Code: 5G341

R-15

II B.Tech. II Semester Supplementary Examinations December 2022
Random Variables and Random Processes
(Electronics and Communication Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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UNIT–I

1. a) 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 and Y denotes the same from coin B, what is the probability for X=Y?   7M

    b) Explain about Conditional Distribution & Conditional Density Functions with necessary equations   7M

OR

2. a) Define Random Variable. Write about the continuous and mixed random variables.   6M

    b) Discuss the Independent and mutually exclusive events with an example each.   8M

UNIT–II

3. a) Determine the moment generating function about origin of the Poisson distribution.   8M

    b) Obtain the variance of Raleigh random variable   6M

OR

4. a) Find the Moment generating function of exponential distribution?   7M

    b) Calculate the characteristic function and first moment for $fX(x) =(1/b)exp(-(x-a)/b)$ for x a   7M

UNIT–III

5. a) Two statistically independent random variables X and Y have mean values $E[X] = 2$ and $E[Y] = 4$. They have second moments $E[X^2] = 8$ and $E[Y^2] = 25$. Find Variance of $W = 3X-Y$ 8M

    b) Write short notes on jointly Gaussian random variables.   6M

OR

6. a) Verify the properties of joint characteristic function.   7M

    b) Explain covariance of two random variables.   7M

UNIT–IV

7. a) If x (t) is a stationary random process having mean = 3 and auto correlation function: $RXX ( ) = 9 + 2^{|\cdot|}$. Find the mean and variance of the random variable.   7M

    b) With suitable example and mathematical equations, illustrate the difference between a wide-sense stationary and strict-sense stationary stochastic process   7M

OR

8. a) State and prove properties of cross correlation function   9M

    b) Classify random processes and explain.   5M

UNIT–V

9. a) Derive the relation between input PSD and output PSD of an LTI system   7M

    b) Find power spectrum of WSS noise process N(t) with autocorrelation function defined as below $R_{NN}(\tau) = Pe^{-3|\tau|}$ 7M

OR

10. a) Derive the expression for power density spectrum of a random process   7M

    b) Discuss properties of cross power density spectrum   7M

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