

**B.E /B.Tech DEGREE END SEMESTER EXAMINATIONS NOV/DEC 2012**

21

Branch - Electronics and Communication Engineering

III Semester

EC9203 Signals and Systems

Time: 3 hours

Max marks: 100

Answer **ALL** questions

**PART-A (10 x 2 =20 MARKS)**

1. Define and plot the following signals. (a)delta (b)unit step (c)gate function (d)real exponential
2. Define Linear-time invariant system.
3. What are the differences between Fourier series and Fourier transform?
4. What are the differences between Fourier transform and Laplace transform?
5. Write down the constant differential equation to represent a continuous time system.
6. What are the steps involved in computing convolution integral?
7. What is meant by Nyquist rate?
8. Define discrete time Fourier transform.
9. Draw the direct form-II representation of a third order system.
10. What is state space model?

**PART-B (5 X 16 = 80 MARKS)**

11. (i) Find the Fourier transform of a rectangular pulse with amplitude A and width T second. Draw the spectrum of the signal. (8)

- (ii) Find the Fourier series of the signal shown in the figure and plot the magnitude spectrum.

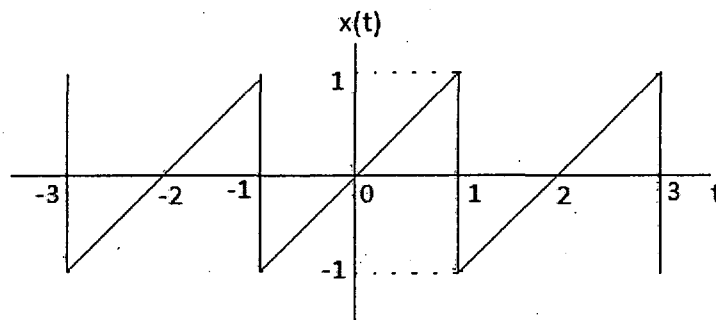


Fig. 11.(ii)

(8)

12. a (i) Draw the plot of complex exponential signal and explain. (8)

(ii) Sketch and label carefully  $x(4-(t/2))$  and  $[x(t) + x(-t)]$  for the signal  $x(t)$  shown in figure.12 a ii

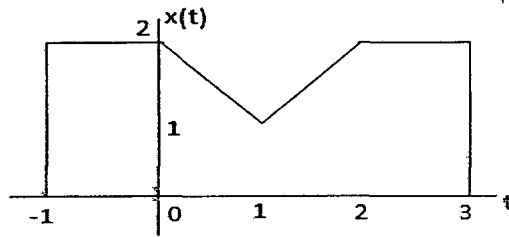


Fig. 12.a.(11)

(4+4)

(OR)

12. b (i) Let  $y(t)$  is the response of the signal  $x(t)$ . Find the response of the signal  $x_1(t)$  shown in the figure using LTI property. (8)

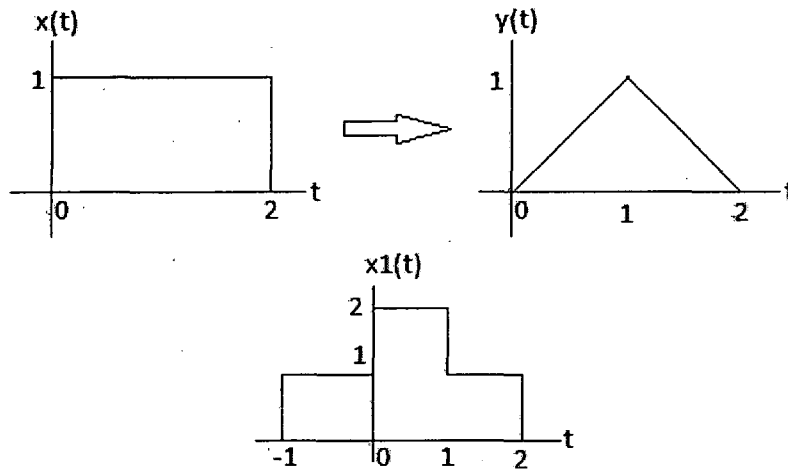


Fig. 12.b(i)

(ii) The two signals  $x(t) = \cos(2\pi 10t)$  and  $y(t) = \cos(2\pi 50t)$  are sampled at a rate of 50 Hz. Plot the sampled signals  $x(n)$  and  $y(n)$  upto six samples. What is your observation? Give the reason. (8)

13. a (i) Find the causal signal whose transform is given by  $X(s) = (s+4)/(s^2 + 4s+5)$  (8)

(ii) Sketch the magnitude and phase of the frequency response  $H(e^{j\omega}) = (1 - 2 e^{-j\omega})/(1 + \frac{1}{2} e^{-j\omega})$  (8)

(OR)

13. b (i) Compute the convolution of the two signals given by  $x(t) = 1$  for  $0 < t < 2$  and

$y(t) = 1$  for  $0 < t < 1$  and  $-1$  for  $1 < t < 2$  (8)

(ii) Find the impulse response of a system which produces the output  $y(t) = e^{-t} - e^{-2t} u(t)$  for an

input  $x(t) = e^{-3t} u(t)$  (8)

14. a (i) Find the DTFT of the signal  $x(n) = a^n u(n)$  and plot the magnitude and phase spectrum. (10)

(ii) Find the output of the system which are in series  $h_1(n) = (1, 1, 1)$  and  $h_2(n) = (1, 1, 1)$  for the step input (6)

(OR)

14. b(i) Find the causal sequence whose transform is given by  $X(z) = (1 - 2z^{-1}) / (1 - (5/2)z^{-1} + z^{-2})$  (8)

(ii) Determine the Z-transform of the signal  $x(n) = [(1/4)^n + (3/4)^n] u(n)$  of the system. Plot the pole and zero location and its ROC (8)

15. a(i) Draw the direct form representation of the system given by  $H(z) = (2 + 3z^{-1} + 4z^{-2}) / (1 + 5z^{-1} + 6z^{-2} + 7z^{-3})$

(ii) Find the impulse response of the system shown in figure. (8)

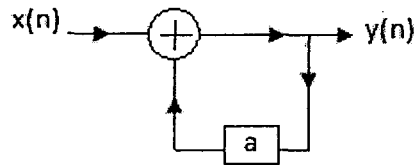


Fig. 15.a(ii)

(OR)

15. b(i) Draw the state space matrices A, B, C, D for the problem 15. a (i) (8)

(ii) Determine the response of a unit step function for a system given by the difference equation  $y(n-2) - (10/3)y(n-1) + y(n) = x(n)$  (8)