

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE
BRANCH: ECE

SEMESTER: VII
SESSION : MO/2019

SUBJECT : MEC1011 PROBABILITY MODELS AND STOCHASTIC PROCESSES

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
 2. Candidates may attempt for all 30 marks.
 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. The missing data, if any, may be assumed suitably.
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- Q1 (a) Define the distribution functions with their properties. [2]
(b) A random variable X has a probability density function define as [3]
 $f(x) = 2e^{-2x} u(x)$. Find the first and second order moments.
- Q2 (a) Explain binomial distribution function with suitable example. [2]
(b) The joint density function of two random variables X and Y is given by: [3]
$$f_{XY} = \begin{cases} c(2x + y) & \text{for } 0 < x < 2, 0 < y < 3 \\ 0, & \text{elsewhere} \end{cases}$$
Determine the value of c.
- Q3 (a) Describe conditional expectation. [2]
(b) A random variable has an average of 10 and variance 5. Find the probability that X will be [3]
between 6 and 14.
- Q4 (a) Explain Central limit theorem with example. [2]
(b) Two random variable X and Y have joint pdf [3]
 $f_{X,Y}(x,y) = xye^{-y^2/4} \quad 0 \leq x \leq 1; y \geq 0$. Determine if X and Y are independent.
- Q5 (a) Describe a jointly Gaussian random variable. [2]
(b) Describe about sampling theory? Define the sample mean and sample variance. [3]
- Q6 (a) Define random process with suitable example. [2]
(b) The probability density function of a random variable has the form of [3]
 $f_x(x) = 5e^{-kx} u(x)$. where $u(x)$ is the unit step function. Find
a) the value of k
b) the probability that $X > 1$