END SEMESTER EXAMINATION APRIL/MAY 2013

EC 9203 SIGNALS AND SYSTEMS

ELECTRONICS AND COMMUNICATION ENGINEERING

III SEMESTER

R2008

Time 3 hr **Max Marks 100**

AnswerAll Questions

PART A(10x2=20)

1. Determine whether or not the given signal is periodic signal. If periodic find the fundamental period. $x[n]=e^{-j5\pi n}$
2. What is meant by Causal system? Determine whether or not the given system is causal y(t)=x(t-7)
3. Find the Laplace transform of the signal and its ROC. $x(t)= e^{-at} u(t)$.
4. State the multiplication property of Fourier transform.
5. A causal LTI system has the system function $H(s)=\frac{1}{s-5}$ .Determine the differential equation that describes system.
6. Define the term 'state'.
7. Determine the minimum possible sampling frequency required for sampling the signal without aliasing effect. $y(t)=3\cos 2\pi x_1 t+2\cos 2\pi x_2 t$.
8. Draw the spectrum of $\cos 5n$
9. A discrete time system has the impulse response of $h[n]=a^{-n}.u[n]$;a<0.Determine whether or not the system is stable.
10. Obtain y[n]=x[n]*h[n],where $h[n]=\delta[n]+\delta[n+1]$.

PART B(5X16=80)

11.i) A discrete time system output is given by y[n] =0 ; x[n]<0

=x[n]+x[n+5] ; x[n]≥0

Determine whether or not the following properties hold for the system

a).Memory b).Linearity c).Time invariant

Give proper justification. (6)

ii) The signal x(t) is given in Figure.1.Sketch and label each of the following signal.

a)x(t-3) b)x(-2t+5) c) $x_{even}(t)$ d) x(-t).u(t) (10)

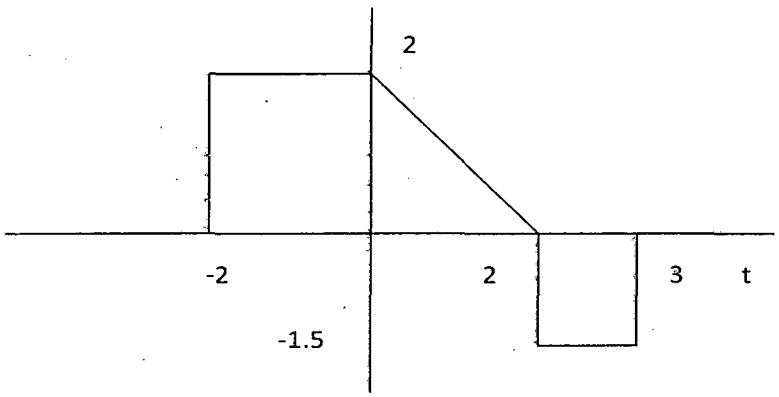

Figure.1

12.a. i)Determine the Fourier series representation of the periodic rectangular pulse with period of 2. (10)

ii)Determine the Fourier transform of the periodic impulse train. (6)

OR

12.b. Determine the Laplace transform of $x(t)=e^{-a|t|}$; a>0.Sketch the ROC for a<1 and a>1.

13.a. A continuous time LTI system has the impulse response $h(t)=e^{-3t}u(t)$.Determine the output response of this system for the input x(t)=u(t-3)-u(t-5).

OR

13.b. Consider LTI system whose response to the input $x(t)=[e^{-3t}-e^{-t}]u(t)$ is

$y(t)=2[e^{-t}-e^{-4t}]u(t)$.

i)Find the frequency response of the system (6)

ii)Determine the system's impulse response. (6)

iii)Find the differential equation relating the input and output of this system. (4)

14.a.i. Consider a discrete time LTI system with impulse response $h[n]=(1/2)^n u[n]$.Using Fourier transform determine the response of the system to the input $x[n]=(n+1)(1/5)^n u[n]$. (10)

ii)Discuss the low pass sampling theorem. (6)

OR

14b.i. Determine the Z-transform of $x[n] = \{(1/8)^n \cos(\pi/8n), n \leq 0$ and x[n]=0 for any other value of *n*. Draw the ROC and mark the poles and zeros. (10)

ii. The input output relationship of the system is described by

y[n-2]+y[n]=2x[n].Determine the transfer function of the system. (6)

15.a.i. Realize the given LTI system using direct form II.

y[n]-5/6y[n-1]+1/6y[n-2]=x[n]+2x[n-1) (8)

ii. Determine the impulse response of the above system assuming the system is causal and stable. (8)

OR

15.b. Find the state variable of the system described in Question No.15.a.
