UNIVERSITY COLLEGE OF ENGINEERING KAKINADA (AUTONOMOUS)
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Name of the Course: **Random Variables & Stochastic Processes**
Class: **II B.Tech I-Sem**
Academic Year: **2019-20**

Tutorial # 1

1. Define sample space. Give examples.
2. Define a random event. Give examples.
3. List the axioms of probability.
4. What are the steps involved in statistical modeling of a random experiment?
5. Define the following:
   i. Relative frequency of an event
   ii. Statistically independent events
   iii. Exhaustive events
6. Define joint probability, conditional probability and Baye's rule.
7. Define random variable. What are the types of random variable?
8. In an experiment, a trial consists of four successive tosses of a coin. If we define a random variable X as the number of heads appearing in a trial, determine the probability density function of X.
9. Write the CDF and PDF of different random variables. Make the plots of these functions.
10. A Gaussian random variable has a mean value of 1 and a variance of 4. Find the probability that the random variable has a value between 1 and 2.
11. The PDF of a random variable X is given by

$$f_X(x) = \frac{1}{2\sqrt{2\pi}} e^{-x^2/32} u(x)$$

   a) Sketch $f_X(x)$ b) Determine $P(X \geq 1)$

12. The PDF of a Gaussian random variable X is given by

$$f_X(x) = \frac{1}{3\sqrt{2\pi}} e^{-(x-4)^2/18}$$

   Determine

   a) $P(X \geq 4)$ b) $P(X \leq 0)$

13. A random variable X has a probability density function of the form

$$\begin{aligned} f_X(x) &= ax^2 \quad 0 < x \leq 2 \\ &= ax \quad\;\; 2 < x \leq 3 \end{aligned}$$

   a) Find the value of a. b) Find the probability that $2 < X \leq 3$.

14. Suppose $F_X(x) = 1 - e^{-x}\, for\ x \geq 0$ and $F_X(x) = 0\, for\ x < 0$. Plot the CDF. Find

a) $P(1 < X \leq 4)$

b) $P(X \leq 0)$

c) $P(X > 0.75)$

15. Define conditional distribution and density functions. List all the properties of conditional CDF and conditional PDF.