 and p = 1/5. Find the variance of Binomial distribution | CO3 | 1 |
| 8. | Define probability mass function of Poisson distribution. | CO3 | 1 |
| 9. | The sum of 10 items is 12 and sum of their squares is 16.9. Find variance. | CO4 | 1 |
| 10. | Standard deviation of 100 observations is 10. What will be the new standard deviation if 5 is added to each observation? | CO6 | 1 |

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| **PART – B (6 X 3 = 18 MARKS)** | | | |
| 11. | If probability that A solves a problem is 1/2 and that of B is 3/4 and if they aim at solving a problem independently, what is the probability that the problem is solved? | CO1 | 3 |
| 12. | A die is thrown, find the mean outcome. | CO2 | 3 |
| 13. | Find the value of k, if , for 0 < x<1 and 0< y < 1, is to be a joint density function. | CO2 | 3 |
| 14. | The number of monthly breakdowns of a computer is a RV having a Poisson distribution with mean equal to 1.8. Find the probability that this computer will function for a month without a breakdown. | CO3 | 3 |
| 15. | Calculate Quartile deviation of the following data:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **Marks** | 10 | 20 | 30 | 40 | 50 | 60 | 70 | | **No. of students** | 6 | 5 | 8 | 15 | 7 | 6 | 8 | | CO6 | 3 |
| 16. | Ten participants in a contest are ranked by two judges as follows:   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **x** | 1 | 6 | 5 | 10 | 3 | 2 | 4 | 9 | 7 | 8 | | **y** | 6 | 4 | 9 | 8 | 1 | 2 | 3 | 10 | 5 | 7 |   Calculate the rank correlation coefficient. | CO5 | 3 |

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|  | **PART – C (6 X 12 = 72 MARKS)**  **(In Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | |
| 17. | a. | The chances of A, B and C becoming the general manager of a certain company are in the ratio 4:2:3. The probabilities that the bonus scheme will be introduced in the company if A, B and C become general manager are 0.3, 0.7 and 0.8 respectively. If the bonus scheme has been introduced, what is the probability that A has been appointed as general manager? | CO1 | 6 |
| b. | A and B alternately throw a pair of dice. A win if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, what is the chance that A wins? | CO1 | 6 |
| 18. | a. | A random variable X has the following probability distribution.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **x** | -2 | -1 | 0 | 1 | 2 | 3 | | **p(x)** | 0.1 | K | 0.2 | 2K | 0.3 | 3K |   a) Find X, b) Evaluate P(X<2) and P(-2<X<2), c) find the cumulative distribution function of X. | CO2 | 6 |
| b. | A continuous random variable X has a probability density function  Find k, mean and variance. | CO2 | 6 |
| 19. |  | For the bivariate probability distribution of (X, Y) given below, find all marginal and conditional probability distribution.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X | Y | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | | 0 | 0 | 0 | 1/32 | 2/32 | 2/32 | 3/32 | | 1 | 1/16 | 1/16 | 1/8 | 1/8 | 1/8 | 1/8 | | 2 | 1/32 | 1/32 | 1/64 | 1/64 | 0 | 2/64 | | CO2 | 12 |
| 20. | a. | Fit a binomial distribution for the following data:   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **x** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | **Total** | | **f** | 5 | 18 | 28 | 12 | 7 | 6 | 4 | **80** | | CO3 | 6 |
| b. | The mean yield for one-acre plot is 662 kilos with a S.D 32 kilos. Assuming normal distribution, how many one-acre plots in a batch of 1000 plots would you expect to have yield i) over 700 kilos, ii) below 650 kilos and iii) between 650 and 700 kilos? | CO3 | 6 |
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| 21. |  | Calculate mean, median and mode of the following data relating to weight of 120 articles:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Weight (in gm)** | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | | **No. of articles** | 14 | 17 | 22 | 26 | 23 | 18 | | CO4 | 12 |
| 22. |  | The joint probability density function of two dimensional continuous random variables (X, Y) is . Find i) k, ii) marginal distribution, iii) conditional distribution, iv) verify X and Y are independent and v) P(X<1/2). | CO2 | 12 |
| 23. |  | The following are scores of two batsman A and B in a series of innings:   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | 12 | 115 | 6 | 73 | 7 | 19 | 119 | 36 | 84 | 29 | | **B** | 47 | 12 | 16 | 42 | 4 | 51 | 37 | 48 | 13 | 0 |   Who is the better score getter and who is more consistent? | CO6 | 12 |
|  | **Compulsory:** | | | |
| 24. | a. | Obtain the equation of two lines of regression for the following data. Also obtain the estimate of X for Y= 70.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **X** | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 72 | | **Y** | 67 | 68 | 65 | 68 | 72 | 72 | 69 | 71 | | CO5 | 12 |