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 – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **15MA3018** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PROBABILITY AND DISTRIBUTIONS** | **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. | State and prove Boole’s inequality. | CO1 | 10 |
| b. | The joint probability density function of two dimensional RV (X,Y) is given by    (i)Find the marginal density functions of X and Y. (ii) Find the conditional density functions. (iii) Find P (1/4 < x< 1/2 / y ≤ 1/3) | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | State and prove the addition law on probability of three events. | CO1 | 10 |
| b. | In a bolt manufacturing company, machine A, B and C produce 25%, 35% and 40% of the total output respectively. Of their outputs 5%, 4 % and2 % respectively are defective bolts. If a bolt is chosen at random from the combined output, what is the probability that it is defective? If a bolt chosen at random is found to be defective, what is the probability that it was produced by machine B? | CO1 | 10 |
| 3. | a. | Let and have the joint pdf. Find (i) the marginal density functions (ii) conditional probability density function of , given and , given  (iii) conditional mean and variance of | CO1 | 10 |
|  | b. | Let f(x,y)=2, 0 < x < y and 0 < y < 1 be the joint pdf of X and Y.Find E(X/Y) and E(Y/X).Also find the correlation coefficient between X and Y. | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | The joint pdf of (X,Y) is f(x,y)=4xy,0<x,y<1.Find E(X),E(Y),E(X2), E(Y2),E(XY) and E(3Y-2X2-6XY).Are X and Y independent? | CO2 | 10 |
|  | b. | Let and be two random variables having the joint pmf ,given by the following table. Find the correlation coefficient between  and   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | (X1,X2) | (0,0) | (0,1) | (0,2) | (1,1) | (1,2) | (2,2) | | P(X1,X2) | 1/12 | 2/12 | 1/12 | 3/12 | 4/12 | 1/12 | | CO2 | 10 |
| 5. | a. | Find the MGF of Geometric distribution and hence find its mean and variance | CO2 | 12 |
|  | b. | The weekly wages of 1000 workmen are normally distributed around a mean of Rs.70 with a S.D. of Rs.5. Find the probability and hence estimate the number of workers whose weekly wages will be(i)less than Rs 69 (ii) more than Rs 72 (iii) between Rs.69 and Rs.72 | CO2 | 8 |
| (OR) | | | | |
| 6. | a. | Find the MGF of Normal distribution and hence find its mean and variance. | CO2 | 12 |
|  | b. | Let Y be the number of success in n-independent trials of a random experiment having the probability of success p=1/3.(i) if n=3,compute P(2≤Y) (ii) if n=5,compute P(3≥ Y). (iv) Also find the MGF of Y and find the mean and variance of Y if n=3 | CO2 | 8 |
| 7. |  | Derive the probability density function of t-distribution. | CO3 | 20 |
| (OR) | | | | |
| 8. |  | Derive the probability density function of F-distribution. | CO3 | 20 |
|  | | **Compulsory:** |  |  |
| 9. | a. | State and prove Bernoulli’s law of large numbers. | CO3 | 10 |
|  | b. | Find the limiting distribution of poisson distribution. | CO3 | 10 |

ALL THE BEST