SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &
Accredited by NBA (B.E - CSE, EEE, ECE, Mech&B.Tech.IT)
COIMBATORE-641 035, TAMIL NADU

DEPARTMENT OF MATHEMATICS

23MAT203 & PROBABLITY AND RANDOM PROCESS

UNIT-1 (PART-B)

1. There are three boxes containing respectively, 1 white, 2 red, 3 black balls; 2 white, 3 red , 1 black balls; 3 white, 1 red, 2 black balls. A box is chosen at a random. The two balls are 1 red and 1 white. What is the probability that they came from second box?

2. A given lot of IC chips contains 2% defective chips. Each is tested before delivery. The tester itself is not totally reliable. Probability of tester says the chip is good when it is really good is 0.95 and the probability of tester says chip is defective when it is actually defective is 0.94. If a tested device is indicated to be defective, what is the probability that it is actually defective.

3. A bag contains 3 black and 4 white balls. Two balls are drawn at random one at time without replacement
   i)   What is the probability that the second ball drawn is white?
   ii)   What is the conditional probability that the first ball drawn is white if the second ball is known to be white?

4. When a die is thrown, X denotes the number that turns up. Find E(X), $E(X^2)$ and Vax(X)

5. A random variable X has the following probability distribution

X=x_i	-2	-1	0	1	2	3
P(X=x_i)	0.1	k	0.2	2k	0.3	3k

   Find
   i)   The value of k
   ii)   Evaluate P(X<2) and P(-2<x<2)
   iii)   Find the cumulative distribution of X and
   iv)   Evaluate the mean of X

6. The probability function of an infinite dicrete distribution is given by
   $P(X = x) = \frac{1}{2^j}$, j=1,2,…∞. Find the mean and variance of the distribution.
   Also Find P(X is even), P(X≥ 5) and P(X is divisible by 3).

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7. If random variable X takes the values 1,2,3 and 4 such that $2P(X = 1) = 3P(X = 2) = P(X = 3) = 5P(X = 4)$. Find the probability distribution and cumulative function of X.

8. A continuous random variable X has the density function $f(x) = \frac{K}{1+X^2}$, $-\infty < x < \infty$. Find the value of K and the distribution function.

9. The cumulative distribution function of a random variable X is $F(x) = 1 - (1 + x)e^{-x}, x > 0$. Find the probability density function of X, mean and variance of X.

10. The density function of a random variable x is given by $f(x) = Kx(2 - x), 0 \leq x \leq 2)$. Find K, mean, variance and r^{th} moment.

11. Let the random variable X have the p,d,f $f(x) = \begin{cases} \frac{1}{2}e^{-\frac{x}{2}} & , x > 0 \\ 0 , otherwise \end{cases}$

    Find the moment generating function, mean and variance of X.

12. Find the first four moments about the origin for a random variable X having the pdf

$$f(x) = \begin{cases} \frac{4x(9-x^2)}{81} & , \quad 0 \leq x \leq 3 \\ 0, \quad otherwise \end{cases}$$

13. Find the M.G.F of the random variable X having the probability density function

$$f(x) = \begin{cases} \frac{x}{4}e^{-\frac{x}{2}}, x > 0 \\ 0, otherwise \end{cases}$$. Also deduce the first four moments about the

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