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 – Apr/May – 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 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. | Players X and Y roll a pair of dice alternately. The player who rolls 11 first wins. If X starts find the chance of Y 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 at random from the first urn and placed in the second urn and then 1 ball is taken fat random from the latter. What is the probability that it is a white ball? | CO1 | 10 |
| b. | The probability that a student passes a certain exam is 0.9 given that he studied. The probability that he passes the exam without studying is 0.2. Assume that the probability that the student studies for an exam is 0.75. Given that the student passed the exam, what is the probability that he studied? | CO1 | 10 |
| 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) Find the cdf of X | CO1 | 10 |
|  | b. | The joint pdf of the random variable (X,Y) is given by . Find (i) k (ii) Marginal and conditional densities (iii) check whether X and Y are independent. | CO1 | 10 |
| (OR) | | | | |
| 4. |  | The joint probability mass function of (x,y) is given by p(x,y) = (x+y)/21, x=1,2,3 ; y = 1,2. Find all the marginal and conditional probability distribution. Also find the probability distribution of X+Y. | CO1 | 20 |
| 5. | a. | 4 coins are tossed 100 times, the number of heads fallen in each of 100 times was noted and the results are given below.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | | f | 5 | 29 | 36 | 25 | 5 |   Fit a binomial distribution to observed data and calculate the expected frequency. | CO1 | 10 |
|  | b. | The mileage which car owners get with certain type of radial tyre is a RV having exponential distribution with mean of 40000km. Find the probability that one of tyres will lost (i) atleast 20000 km (ii) atmost 30000 km (iii) between 20000 km and 30000 km. | CO1 | 10 |
| (OR) | | | | |
| 6. | a. | Fit Poisson distribution to given data and calculate expected frequencies.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | | f | 109 | 65 | 22 | 3 | 1 | | CO1 | 10 |
|  | b. | The weakly wages of 1000 workman are normally distributed with mean of Rs.70 and S.D of Rs.5. Estimate the number of workers whose wages will be (i) less than Rs.69, (ii) more than Rs.72 (iii) between Rs.69 and Rs. 72. | CO1 | 10 |
| 7. | a. | Find the Moment Generating Function of Binomial distribution and hence find its mean and variance. | CO1 | 10 |
|  | b. | Given E(X)=8 and E(X2) =68. Find P(5 < X <11) using Tchebycheff’s inequality. | CO1 | 10 |
| (OR) | | | | |
| 8. |  | Two random processess {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. | CO2 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Evaluate  using (i) Trapezoidal (ii) Simpson’s 1/3 rule (Take h=1). | CO3 | 10 |
|  | b. | Apply the fourth order Runge-Kutta method to find y(0.8) given that y′ = y-x2, y(0.7)=1.8763. | CO3 | 10 |

ALL THE BEST