R07

Code: R7210402

B.Tech II Year I Semester (R07) Supplementary Examinations December 2015

PROBABILITY THEORY & STOCHASTIC PROCESSES

(Common to ECE & ECC)

(For 2008 Regular admitted batch only)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1 (a) Define the term "independent events". State the conditions for independent of:
(i) Any two events.
(ii) Any three events A, B and C.
(b) Explain in detail about total probability.

2 (a) The sample space for an experiment is S = {0, 2, 4, 6}. List all the possible values of the following random variable:
(i) $X = 2S$.
(ii) $X = 2S^2 + 1$.
(iii) $X = \frac{1}{2S+1}$.
(b) Briefly explain about Rayleigh density function.

3 (a) Explain the following terms:
(i) Skew.
ii) Moments about the origin.
(b) Describe briefly about the transformation of a discrete random variable.

4 (a) Two independent random variables X and Y have densities $f_X(x) = 5\,e^{-5x}\,u(x)$ and $f_Y(y) = 2\,e^{-2y}\,u(y)$. Find the density of the sum Z = X + Y.
(b) Explain the properties of conditional density function.

5 (a) Explain the linear transformations of Gaussian random variables.
(b) Statistically independent random variables X and Y have moments m_{10} = 2, m_{20} = 16, m_{02} = 30, m_{11} = -10. Find the moment μ_{22}.

6 (a) Explain the classification of random processes.
(b) Find the auto correlation function of a random process with periodic sample function $p(t) = A\,sin^2\left(\frac{2\pi t}{T}\right)$ Where A and T>0 are constants.

7 (a) Define power spectral density. Prove that power density spectrum is real and even function in ω.
(b) Explain any four properties of cross-power density spectrum.

8 (a) Explain the following terms:
(i) Resistive noise source. (ii) Effective noise temperature. (iii) Noise figure.
(b) If X(t) is a differentiable WSS random process and $Y(t) = \frac{d}{dt}\,X(t)$. Find an expression for $S_{YY}(\omega)$ and $R_{YY}(\tau)$.

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