R18 Regulation *Subject code:* **2P4DE**

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, JULY 2021

PROBABILITY THEORY AND STOCHASTIC PROCESS

(ECE)

Maximum Marks: 70 Date:06.08.2021 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)

1 State Total probability theorem.

2 Define continuous random variable with examples.

3 Find the Binomial distribution if mean is 6 and S.D is $\sqrt{2}$.

4 Find the moment generating function for $P(X=x)=\begin{cases}\frac{1}{3} & for\ x=1\\ \frac{2}{3} & for\ x=2\end{cases}$.

5 Define conditional distribution for the random variables in discrete case.

6 Define the two-dimensional transformation of random variable.

7 Define second order stationary process.

8 Define cross correlation.

9 Find the mean and variance of random process from auto correlation $R(\tau)=18+\frac{2}{6+\tau^2}$.

10 Write any two properties of Power spectral density.

Part-B

Answer All the following questions. (5x10M=50Marks)

11 A factory has three machines A; B and C which generate items in the proportional 2:6:3. 50%; 70% and 90% of the items generated by A; B and C respectively are known to have standard quality. An item selected at random from a day's production is known to have quality. What is the chance that it came from C? (10M)

OR

12 A random variable X has the following probability distribution. (10M)

x	0	1	2	3	4	5	6	7
P(x)	0	β	2β	2β	3β	β^2	$2\beta^2$	$7\beta^2+\beta$

Find (i) the value of β (ii)$P(x<6)$, $P(x\geq 6)$ and $P(0<x<3)$ (iii) mean and variance.

13 A. Explain the properties of probability distribution function with proofs. (5M)

B. Write the density and distribution functions of gaussian and uniform random variables. (5M)

OR

14 A. Calculate first two moments about origin for the density function $f(x) = kx^2e^{-x}; x > 0$. (6M)

B. Let X be a continuous random variable with $f(x) = \begin{cases} \frac{x}{12}; 1 < x < 5 \\ 0; otherwise \end{cases}$. Find p.d.f. of 2X -3. (4M)

15 Let (X,Y) be a bivariate RV with joint probability $p(x, y) = \lambda(2x + 3y)$; $x = 0,1,2,3$ & $y = 1,2,3$. Find (i) the value of λ (ii) Marginal probability distributions of X & Y (iii) Cov(X,Y) (10M)

OR

16 A. Explain the properties of covariance with proofs. (5M)

B. Find the density functions of X and Y from the joint pdf $f(x,y) = e^{-(x+y)}, x > 0$ &$y > 0$. Also compute $f(x|y)$. (5M)

17 Consider the RP $X(t) = A\,cos(\omega t + \varphi)$ where φ is uniformly distributed in the interval$(0\,, 2\pi)$. Check whether X(t) is WSS or not. (10M)

OR

18 Suppose that customers arrive at a supermarket according to a Poisson Process with mean rate of 4 per minute. Find the Probability that during a time interval of 2 minutes (i) exactly 3 customer arrive (ii) exactly 4 customer arrive (iii) No customers arrive. (10M)

19 State and prove wiener khintchine relation (10M)

OR

20 A linear time invariant has a impulse response $h(t) = e^{-\beta t}U(t)$. Find the power spectral density of the Y(t) corresponding to the input X(t). (10M)