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



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

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| **Code :** | **14MA2015** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PROBABILITY, RANDOM PROCESS AND NUMERICAL METHODS** | **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 a shooting test, the probability of hitting the target is ½ for A, 2/3 for B and ¾ 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) all hits the target. | CO1 | 10 |
| b. | An urn contains 3 white balls, 4 red balls and 5 black balls. Two balls are drawn from the urn at random. Find the probability that;  i) both of them are of the same color ii) they are of different colors. | CO1 | 7 |
|  | c. | If p(A∪B) = 5/6, p(A∩B) = 1/3 and p(‾B)=1/2. Prove that the events A and B are independent. | CO1 | 3 |
| **(OR)** | | | | |
| 2. | a. | 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 the game, find the chance of B winning and if A begins the game find the chance of A winning | CO1 | 14 |
| b. | From 6 positive and 8 negative numbers, 4 numbers are chosen at random and multiplied. What is the probability that the product is positive? | CO1 | 6 |
|  |  |  |  |  |
| 3. | 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 |     i) Find k. ii) Evaluate p(x<2) iii) Evaluate p(-2<X<2)  iv) Find the cdf of X v) Evaluate the mean of X. | CO1 | 10 |
| b. | The joint pdf of the random variable (X,Y) is given by , x > 0, y > 0. Find (i) k (ii) Marginal and conditional densities (iii) check whether X and Y are independent. | CO1 | 10 |
| **(OR)** | | | | |
| 4. |  | The probability function of an infinite discrete distribution is given by  ; j =1,2,…, ∞. Verify that the total probability is 1 and find the mean and variance of the distribution. Find also P(X≥5) and P(X is even). | CO1 | 20 |
|  |  |  |  |  |
| 5. | a. | Fit a Poisson distribution for the following distribution:  x 0 1 2 3 4 5  f 142 156 69 27 5 1 | CO2 | 10 |
| b. | The weekly wages of 1000 workman are normally distributed with mean of Rs. 70 and S.D of Rs.5. Estimate no.of workers, whose wages will be (i) less than Rs. 69 (ii) more than Rs.72, (iii) between Rs. 69 and Rs. 72. | CO2 | 10 |

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| **(OR)** | | | | |
| 6. | a. | The mileage which car owners get with certain type if radial tire is a RV having exponential distribution with mean of 40000km. Find the probability that one of tires will lost (i) atleast 20000 km (ii) atmost 30000 km (iii) between 20000 km and 30000 km. | CO2 | 10 |
| b. | A random variable X has a mean μ = 12 and variance σ2= 9 and an unknown distribution. Find P(6<X<18). | CO2 | 10 |
|  |  |  |  |  |
| 7. |  | If U(t) = X cost +Y sint and V(t) = Y cost +X sint where X and Y are independent RVs such that E(X) = 0 = E(Y), E(Y2) = E(X2) = 1 show that {U(t)} and {V(t)} are individually stationary in the wide sense but they are not jointly wide sense stationary. | CO3 | 20 |
| **(OR)** | | | | |
| 8. | a. | Evaluate by using (i) Trapezoidal rule (ii) Simpson’s rule | CO5 | 10 |
| b. | Find the first two derivative at x = 15 from the table below:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X | 15 | 17 | 19 | 21 | 23 | 25 | | Y= | 3.873 | 4.123 | 4.359 | 4.583 | 4.796 | 5.000 | | CO6 | 10 |
|  | | **Compulsory**: |  |  |
| 9. |  | Find y(0.1) given that y′ = 1-y , y(0)=0 using  i) Euler’s method  ii) Taylor’s series method  iii) Fourth order Runge Kutta method. | CO6 | 20 |