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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

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

**Supplementary Examination – June – 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. | A problem is given to 3 students whose chances of solving it are ½, 1/3 and ¼. Evaluate the probability that (i) only one of them solves the problem, (ii) None solves the problem and (iii) Atleast one of them solves the problem | CO1 | | | 10 |
| b. | 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 B begins the game, find the chance of his winning. | CO1 | | | 10 |
| (OR) | | | | | | |
| 2. | a. | There are two bags one of which contain 5 red and 8 black balls and the other 7 red and 10 black balls. A ball is drawn from the first and place it in the second. Find the chance of drawing a red ball. | CO1 | | | 8 |
| b. | The chance that a doctor A will diagnose a disease x correctly is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of doctor A, who had disease x died. Calculate the chance that his disease was diagnosed correctly. | CO1 | | | 12 |
| 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. | The joint pdf of two dimensional random variable(x,y) is given by f(x) = k(6-x-y), 0≤x≤2, 2≤y≤4; =0 elsewhere. (i) Find the value of k, (ii) Compute p(X <1, Y<3) (iii) p(x<1/y<3) | CO1 | | | 10 |
| (OR) | | | | | | |
| 4. |  | For the bivariate probability distribution of (X,Y) given below find (i) (ii) , (iii) (iv) (v) (vi) all marginal and conditional probability distributions   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X | Y | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | | 0 | 0 | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | | 1 | 0.01 | 0.02 | 0.04 | 0.05 | 0.06 | 0.08 | | 2 | 0.01 | 0.03 | 0.05 | 0.05 | 0.05 | 0.06 | | 3 | 0.01 | 0.02 | 0.04 | 0.06 | 0.06 | 0.05 | | CO1 | | | 20 |
| 5. | a. | The time (in hrs) required to repair a machine is exponentially distributed with parameter λ=1/3. (i) What is the probability that the repair time exceeds 3 hrs (ii) What is the conditional probability that the repair time takes 12 hrs given that the duration exceeds 9 hrs. | CO1 | | | 8 |
|  | b. | The following data are number of seeds germinating out of 10 on a damp filter for 80 sets of seeds. Fit a binomial distribution to this data and calculate the expected frequencies:   |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | f | 6 | 20 | 28 | 12 | 8 | 6 | 0 | 0 | 0 | 0 | 0 | | CO1 | | | 12 |
| (OR) | | | | | | |
| 6. | a. | In a certain factory producing razor blades there is small chance of 1/560 to be defective. There are 10 blades in packet. Use Poisson distribution to calculate the approximate number of packet containing (i) no defective (ii) 1 defective (iii) 2 defective plades in a consignment of 10000 packets | | CO1 | 10 | |
|  | b. | A mean weight of 500 students is 151 lb and S.D is 15 lb. Assuming that weights are normally distributed. Find how many students weight will be less than 120 lb (ii) more than 155 lb (iii) between 120 lb and 155 lb. | | CO1 | 10 | |
| 7. | a. | Find the Moment Generating Function of Exponential distribution and hence find its mean and variance. | | CO1 | 10 | |
|  | b. | A discrete random variable X takes the values -1, 0, 1 with probability 1/8, ¾, 1/8 respectively. Evaluate p{|X-μ|≥2σ} and compare it with the upper bound given by Tchebycheff’s inequality. | | CO1 | 10 | |
| (OR) | | | | | | |
| 8. |  | Two random processess {X(t)} and {Y(t)} given by X(t) = A cosλt+Bsinλt and Y(t) = B cosλt – A sin λt. Show that {X(t)} and {Y(t)} are jointly WSS if A and B are uncorrelated random variables with zero mean and the same variances and λ is a constant. | | CO2 | 20 | |
|  | | **Compulsory:** | |  |  | |
| 9. | a. | Evaluate  using(i) Trapezoidal (ii) Simpson’s 1/3 rule with h=1. Also verify your results with actual integration. | | CO3 | 10 | |
|  | b. | Apply the fourth order Runge-Kutta method to find y(0.1),y(0.2) given that y′ = - y, y(0)=1. | | CO3 | 10 | |

ALL THE BEST