R17 Regulation

Subject code:1P3DD

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Year I Semester Supplementary Examinations, March/April 2023

Signals and Stochastic Process

ECE

Maximum Marks: 70

Date:04.04.2023 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 unit impulse function.

2 Define signal bandwidth and system bandwidth

3 What is half wave symmetry?

4 State the conditions for the existence of Fourier Transform.

5 Find laplace transform of $e^{-at}u(t)$.

6 Find z- transform and ROC of $x[n]=-a^n u(-n-1)$.

7 Give an example of a deterministic random process.

8 Write short notes on Gaussian random process.

9 Write the expression for power spectral density.

10 The output of a filter is given by Y(t)=X(t+T)+X(t-T), where X(t) is a WSS process, power spectral density Sxx(w), and T is a constant. Find the power spectrum of Y(t).

Part-B

Answer All the following questions. (10M X 5=50Marks)

11 Define orthogonal signal space and orthogonal vector space. Bring out clearly its applications in representing a signal and vector respectively. [10]

OR

12 Show that for linear phase systems, the impulse response is symmetrical about $t=t_d$. [10]

13 Expand following function f(t) by trigonometric Fourier series over the interval (0,1). In this interval f(t) is expressed as f(t) = At. [10]

OR

14 State and prove time reversal, time shifting and time scaling properties of Fourier Transform. [10]

15 Prove that $x(t)= e^{-at}u(t)$ and $x(t)= -e^{-at}u(-t)$ have the same X(S) and differ only in ROC. Also plot the ROC. [10]

OR

16 State and prove initial value and final value theorems of Z-Transform. [10]

17 Show that the random process $X(t) = A\cos(\omega_0 t+\theta)$ is wide-sense stationary if it is assumed that A and ω_0 are constants and θ is a uniformly density random variable over the interval $(0,2\pi)$. [10]

OR

18 Define autocorrelation function of a random process. Write its properties and prove any two of them. [10]

19 Explain about cross power spectrum density and its properties with proofs. [10]

OR

20 Derive the relationship between cross-power spectrum and cross correlation function. [10]