

B.E. Electronics & Communication/Telecommunication Engineering (Model Curriculum) Sem-III
004 : Signals and Systems

P. Pages : 2

Time : Three Hours



GUG/W/22/13909

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.

1. a) Given the signal $x(t)$. Draw signals $x(t+1)$, $x(-t-1)$, $x(-t)$, $x(t/2)$. 8

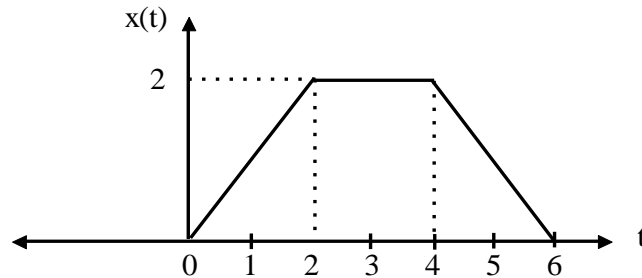


Fig. 1

- b) Determine whether the following signals are periodic or aperiodic, If periodic. Determine its fundamental period. 8

i) $x(t) = \sin 6\pi t + \cos 5\pi t$ ii) $x(t) = 10 + e^{\frac{j2\pi}{5}t} + e^{\frac{j3\pi}{7}t}$

OR

2. a) Determine and sketch the even and odd parts of the signal $x(n)$ given as $x(n) = \{-1, -1, 1, 1, 1, 1\}$ 8

- b) Define Energy Signal and Power Signal and calculate Energy of following signal 8
 $x(t) = e^{-at} u(t) : a > 0 : a = 0 : a = 0$

3. a) Find the circular convolution of two sequences. 8
 $x(n) = \{3, 2, -1, -2, 3, 2\}$ and $h(n) = \{3, 2, 2\}$

- b) List out the properties of LTI system. Describe any two with details. 8

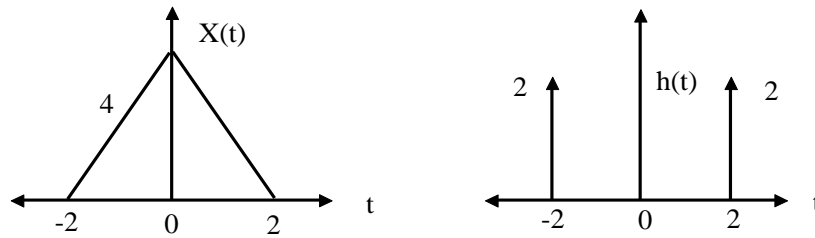
OR

4. a) Compute the following convolution 8

i) $x(n) = \{1, -2, 2, -1, 0, 1\}$
 $h(n) = \{1, 2, 3, 0\}$

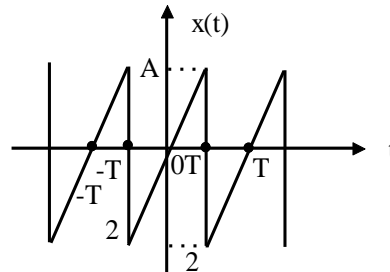
ii) $x(n) = \{1, 2, 4\}$,
 $h(n) = \{1, 1, 1, 1\}$

5. a) Obtain the convolution between the two signals. 8



- a) Find the DFT of following discrete time signal $x(n) = \{2, -1, -2, 1\}$ 8

- b) Determine the trigonometric form of Fourier series for the signal shown in fig. 2. 8



OR

6. a) Determine the Fourier series representation of the following discrete time signal $x(n) = \{ \dots, 2, 3, -2, 2, 3, -2, 2, 3, -2, \dots \}$ 8

- b) Prove the following properties of Fourier transform. 8

- i) Time scaling. ii) Time convolution

7. a) State and prove the convolution property of z-transform. 8

- b) 8

If $Y(z) = \frac{1 - 3z^{-1}}{(1 - \frac{1}{2}z^{-1})(1 - 2z^{-1})}$

Find the inverse Z-Transform if

- i) System is stable ii) System is causal iii) System is anticausal

OR

8. a) What is ROC of Laplace transform? State its properties. 8

- b) Determine the inverse Z-transform of 8

$$x(z) = \frac{z(z-1)}{(z+1)^3(z-2)} \quad |z| > 2$$

9. a) State and prove the Sampling theorem. 8

- b) Define the following terms. 8

- i) Zero order hold sampling ii) Aliasing effect.

OR

10. a) Write short note on flat-Top sampling. 8

- b) Explain the reconstruction of signal from its samples using interpolation. 8
