



R18 Regulation

Subject code: 2P4DE

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech IV Semester Supplementary Examinations, September 2023

Probability Theory and Stochastic Process

(ECE)

Maximum Marks: 70

Date: 23.09.2023 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Define probability of the event with an example.
- 2 Clearly explain about certainty and uncertainty with suitable examples.
- 3 Define Poisson random variable.
- 4 Explain central moments of a Random variable.
- 5 Write about linear transformations of Gaussian random variables.
- 6 Distinguish between joint distribution and marginal distribution.
- 7 Explain about second order stationary process.
- 8 Where the Poisson random processes is used? Explain.
- 9 Show that $S_{XX}(\omega) = S_{XX}(-\omega)$.
- 10 Write properties of cross power density spectrum.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 a. State and prove total probability' theorem. (5M)
b. Coin A has a probability of head = 1/4 and coin B is a fair coin. Each coin is flipped four times. If X is the number of heads resulting from coin A and Y denotes the same from coin B, what is the probability for X=Y? (5M)

OR

- 12 a. State Random Variable and Types of Random Variables with suitable example. (5M)
b. Define the term Independent events. State the conditions for Independence of (5M)
 - i) any two events A and B
 - ii) any three events A, B and C

- 13 Explain Probability Distribution Function and mention its properties. (10M)

OR

- 14 If X is a uniform random variable in $-5 \leq x \leq 5$. Find $E[X]$, $E[X^2]$, $E[2X+5]$, $E[(X+1)^2]$ $E[(3x-4)/5]$ (10M)

- 15 a. Define and explain joint density function of two random variables X and Y. (5M)
b. State properties of joint probability distribution function. (5M)

OR

16 Define conditional distribution and density function of two Random variables X and Y. (10M)

17 Define the terms: (i) Random process. (ii) Stationary random process. (iii) Wide sense stationary random process. (iv) Ergodic random process. (10M)

OR

18 Define cross correlation function of a random process. Write its properties and prove any four of them. (10M)

19 Derive the relation between PSDs of input and output random process of an LTI system. (10M)

OR

20 Explain about cross power spectrum density and its properties with proofs. (10M)