Roll No .....

# EC-225

## B.E. IV Semester

Examination, June 2017

## Choice Based Credit System (CBCS)

## Signals and System

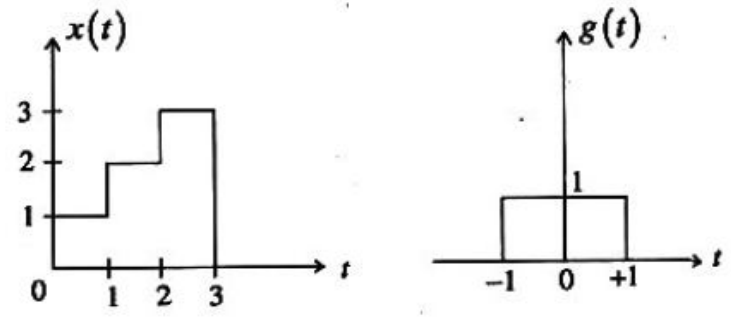
***Time : Three Hours***

***Maximum Marks: 60***

***Note:*** i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Two signals $x(t)$ and $g(t)$ as shown in Fig. Express the signals $x(t)$ in terms of $g(t)$.




b) Determine whether the following signals are energy or power and calculate their energy or power:

i) $x(n)=(0.5)^n u(n)$

ii) $x(t)=\cos^2(wt)$







2. Check the followings are stable, causal and memoryless:

a) $h(n)=e^{-4|n|}$

b) $h(n)=2u(n)-2u(n-2)$

c) $h(t)=e^{-t}u(t+100)$

d) $h(n)=\delta(n)+\sin(n\pi)$

3. a) Determine the transfer function and impulse response for the causal LTI system described by the difference equation:

$$y(n)-\left(\frac{1}{4}\right)y(n-1)-\left(\frac{3}{8}\right)y(n-2)=-x(n)+2x(n-1)$$

b) The impulse response of a discrete LTI system is given by,

$h(n)=u(n+1)-u(n-4)$. The system is excited by the input signal $x(n)=u(n+1)-2u(n-2)+u(n-4)$. Obtain the response of the system $y(n)=x(n)*h(n)$ and plot the same.

4. a) Find the inverse z-transform of the function:

$$x(z)=\frac{z^4+z^2}{z^2-\frac{3}{4}z+\frac{1}{8}};|z|>\frac{1}{2}\text{ by}$$

Partial fraction expansion method.

b) Find the Z-transform of the function and indicate the ROC:

$$x(n)=n(n+1)a^n u(n)$$

5. a) Determine the impulse response of the sequence described by

$$y(n)-2y(n-1)+y(n-2)=x(n)+3x(n-3)$$

b) Find convolution of 2 finite duration sequences,

$h(n)=a^n u(n)$ for all $n$ and $x(n)=b^n u(n)$ for all n

i) When $a=b$

ii) When $a\neq b$

6. a) Determine the DTFS coefficients of,

$$x(n)-1+\sin\left\{\frac{1}{12}\pi n+\frac{3\pi}{8}\right\}$$

b) Find the DTFT of the signal $x(n)$ given by $x(n)=u(n)-u(n-N)$; where N is any positive integer. Determine the magnitude phase components for N = 5.

7. a) Draw the direct form I and direct form II implementations for:

$$y(n)-\frac{1}{2}y(n-1)-y(n-3)=3x(n-1)+2x(n-2)$$

b) What is the impulse response of two LTI systems connected in parallel?





a) State and prove differentiation in Z-domain property of Z-transforms.

b) Derive the relation between Z-transform and Fourier transform.

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