R20 Regulation *Subject code: 3P4DA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, July 2024

PROBABILITY THEORY AND STOCHASTIC PROCESS

(ECE)

Maximum Marks: 70 Date:18.07.2024 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 which carries 10M.
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)		CO	Bloom Tx
1	Define probability of the event with an example.	1	L1
2	Clearly explain about certainty and uncertainty with suitable examples.	1	L1
3	State the Rayleigh Random variable	2	L1
4	Write short notes on Chebychev's inequality.	2	L1
5	Define the joint moments about the origin.	3	L1
6	Prove that $\mu_2 = m_2 - m_1^2$?	3	L4
7	Explain about stationary process..	4	L2
8	Where the Poisson random processes is used? Explain	4	L1
9	List any two properties of cross PSD.	5	L1
10	Write properties of cross power density spectrum.	5	L2

Part-B

Answer All the following questions. (5X10M=50Marks)			
11	(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? (6M) (b) State and prove Bayes' theorem (4M)	1	L3
	OR		
12	A shipment of components consists of 3 identical boxes. One box contains 2000 components of which 25% are defective, the second box has 5000 components of which 20% are defective and third box contains 2000 components of which are 600 are defective. A box is selected at random and a component is removed at random from the box. i) What is the probability that this component is defective? ii) What is the probability that it came from the second box. (10M)	1	L3
13	Obtain the variance of Rayleigh random variable (10M)	2	L3

	OR		
14	(a) Obtain the expression for conditional density f X(X/B) where event B is defined as $\{ y\ a \leq Y \leq y\ b \}$. (6M) (b)State central limit theorem. (4M)	2	L3
15	(a)Explain Moments about the Origin and Moments about the Mean. (5M) (b)For the uniformly distributed Random Variable X, Determine (5M) i) Moment generating function ii) Mean and Variance	3	L1
	OR		
16	(a)Define conditional distribution and density function of two Random variables X and Y. (5M) (b) Obtain the characteristic function of Poisson random variable. (5M)	3	L2
17	Define autocorrelation function of a random process. Write properties of auto correlation function of a WSS process and prove any three of them. (10M)	4	L1
	OR		
18	(a)Define cross correlation function of a random process. Write its properties and prove any four of them. (6M) (b)Explain in brief the concepts of stationary random processes. (4M)	4	L2
19	Derive the relationship between cross-power spectrum and cross-correlation function. (10M)	5	L3
	OR		
20	The auto correlation of a stationary random process is given by $R_{XX}(\tau) = ae^{-b\|t\|}, b > 0$. Find the spectral density function. (10M)	5	L2