

Code No: 156CV

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, August - 2022

SIGNALS AND SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 Hours

Max.Marks:75

Answer any five questions  
All questions carry equal marks

- - -

- 1.a) Show that complex exponential functions forms complete orthogonal set over the interval  $\left(t_0, t_0 + \frac{2\pi}{\Omega}\right)$ .
- b) Prove that RC network is Linear Time Invariant System. [8+7]
- 2.a) Find the Exponential Fourier series of Half wave rectified sinusoidal wave.
- b) Find and sketch the Fourier spectrum of the Power signal with frequency 50Hz. [8+7]
- 3.a) Derive the conditions for distortion less transmission systems.
- b) Find the convolution between two rectangular pulses of unit width. [8+7]
- 4.a) Find the Impulse response of the system described by the differential equation  $y''(t) + 3y'(t) + 2y(t) = x(t)$ .
- b) Find the Inverse Z-Transforms of the signals i)  $X(z^{-1})$  ii)  $X(-Z)$ . [8+7]
- 5.a) State and prove Uniform Sampling Theorem for band limited signals, with the necessary mathematical equations. Also sketch the neat graphs (in time domain, Frequency domain).
- b) Find and Sketch the Power spectral density function of the signal: [8+7]  
 $x(t) = A \cos(\omega t + \theta)$
- 6.a) State and prove the properties of Impulse Function.
- b) State and prove the Parsevals Theorem of Fourier Transform. [7+8]
- 7.a) Derive the relationship between rise time and bandwidth of a system.
- b) Determine the Z-Transform, also sketch the pole, zero locations, and associated ROC of the signal  $x(t) = \left(\frac{1}{2}\right)^n u(n) - \left(\frac{1}{3}\right)^n u(-n-1)$ . [7+8]
- 8.a) Write notes on Natural Sampling.
- b) Find the relationship between the convolution and correlation in time and frequency domain. [7+8]

---oo0oo---