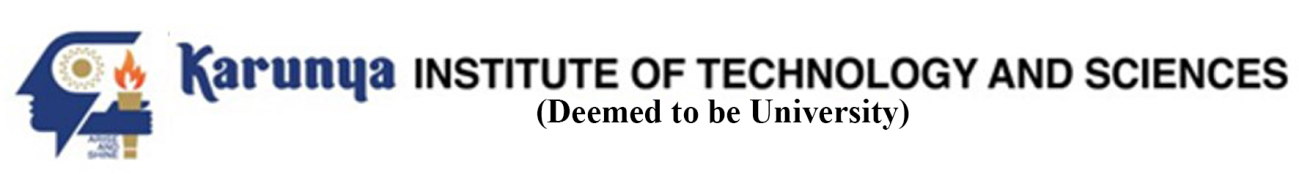
Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec – 2018**

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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. | A box contains 6 red 4 white and 5 black balls. A person draws 3 balls from the box at random. Find the probability that among the balls drawn there is (i) atleast two white balls (ii) all the balls are of same color (iii) all the balls are of different colors | | CO1 | | 10 |
| b. | A and B toss a coin alternatively on the understanding that the one who obtains the head first wins. (i) if A starts what is his chance of winning. (ii) if B starts what is the chance of A winning. | | CO1 | | 10 |
| (OR) | | | | | | |
| 2. | a. | An urn contains 10 white and 3 black balls another urn contains 3 white and 5 black balls. Two balls are drawn from the first urn and put into the second urn and then a ball is drawn from the later. If the drawn ball is white, what is the probability that 1 white and 1 black ball is transferred? | | CO1 | | 10 |
| b. | If the probability that a communication system has high selectivity is 0.54 and the probability that it will have high fidelity is 0.81 and the probability that it will have both is 0.18. Find the probability that (i) a system with high fidelity will also have high selectivity (ii) a system with high selectivity will also have high fidelity | | CO1 | | 10 |
| 3. | a. | A random variable X takes the values 1, 2, 3, 4 such that 2 P(X = 1 ) = 3 P(X =2) = P(X = 3) = 5P(X = 4).  (i) Find the probability distribution (ii) Find the cdf of X (iii) Evaluate the mean of X. | | CO1 | | 10 |
|  | b. | The diameter of an electric cable X is a continuous random variable with pdf f (x) = k( x – x2), . Find i) the value of k  (ii) mean (iii) variance. | | CO1 | | 10 |
| (OR) | | | | | | |
| 4. |  | The joint probability mass function of (x,y) is given by p(x,y) = k(x+2y), x=0,1,2; y = 0,1,2. (i) Find k. (ii) Find all the marginal and conditional probability distribution. Also find the probability distribution of X+Y. | | CO1 | | 20 |
| 5. | a. | Fit a Poisson distribution for the following data and calculate the expected frequencies.  x 0 1 2 3 4 5 6  f 314 335 204 86 29 9 3 | | CO1 | | 10 |
| b. | Suppose the life of automobile batteries is exponentially distributed with parameter λ = 0.0001 days. (i) What is the probability that a battery will last more than 1200 days (ii) what is the probability that a battery will last more than 1200 days given that it has already served 1000 days? | | CO1 | | 10 |
| (OR) | | | | | | |
| 6. | a. | A RV X is exponentially distributed with parameter 1. Use Tchebycheff’s inequality to show that P(-1 < X < 3) ≥ ¾. Find the actual probability also. | CO1 | | 10 | |
| b. | 20 dice are thrown. Find approximately the probability that the sum obtained is between 65 and 75 using central limite theorem. | CO1 | | 10 | |
| 7. |  | Two random processess {X(t)} and {Y(t)} given by X(t) = Pcos10t+Qsin10t and Y(t) = Q cos10t – P sin 10t. Show that {X(t)} and {Y(t)} are jointly WSS if P and Q are uncorrelated random variables with zero mean and the same variances. | CO1 | | 20 | |
| (OR) | | | | | | |
| 8. | a. | Find the first derivative of √x at x = 15 and x = 25 from the table given below   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X | 15 | 17 | 19 | 21 | 23 | 25 | | √X | 3.873 | 4.123 | 4.359 | 4.583 | 4.796 | 5.000 | | CO2 | | 10 | |
| b. | Evaluate  using(i) Trapezoidal (ii) Simpson’s both rules with h=1. | CO3 | | 10 | |
|  | | **Compulsory:** |  | |  | |
| 9 |  | Find y(0.1) given that y′ = 2+y , y(0)=1 using (a) Euler’s method  (b) Taylor’s series method and (c) Fourth order RungeKutta method. | CO3 | | 20 | |