**R18**

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**

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1.a) Show that complex exponential functions forms complete orthogonal set over the interval $\left(t_0, t_0 + \frac{2\pi}{\omega_0}\right)$.

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]

$$x(t) = A\cos(\omega_0 t + \theta)$$

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]

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