

Code No: 153BQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, March - 2022

PROBABILITY THEORY AND STOCHASTIC PROCESSES

(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Discuss about the Discrete and Continuous Sample Spaces.
 b) Find the probability of the card being either red or a king when one card is drawn from a regular deck of 52 cards.
 c) State and prove Bays theorem. [5+5+5]
- 2.a) Given $P(A) = 1/3$, $P(B) = 1/2$, $P(A \cap B) = 1/5$, then find $P(A \cup B)$ and $P(A^c \cap B^c)$.
 b) Differentiate between the joint probability and conditional probability.
 c) Define Gaussian and Rayleigh distribution functions. [5+5+5]
- 3.a) Show that the mean value of a weighted sum of random variables is equal to the Weighted sum of mean values.
 b) Write about Chebychev's inequality and mention about its characteristic function [8+7]
- 4.a) Define moment generating function. State and prove the properties of moment generating function.
 b) If X and Y are two random variables which are Gaussian. If a random variable Z is defined as $Z = X + Y$, Find $E_2(Z)$. [8+7]
- 5.a) Explain about the Autocorrelation function and mention its properties and use.
 b) Differentiate between a Gaussian random process and Poisson random process.
 c) Explain the concept of stationary process and write some examples. [7+4+4]
- 6.a) Show that the auto-correlation function and power density spectrum is Fourier transform pair.
 b) What is power spectrum? Explain its significance and relate this to cross power spectrum. [8+7]
- 7.a) Write about the different types of Noise sources and modeling in brief.
 b) Discuss about the quadrature representation of narrow band noise with its properties. [7+8]
- 8.a) Write a note on Mutual information and channel capacity of discrete channel.
 b) Explain about the Huffman coding and procedure for code implementation with example. [8+7]