8. 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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Roll No .....

EC-225

B.E. IV Semester

Examination, June 2017

Choice Based Credit System (CBCS)

Signals and System

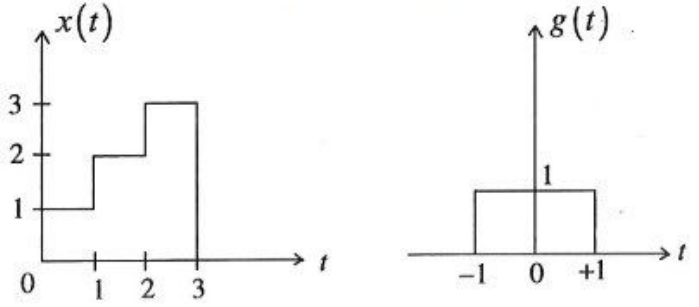
Time : Three Hours

Maximum Marks: t

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 th signals $x(t)$ in terms of $g(t)$.



   b) Determine whether the following signals are energy 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:

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

   Partial fraction expansion method.

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

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

5. a) Determine the impulse response of the sequenc 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 b $x(n)=u(n)-u(n-N)$; where N is any positive intege Determine the magnitude phase components for N = 5.

7. a) Draw the direct form I and direct form II implementation 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 system connected in parallel?