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
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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 $F_Z(Z)$.   [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]

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