



End Semester Examination – Nov/Dec – 2016

Code : **15MA3018**
 Sub. Name : **Probability and Distributions**

Semester : **2016-17 ODD**
 Duration : **3hrs**
 Max. marks : **100**

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

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 $f(x,y)=\frac{x(1+3y^2)}{4} \quad 0 < x < 2, 0 < y < 1$ (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)																		
	a.	State and prove the addition law on probability of three events.	CO1															
	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 X_1 and X_2 have the joint pdf $f(x_1, x_2) = 6x_2, 0 < x_1 < x_2 < 1$. Find (i) the marginal density functions (ii) conditional probability density function of X_1 , given $X_2 = x_2$ and X_2 , given $X_1 = x_1$ (iii) conditional mean and variance of X_1 / X_2	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 $E(X), E(Y), E(X^2), E(Y^2), E(XY)$ and $E(3Y-2X^2-6XY)$.Are X and Y independent?	CO2	10														
	b.	Let X_1 and X_2 be two random variables having the joint pmf ,given by the following table. Find the correlation coefficient between X_1 and X_2 <table border="1"><tr><td>(X_1, X_2)</td><td>(0,0)</td><td>(0,1)</td><td>(0,2)</td><td>(1,1)</td><td>(1,2)</td><td>(2,2)</td></tr><tr><td>P(X_1, X_2)</td><td>1/12</td><td>2/12</td><td>1/12</td><td>3/12</td><td>4/12</td><td>1/12</td></tr></table>	(X_1, X_2)	(0,0)	(0,1)	(0,2)	(1,1)	(1,2)	(2,2)	P(X_1, X_2)	1/12	2/12	1/12	3/12	4/12	1/12	CO2	10
(X_1, X_2)	(0,0)	(0,1)	(0,2)	(1,1)	(1,2)	(2,2)												
P(X_1, X_2)	1/12	2/12	1/12	3/12	4/12	1/12												
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	1														

				2
	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 $P(2 \leq Y)$ (ii) if $n=5$, compute $P(3 \geq Y)$. (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	2 0
(OR)				
8.		Derive the probability density function of F-distribution	CO3	2 0
<u>Compulsory:</u>				
9.	a.	State and prove Bernoulli's law of large numbers.	CO3	1 0
	b.	Find the limiting distribution of poisson distribution	CO3	1 0

ALL THE BEST