Code No: 153BQ **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, October - 2020

PROBABILITY THEORY AND STOCHASTIC PROCESSES

(Electronics and Communication Engineering)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

1.a) Write about the Binomial and Poisson distributions with their characteristics.
b) If A and B are independent events, prove that the events A′ and B, A and B, and A and B′ are also independent. [7+8]

2.a) If X and Y are two random variables which are Gaussian. If a random variable Z is defined as Z=X+Y, Find $f_Z(Z)$.
b) State and prove Bayes theorem of probability. [7+8]

3.a) Distinguish between the monotonic and non-monotonic transformations.
b) Prove that the variance of a weighted sum of uncorrected random variables equals the weighted sum of the variances of the random variables. [6+9]

4.a) Find the moment generating function about origin of the Poisson distribution.
b) Define conditional distribution and density function of two random variables X and Y. [8+7]

5.a) Discuss about the autocorrelation function and its properties
b) Let X be a random variable defined, Find E [3X] and E[X^2] given the density function as $f_x(x) = \begin{cases} (\pi/16)\cos(\pi x/8) & -4 \le x \le 4 \\ 0 & elsewhere \end{cases}$ [7+8]

6. A Gaussian random variable X having a mean value of zero and variance one is transformed to another random variable Y by a square law transformation. Find the density function of Y. [15]

7.a) Discuss the relation between PSDs of input and output random process of an LTI system.
b) Evaluate the PSD of a random process z(t) = X(t)+y(t) where x(t) and y(t) are zero mean, individual random process. [8+7]

8.a) Discuss about the Entropy and Information rate and their measurement parameters.
b) Explain the Source coding and mention the process of Huffman coding with an example. [7+8]

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