Electronics & Communication Engineering (CBCS Pattern) M. Tech. First Semester
CBCS + Old (CBS Pattern)

PECS11 - Probability Theory and Stochastic Processes

P. Pages : 2 **GUG/W/18/10978**

Time : Three Hours * 3 1 0 5 * Max. Marks : 70

Notes : 1. Attempt **any five** questions.
2. All questions carry equal marks.
3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Define Distribution function and Briefly explain its properties. **7**

b) A certain test for a particular cancer is known to be 95% accurate. A person submits to be the test and results are positive. Suppose that the person comes from a population of 1,00,000 where 200 people suffer from that disease. What can we conclude about the probability that the person under the test has that particular cancer? **7**

2. a) Determine binomial distribution for which mean is 4 and variance is 3. **7**

b) A fair coin is tossed twice and let random variable X represent number of heads. find $F_X(X)$. **7**

3. a) A set of 8 symmetrical coins was tossed 256 times and the frequencies of throws observed were as follows. **14**

Number of heads	0	1	2	3	4	5	6	7	8
Freq. of throws	2	6	24	63	64	50	36	10	1

Fit a binomial distribution to the data and hence as otherwise calculate the theoretical frequencies.

4. a) Find the first four moments about mean for a random variable X having density function. **7**

$$f(x) = \begin{cases} \frac{4}{81}x\left(9-x^2\right) & 0 \le x \le 3 \\ 0 & \text{otherwise} \end{cases}$$

b) Define continuous random variable. State its properties. **7**

5. a) Let $X \sim U([\pi, -\pi])$. Find the distributions of random variable y = cos x the density function. X is given by. **7**

$$f_X(x) = \begin{cases} 1/2\pi & \text{if } x \in (-\pi, \pi) \\ 0 & \text{otherwise} \end{cases}$$

b) Explain Normal distribution with its properties. **7**

6. a) Given $f(x) = \begin{cases} x/2 & \text{if } 0 \le x \le 2 \\ 0 & \text{otherwise} \end{cases}$ **14**

and $g(y) = \begin{cases} 2(1-y) & \text{if } 0 \le y \le 1 \\ 0 & \text{otherwise} \end{cases}$

Determine the function y(x) which will transform f (x) into g (y).

7. a) Suppose X (t) is normal process with $n(t)=3$, $c(t_1, t_2) = 4e^{-0.2|t_1-t_2|}$ **7**

a) Find the probability that $X(5) \le 2$

b) Find the probability that $|x(8)-X(5)| \le 1$.

b) Establish necessary and sufficient condition for the process. **7**
$X(t)=a\cos wt+b\sin wt$.

8. a) Explain Markov Process in details. **7**

b) Explain wide sense Stationary Process. **7**

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