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BIEL-007

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00693

Term-End Examination

June, 2014

BIEL-007 : SIGNALS AND SYSTEMS

Time : 3 hours *Maximum Marks : 70*

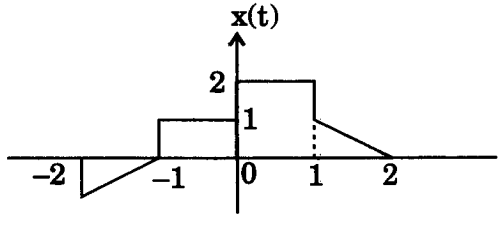
Note : *There are seven questions. Attempt any* ***five*** *questions. All questions carry equal marks.*

1. (a) What is the definition of signal ? Classify the signals with example.

(b) Label and sketch the following graphs :

(i) $x(4 - \frac{t}{2})$

(ii) $x(2 - t)$ *2×7=14*



2. (a) What do you understand by LTI system. Check whether the following systems are LTI or not.

(i) $2 \cdot \frac{d^2y(t)}{dt} + 5 \cdot \frac{dy(t)}{dt} + 3 \cdot y(t) = t \cdot x(t)$

(ii) $n^2 y[n-2] + 3y[n] = 5x[n-1]$

(b) Find convolution sum of x[n] and h[n] where x[n] = {1, – 2, 3} and h[n] = {2, 3, 4, 1}.

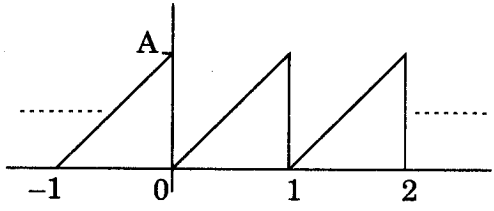
2×7=14

3. (a) Define impulse response of a system. Why is impulse response of so much importance ?

(b) What are different types of interconnection of systems ? *2×7=14*

4. (a) Find trigonometric Fourier series of periodic waveform.

$x(t) = At \qquad 0 \le t \le 1$



(b) Find and plot the magnitude and phase spectra of the signal

$x(t) = A \cdot e^{-t/T} U(t)$

where A and T are real valued constants. *2×7=14*

5. (a) State and prove Convolution theorem of Fourier transform.

(b) If $x[n] = \begin{cases} a^n & 0 \le n \le (N-1) \\ 0 & \text{otherwise} \end{cases}$

show that $x(z) = \dfrac{1 - a^N z^{-N}}{1 - az^{-1}}$; $|z| > |a|$.

2×7=14

6. (a) Find Z-transform and ROC for the following sequence

$$x[n] = -b^n U[-n-1]$$

(b) Using long-division method, find first four terms of the sequence x[n] if

$$x(z) = \frac{z}{3z^2 - 4z + 1}, \text{ when ROC is}$$

(i) $|z| > 1$

(ii) $|z| < \dfrac{1}{3}$ *2×7=14*

7. Write short notes of 100 words each on any ***two*** of the following : *2×7=14*

(a) Basic operations on signals

(b) Energy signals and Power signals

(c) Fourier Transform

(d) Z-transform applications