Code No: 53019 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, February/March - 2016
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 single card is drawn from a 52 card deck:
i) What is the probability that the card is queen?
ii) What is the probability that card will be 5 or smaller?
iii) What is the probability that the card is red 10?
b) Write the properties of independent events and multiple events. [9+6]

2.a) Derive an expression for distribution and density functions of binomial distribution and its properties.
b) Define a random variable and list out the conditions of a function to be random variable. [9+6]

3.a) Derive the density function expression for Gaussian continuous random variable of monotonic transformation.
b) Show that the mean and variance of the random variable (X) having the uniform density function are as follows $E[X] = (a+b)/2$, $\sigma_x^2 = (b-a)^2/12$. [9+6]

4.a) Describe the properties of joint density function.
b) Random variable X and Y are components of a two-dimensional random vector and have joint distribution:

$F_{x,y}(x,y) = 1/ab$; $0<x<a$; $0<y<b$
0; otherwise

Find the marginal distribution function $F_x(x)$ and $F_y(y)$. [9+6]

5.a) Two random variables X and Y have joint characteristic function $\phi_{x,y}(w_1, w_2) = \exp(-2w_1^2 - 8w_2^2)$
Show that X and Y are both zero mean random variables and they are uncorrelated.
b) Derive the density function of linear transformation of Gaussian random variables. [9+6]

6.a) Write a short notes on classification of processes.
b) What is ergodicity and various processes involved in stochastic process? [9+6]

7.a) Describe about the cross power density spectrum and its properties.
b) Write the relationship between the power spectrum and auto correlation function. [9+6]

8. Write short notes on:
a) Sources of noise b) White noise and its applications. [6+9]

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