**Code No. 2078**

# FACULTY OF INFORMATICS

**B.E. 2/4 (IT) II – Semester (Main) Examination, April / May 2013**

**Subject : Probability and Random Process**

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

***Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.***

**PART – A** (25 Marks)

1. A player tosses four coins at a time, find the probabilities at least two heads and at least two tails. (3)

2. State multiplication theorem for three events. (2)

3. Find the characteristic function of p.m.f. (2)

$$p(x) = \frac{e^{-\lambda} . \lambda^{x}}{x!} \quad \lambda > 9;\ x > 0$$

4. Define power spectral density function. (2)

5. State the properties of joint probability distribution function. (3)

6. Explain weakly stationery process. (2)

7. Define Gaussian process. (2)

8. Show that if X and Y are independent random variables COV(X, Y) = 0. (3)

9. If A and B are independent events then find $P(A^c \cap B^c)$. (3)

10. Define Noise and Filter. (3)

**PART – B** (5 x 10 = 50 Marks)

11. Two players A and B draws balls one at a time alternatively from a box containing m white balls and n black balls. Suppose the player who picks the first white ball wins the game, what is the probability that the player who starts the game will win? (10)

12.a) A fair coins is tosses twice, and let the random variable X represent the number of heads, find $F_x$ (X). (5)

b) Over a period of 12 hours, 180 calls are made at random. What is the probability that in a four hour interval the number of calls is between 50 and 70. (5)

13.a) State and prove Baye's theorem. (5)

b) A speaks truth 4 out of 5 times, a dice is rolled he reports that there is a six. What is the probability that there was a six? (5)

14.a) Prove that the random process $X(t) = A \cos (wt + \theta)$ is not stationery, if it is assumed that A and w are constants and θ is uniformly distributed on the interval $(0, \pi)$. (5)

b) Explain the properties of power spectral density function. (5)

15.a) Let $X(t) = A \cos wt + B \sin wt$, $Y(t) = B \cos wt - A \sin wt$ where A and B are random variables, w is a constant, show that X(t) and Y(t) are wide sense stationary if A and B are uncorrelated, with zero mean and same variance. (5)

b) Find the autocorrelation function of a random telegraph signal process. (5)

16.a) Show that the power spectrum of a real random process X(t) is real. (5)

b) For a random process having $R_{xx}(\tau) = ae^{-b|\tau|}$ find the spectral density function, where a, b are constants. (5)

17. Explain : (10)
   a) Band pass process
   b) White noise
   c) Colored noise

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