Sanjivani Rural Education Society's
Sanjivani College Of Engineering, Kopargaon
(An Autonomous Institute Affiliated by SPPU)

SY BTECH   EM-III   SEM-4 (Comp/IT/ECE/MTX)
Tutorial 4
Discrete Random Variable

1. If 52 playing cards are randomly distributed among 4 people so that each gets 13 cards, what is the probability that somebody will have 4 kings?

2. Let X be a discrete random variable with PMF $f(x) = c(1-c)^{x-1}$.
   i) Show that $\sum_{x=1}^{\infty} f(x) = 1$, ii) Find $p(2 \leq x < 5)$ if $c = \frac{1}{2}$. Find distribution function, $P(1 \leq X \leq 3)$, $P(X < 3), P(X \geq 2)$.

3. Find k, if a random variable assumes 4 values with probabilities $\frac{1+3k}{4}, \frac{1+k}{4}, \frac{1+2k}{4}, \frac{1-4k}{4}$.

4. A fair coin is tossed three times. Let X denote number of heads occurs then find
   i) $E(X)$, ii) $E(X^2)$, iii) $E(5X + 9)$, iv) $E(X^2 + 50X)$, v) $var(X)$, vi) σ.

5. If X has the pmf $f(x) = \frac{32}{63}\frac{1}{2^x}$ for $x = \{1,2,3,4\}$ Find i) $E(X)$, ii) $E(X^2)$, iii) $E(5X + 9)$, iv) $E(X^2 + 50X)$, v) $var(X)$, vi) σ.

6. There are 10 girl students in a class, out of which 4 are interested in friendship with boy students. If a boy approached 4 girl students for friendship, what is the probability that the boy will not get any positive reply?

7. A question paper contains 4 questions, and a candidate will be declared to have passed the examination if he/she answered at least one question correctly. What is the probability that the candidate passes the examination?

8. If Sanjivani College office the average number of phone calls per minute between 2PM to 4PM is 2.35. Find the probability that during one particular minute there will be at most 2 phone calls.

9. If 0.8% of the computers delivered to Sanjivani College are defective. Using Poisson distribution, determine the probability that four computers will be defective in a random sample of 400.

10. If a fair coin be tossed three times. Let X be a random variable give 1 if first is head and 0 if first is tail. Y be the random variable denotes the number of heads occurs. Find $f(x,y), f_1(x), f_2(x)$ Determine whether X and Y are independent.

11. The joint probability function of two discrete random variables X and Y is given by,

$$f(x,y) = \begin{cases} C(x^2 + y^2), & x = 0,1,2, y = 1,2,3 \\ 0, & \text{otherwise} \end{cases}$$

Find i) Constant C, ii) $P(X = 2, Y = 3)$, iii)$P(1 \leq X \leq 2, Y \leq 2)$, iv)$P(X \geq 1)$ v) $P(Y < 2)$ iv) marginal probability function of X and Y. Also determine whether X and Y are independent.