

**II B. Tech I Semester Supplementary Examinations, September - 2021**  
**SIGNALAS AND SYSTEMS**

(Electronics and communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions each Question from each unit  
 All Questions carry **Equal** Marks

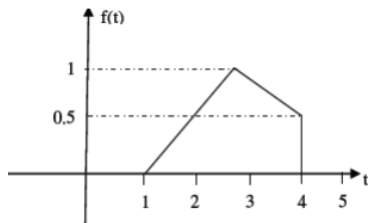
- 1 a) Find the expression for mean square error using the expression of a function using orthogonal signal space. [8M]  
 b) Examine whether the following system are time invariant or not. [7M]  
 (a)  $y(t) = tx(t)$  (b)  $y[n] = x[2n]$

Or

- 2 a) Estimate whether the following signals are energy signals or power signals [8M]  
 (a)  $x[n] = (\frac{1}{2})^n u[n]$   
 (b)  $x(t) = e^{-2t} u(t)$   
 b) Discuss about the Analogy between vectors and signals. [7M]
- 3 a) With regard to Fourier series representation, justify the following statements (a.) Odd functions have only sine term (b.) Even functions have no sine term (c.) Functions with half wave symmetry have only odd harmonics. [8M]  
 b) Determine the Fourier transform of the signal  $x(t) = e^{-at} u(t)$ ,  $a > 0$ , plot the Magnitude and Phase Spectrum. [7M]

Or

- 4 a) List the properties of continuous time Fourier series and explain them. [8M]  
 b) Find the Fourier transform of following waveform using the property of Fourier transform. [7M]

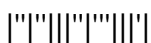


- 5 a) Determine the System response of the given differential equation [8M]  
 $y''(t) + 3y'(t) = x(t)$ , Where  $x(t) = e^{-2t} u(t)$ .  
 b) Explain causality and physical reliability of a system and explain Poly- Wiener criterion. [7M]

Or

- 6 a) The system produces the output  $y(t) = e^{-t} u(t)$  for an input  $x(t) = e^{-2t} u(t)$ . Predict [8M]  
 i) Frequency response ii) the impulse response.  
 b) Explain about Signal bandwidth and system bandwidth. [7M]
- 7 a) Obtain the Nyquist rate of the signal,  $x(t) = \cos 2000\pi t + 10\sin 10000\pi t + 20 \cos 5000\pi t$ . [8M]  
 b) Explain about Detection of periodic signals in the presence of noise by correlation. [7M]

Or



- 8 a) Consider the analog signal  $x(t) = 2\cos 2000\pi t + 5\sin 4000\pi t + 12\cos 2000\pi t$ . [8M]  
(i) Discuss the Nyquist sampling rate.  
(ii) If the analog signal is sampled at  $F_s = 5000\text{Hz}$ , formulate the discrete time signal obtained by sampling.
- b) List the properties of Cross correlation function. [7M]
- 9 a) Discover the initial value and final value of signal  $x(t)$  whose Laplace Transform is [8M]
- $$X(s) = \frac{2s+5}{s(s+3)}$$
- b) Create the Laplace Transform of  $x(t) = t^2 e^{-2t} u(t)$  [7M]

Or

- 10 a) Find the Z transform of the unit step function and determine ROC. [7M]

