



Code No. : 5443/N

FACULTY OF INFORMATICS  
B.E. 2/4 (IT) II Sem. (New) (Main) Examination, May/June 2012  
SIGNALS AND SYSTEMS

Time: 3 Hours]

[Max. Marks: 75

**Note :** Answer *all* questions from Part A. Answer any *five* questions from Part B.

PART – A (25 Marks)

1. How are signals classified ? What are the basic operations on signals ? 2
2. Sketch the following signal  
 $u(-n + 2) - u(-n - 2)$  2
3. How do you obtain exponential Fourier series coefficients from trigonometric Fourier series coefficients ? 2
4. State the convolution property of Fourier transform. 3
5. What is region of convergence wrt z- transform ? 2
6. Distinguish between auto correlation and cross correlation. 3
7. When does aliasing occur ? How can it be avoided ? 3
8. What is the function of ADC ? 2
9. Find the inverse z -transform of  $X(z) = \frac{z}{(z - 2)(z + 3)}$ . 3
10. Define BIBO stability. 3



## PART - B

11. a) Determine the triconometric Fourier series of the signal shown in Figure 1 6

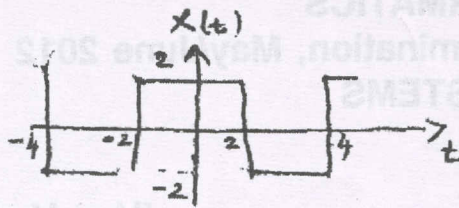


Fig. 1

- b) For the signal  $x(t)$  shown in Figure 2, find the signal  $x(-t-2)$ . 4

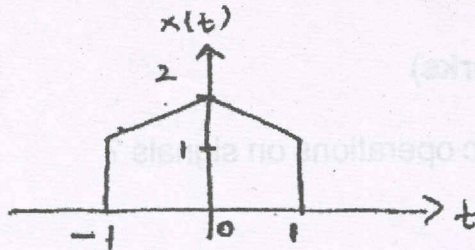


Fig. 2

12. a) Find the Fourier transform of the function  $x(t) = [u(t+2) - u(t-2)] \cos 2\pi t$ . 5  
 b) State and prove Parseval's theorem for energy and power signals. 5
13. a) What is Zero Order Hold ? Give its representation. 5  
 b) Solve  $\frac{d^2x(t)}{dt^2} + \frac{5dx(t)}{dt} + 5x(t) = e^{-7t} u(t)$   $x(0) = 0$   $\dot{x}(0) = 0$  use LT. 5
14. a) Determine the Nyquist sampling rate and Nyquist sampling interval for  $x(t) = 10 \sin 100\lambda t + 2 \sin 200\lambda t$ . 5  
 b) State and prove sampling theorem. Define band limited signal and bandwidth of a signal. 5
15. a) Distinguish between convolution and correlation. 5  
 b) Find the solution of the following difference equation  $y(n+1) - \frac{1}{4}y(n) = \frac{1}{4}x(n)$   
 $y(0) = 0$   $x(n) = u_s(n)$ . 5
16. a) Prove that the sequences  $x(n) = a^n u(n)$  and  $x(n) = -a^n u(-n-1)$  have the same  $x(z)$  and differ only in ROC. Also Plot their ROCs. 5  
 b) Find the ZT of  $(0.1)^n u_s(n) - 2^n u_s(-n-1)$  and sketch the ROC. 5
17. Write MATLAB program for  
 a) Determination of Fourier transform.  
 b) Scaling of discrete time signals.  
 c) Convolution