



**B.Tech III Semester Supplementary Examinations, July 2024**

**SIGNALS & SYSTEMS**  
(ECE)

**Maximum Marks: 70**

Date:25.07.2024 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	List out conditions to be power signal, with an example.		1	L1
2	Define the trigonometric Fourier series.		1	L1
3	Define Hilbert transform of a signal.		2	L1
4	What is aliasing effect?		2	L1
5	Does the impulse response of a nonlinear system characterize the system?		3	L1
6	Define Causality of signal.		3	L1
7	List out the properties of convolution.		4	L1
8	Define Cross-correlation.		4	L1
9	Why ROC cannot contain poles?		5	L1
10	Find the Z-transform of unit step function?		5	L1

**Part-B**

Answer All the following questions.		(5X10M=50Marks)		
11	a) Discuss the concept of impulse function. Explain how signum function is expressed in terms of unit step function. [5M] b) Prove that the complete set $\{ 1, \cos \omega t, \cos 2\omega t, \cos 3\omega t, \dots, \sin \omega t, \sin 2\omega t, \sin 3\omega t, \dots \}$ are orthogonal over the interval $(t_0, t_0 + \frac{2\pi}{\omega})$ . [5M]		1	L2
OR				
12	Find the Exponential Fourier series for the Square wave shown below. [10M]		1	L2

13	State and Prove Parseval's, linearity and conjugate symmetry property of Fourier Transform. [10M]	2	L2
	OR		
14	With the help of graphical representation analyze sampling theorem for low pass signals. [10M]	2	L2
15	Check whether the following system $y(t)=t^2x(t)+x(t-4)$ is [10M] (a) static or dynamic (b) linear or non-linear (c) causal or non-causal (d) time variant or invariant	3	L2
	OR		
16	a) Define Nyquist sampling rate and Nyquist sampling interval. What are effects of under sampling? [5M] b) Determine Nyquist sampling rate and Nyquist sampling interval of $x(t)=\text{sinc}(100\pi t) + 3\text{sinc}^2(60\pi t)$ . [5M]	3	L2
17	a) Write short notes on Power Spectral Density. [5M] b) State & prove properties of Auto-correlation of energy signals. [5M]	4	L2
	OR		
18	Explain about cross power spectrum density and its properties with proofs (any three properties) [10M]	4	L2
19	a) What is ROC? Discuss about ROCs of various classes of signals. [5M] b) Prove that the signals $x(t)=e^{-at}u(t)$ and $x(t)=-e^{-at}u(-t)$ have the same $X(s)$ and differ only in ROC. [5M]	5	L2
	OR		
20	Develop the inverse Z-transform of $X(z)=\frac{z}{z(z-1)(z-2)^2}$ using long division method. [10M]	5	L2