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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2017**

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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 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 hit the target (ii) atleast one of them hits the target (iii) exactly one of them hits target. | CO1 | 10 |
| b. | Players X and Y roll a pair of dice alternately. The player who rolls 11 first wins. If X starts find the chance Y winning. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Urn I has 2 white and 3 black balls; Urn II has 4 white and 1 black ball; and Urn III has 3 white and 4 black balls. An urn is selected at random and a ball drawn at random is found to be white find the probability that urn I was selected. | CO1 | 14 |
| 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 | 6 |
| 3. | a. | A random variable X has the following probability distribution   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | P(x) | 0 | k | 2k | 2k | 3k | k2 | 2 k2 | 7 k2 +k |   Find (i) k (ii) P(1.5 < X < 4.5 / X > 2) (iii) mean (iv) variance | CO1 | 10 |
|  | b. | A continuous random variable X has a probability density function f(x) = kx2e- x; X>0, (i) Find k (ii) Find mean and variance | CO1 | 10 |
| (OR) | | | | |
| 4. |  | The joint pdf of 2D random variable, f(x,y) = k(6-x-y) ; 0 <x<2; 0 < y < 4 and 0 elsewhere (i) find the value of k (ii) P(X <1, Y < 3) (iii) P(X <1/Y<3) (iv) Marginal and conditional density functions. (v) check for independence. | CO1 | 20 |
| 5. | a. | Fit a binomial distribution to the given data and calculate the expected frequencies.  X 0 1 2 3 4 5 6  f(X) 5 18 28 12 7 6 4 | CO1 | 10 |
|  | b. | In a test on 2000 bulbs it was found that life of a particular make was normally distributed with an average life of 2040 hrs and S.D of 60 hrs. Estimate the number of bulbs likely to burn for (i) less than 1950 hrs (ii) more than 2150 hrs (iii) between 1950 and 2150 hrs. | CO1 | 10 |
| (OR) | | | | |
| 6. | a. | A random variable X is exponentially distributed with parameter 1. Use Tchebycheff inequality to show that the probability of P(-1 ≤ X≤ 3) ≥ ¾. Find the actual probability also. | CO1 | 10 |
|  | b. | Find the Moment Generating Function of Poisson distribution and hence find its mean and variance. | CO1 | 10 |
| 7. |  | Two random processes {X(t)} and {Y(t)} given by X(t) = A cost+Bsint and Y(t) = B cost + A sint. where A and B are independent random variables with E(A) =0=E(B); E(A2) = E(B2) = 1 Show that {X(t)} and {Y(t)} are individually WSS but not jointly WSS. | CO1 | 20 |
| (OR) | | | | |
| 8. | a. | Find the first derivative of y = x1/3 at x = 50 and x = 56 from the given table   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | X | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | Y= x1/3 | 3.6840 | 3.7084 | 3.7325 | 3.7563 | 3.7798 | 3.8030 | 3.8259 | | CO3 | 10 |
| b. | Evaluate  using(i) Trapezoidal (ii) Simpson’s 1/3rd and 3/8th rules with h=1 | CO3 | 10 |
|  | | **Compulsory:** |  |  |
| 9 |  | Find y(0.1) given that y′ = - y , y(0)=1 using (i) Euler’s method (ii) Taylor’s series method and (iii) Fourth order Runge Kutta method. | CO3 | 20 |

ALL THE BEST