Code: R7 210402

R7

B.Tech II Year I Semester (R07) Supplementary Examinations, May 2012

PROBABILITY THEORY AND STOCHASTIC PROCESSES

(Common to ECE and ECC)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1 (a) State and prove Baye's theorem.
(b) Two cards are drawn from 52-card deck (the first is not replaced)
(i) Given the first card is a queen. What is the probability that second is also a queen?
(ii) Repeat part (i) for the first card a queen and second card a 7.
(iii) What is the probability that both cards will be the queen?

2 (a) Define distribution function and write the properties of distribution function.
(b) A random variable X is Gaussian with $a_x = 0$ and $\sigma_x = 1$
(i) What is the probability that |x|>2 (ii) What is the probably that x>2.

3 (a) A discrete random variable X have values X = -1, 01 and 2 with respective probabilities are 0.1, 0.3, 0.4, and 0.2. X is transformed to $Y = 2-X^2 + X^3/3$. Find the density of Y.
(b) Explain about moments about the origin and central moments.

4 (a) Write a short notes on joint characteristic functions.
(b) Find the f_x (x) and f_y (y), when the joint density function is given by
F_{xy}(x,y) = U (x) U (y) $xe^{-x(y-1)}$

5 (a) Derive the relationship between power spectrum and autocorrelation functions.
(b) Write the properties of power density spectrum.

6 (a) What are the differences between determinate and non determinate random process? Explain each with an example.
(b) The auto correlation function, for a stationary ergodic process with no periodic components, is
R_{xx}(T)) = 25 + $\frac{4}{1+6\,T^2}$. Find the mean and variance of the process X (t).

7 (a) State and prove the properties of cross correlation function.
(b) A random process is defined as X (f) = A coswt, where w is constant and A is a uniform random variable over (0, 1). Find the autocorrelation and covariance of X (t).

8 (a) Derive the expression for the power spectral density of input and output of a linear system.
(b) Prove that $|R_{xy}(T)| \leq \sqrt{R_{xx}(0)\,R_{yy}(0)}$.

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