Reg.No. ____________

Karunya 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

			Semester	**:**	**6**
Code	**:**	**14MA2015**	**Duration**	**:**	**3hrs**
Sub. Name :		**Probability, Random Process and Numerical Methods**	**Max. marks :**		**100**

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	A lot consists of 10 good articles, 4 with minor defects and 2 with the major defects. Two articles are choosen at random. Find the probability that (i) both are good (ii) both have major defects (iii) atleast one is good (iv) atmost one is good (v) exactly one is good.	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 A begins the game, find the chance of his winning.	CO1	10
		(OR)		
2.	a.	In a bolt factory , Machines A,B and C produce 25%,35 %and 40% of the total output respectively. Of their outputs 5%,4% and 2% respectively are defective bolts. If a bolt is choosen at random from the combined output, what is the probability that it is defective? If the choosen bolt is found to be defective, what is the probability that it was produced by Machine B?	CO1	10
	b.	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 hits the target (ii) atleast of them hits the target (iii) exactly one of them hits target.	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) Evaluate p(-2<X<2)(iv) Find the cdf of X (v) Evaluate the mean of X.	CO1	10
	b.	The joint pdf of two dimensional random variable(x,y) is given by $f(x,y) = xy^2 + \frac{x^2}{8}$, 0≤x≤2, 0≤y≤1. Compute (i) p(x >1) (ii) p(y<1/2) (iii) p(x>1/y<1/2)	CO1	10
		(OR)		
4.		The joint probability mass function of (x,y) is given by p(x,y) = k(2x+3y), x=0,1,2; y = 1,2,3. Find all the marginal and conditional probability distribution. Also find the probability distribution of X+Y.	CO1	20
5.	a.	5 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 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

(OR)				
6.	a.	Fit a Poisson distribution to the given data and calculate the expected frequencies: x: 0, 1, 2, 3, 4 f: 109, 65, 22, 3, 1	CO1	10
	b.	The time (in hrs) required to repair a machine is exponentially distributed with parameter $\lambda=1/2$. (i) What is the probability that the repair time exceeds 2 hrs (ii) What is the conditional probability that the repair time takes 10 hrs given that the duration exceeds 9 hrs.	CO1	10
7.	a.	Find the Moment Generating Function of binomial 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 $p\{\lvert X-\mu\rvert\geq 2\sigma\}$ 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 $X(t) = A\cos\lambda t+B\sin\lambda t$ and $Y(t) = B\cos\lambda t - A\sin\lambda t$. 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 $\int_0^1 \frac{dx}{1+x^2}$ using(i) Trapezoidal (ii) Simpson's 1/3 rule with h=0.2	CO3	10
	b.	Apply the fourth order Runge-Kutta method to find y(0.2) given that $y' = x+y$, $y(0)=1$.	CO3	10

ALL THE BEST