Code No: 53019 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech II Year I Semester Examinations, May/June-2015
PROBABILITY THEORY AND STOCHASTIC PROCESSES
(Common to ECE, ETM)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

- - -

1.a) A collection of plastic letters, a–z, is mixed in a jar. Two letters are drawn at random, one after the other. What is the probability of drawing a vowel (a, e, i, o, u) and a consonant in either order? Two vowels in any order? Specify your sample space Ω and probability P.

b) Two cards are drawn at random from a single well-shuffled deck of play-ing cards. What is the probability of drawing the ace of spades followed by the jack of hearts? What is the probability of drawing an ace and a jack (in either order)? [8+7]

2.a) Derive an expression for distribution and density functions of Gaussian distribution and its properties.

b) A random variable X is Gaussian with a_x=0 and σ_x=1
i) What is the probability that |X| >2?
ii) What is the probability that X>2? [9+6]

3.a) When light of intensity λ is incident on a photo detector, the number of photoelectrons generated is Poisson with parameter λ. Find the mean number of photo -electrons generated.

b) Write a short note on transformation of discrete random variables. [9+6]

4.a) Describe the properties of joint distribution function.

b) Describe the properties of marginal distribution function. [9+6]

5.a) List out the properties of Gaussian random variable.

b) Suppose that a random, continuous-valued signal X is transmitted over a channel subject to additive, continuous-valued noise Y. The received signal is $Z = (2X + Y)/3$. Find density of Z if X and Y are jointly continuous random variables with joint density f_{XY}. [9+6]

6.a) List out the properties of Gaussian random variable.

b) Suppose that a random, continuous-valued signal X is transmitted over a channel subject to additive, continuous-valued noise Y. The received signal is $Z = (2X + Y)/3$. Find density of Z if X and Y are jointly continuous random variables with joint density f_{XY}. [9+6]

7.a) Derive an expression to obtain the response of power density spectrum and its characteristics.

b) Describe the relationship between cross power spectrum and cross correlation function. [8+7]

8. Write short notes on:
a) types of noise b) modeling of noise sources. [6+9]
