B.E. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester - IV

SE205 (PCC) - Signals & Systems

P. Pages : 2 **GUG/S/23/13860**

Time : Three Hours * 2 5 9 7 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. Due credit will be given to neatness and adequate dimensions.
5. Use of slide rule, Logarithmic tables is permitted.
6. Non programmable calculator is permitted.

1. a) Check whether following equations are causal or non-causal. **8**

i) $y(t) = x^2(t) + x(t-3)$ ii) $y(t) = x(3-t) + x(t-2)$

iii) $y[n] = x[2n]$ iv) $y[n] = \sin(x[n])$

b) Define and explain basic types of signals. **8**

i) Unit Step signal ii) Ramp signal

iii) Unit Impulse signal iv) Sinusoidal signal

OR

2. a) Check for linearity of following equations. **8**

i) $y(t) = e^{x(t)}$ ii) $y(t) = tx(t)$

b) Check shift invariancy for given system. **8**

i) $y(t) = 2 + x(t)$ ii) $y(t) = x(2t)$

iii) $y(t) = \cos t + x(t)$ iv) $y(t) = x(\sin t)$

3. a) Find the convolution using graphical method for the signals. **8**

$x(t) = e^{-2t}u(t); h(t) = u(t+3)$

b) Check whether the given system is LTI or not. **8**

i) $y(t) = x^2(t)$ ii) $y(t) = x(t-1)$

OR

4. a) Perform the convolution of following signals. **8**

$x_1(t) = tu(t);\ x_2(t) = e^{-2t}u(t)$

b) Find the frequency response and impulse response of the given system. **8**

Input $x(t) = e^{-t}u(t)$; output $y(t) = e^{-2t}u(t) + e^{-3t}u(t)$

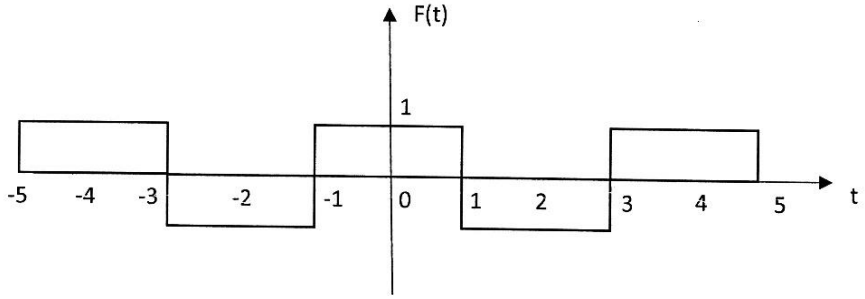
5. a) Find the Fourier transform of signal $x(t) = e^{-at} \cdot u(t)$ plot its magnitude and phase spectrum a > 0. **8**

b) State and explain the sufficient condition for the existence of a Fourier transform of discrete time signals. **8**

OR

6. a) State and explain Parseval's theorem. **8**

b) Calculate Fourier coefficient of given square wave of time T = 4 and amplitude 1. **8**



7. a) Determine z-Transform for discrete time signals. **8**

$x[n] = (2)^n \cdot u[-n-3]$

b) Explain the properties of Laplace transform. **8**

i) Time Scaling ii) Integration frequency

iii) Time shifting iv) Differentiation in time

OR

8. a) Determine the Laplace transform of given signal. **8**

i) $x(t) = e^{-5t}u(t) + e^{-2t}u(-t)$ ii) $x(t) = (e^{-3t}2\cos 5t - e^{-3t}3\sin 5t)$

b) Determine z-Transform for discrete time signals. **8**

i) $x[n] = (1/4)^n u[n-4]$ ii) $x(n) = \sin(w_d n)\, u(n)$

9. a) What is filter ? Write and explain types of filters. **6**

b) State & prove sampling theorem. **6**

c) What is Aliasing and its effects on reconstruction of signal. **4**

OR

10. a) Relation between continuous and discrete time systems. **4**

b) Explain modulation in details. Write types of modulation used for communication. **6**

c) An analog signal $x(t) = 2\sin(480\pi t) + 3\sin(720\pi t)$ is sampled 600 times per second. **6**
Determine :

i) Nyquist sampling rate ii) Discrete time signal x(n) after sampling

iii) Discrete time signal if sampling rate.

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