Code No. 5436 / N

FACULTY OF INFORMATICS

B.E 2/4 (IT) II – Semester (Main) Examination, May/ June 2016

Subject: Signals and Systems

Time: 3 hours

Note: Answer All questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 Define unit impulse and unit step signals. 2M

2 Show that the exponential signal e^{-3t} .u(t) is an energy signal. 2M

3 Write the conditions for existence of Fourier series. 3M

4 Derive relationship between the coefficients of Exponential and Trigonometric Fourier series. 3M

5 Write any three properties of Fourier Transform. 3M

6 What is the relationship between Fourier Transform and Laplace Transform? 2M

7 Sketch the following. 3M
   a) u(n)
   b) u(n) - u(n-4)

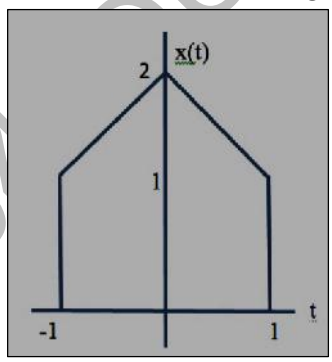
8 Define aliasing. 2M

9 Write any three properties of Z-Transform. 3M

10 Find DTFT of a^n.u(n) 3M

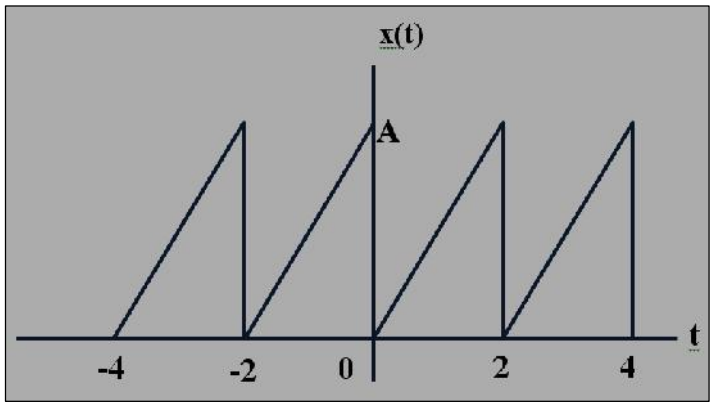
PART – B (50 Marks)

11 a) For the signal x(t) shown in figure, Sketch the following. 6M
   i) x(t–3)
   ii) x($t/2$ –1)
   iii) x(1 – t)
   iv) x(–2t)

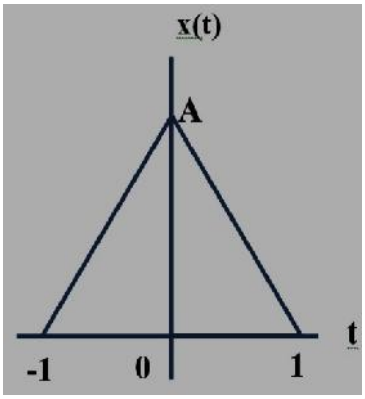


   b) Check whether the following systems are Time–invariant or not. 4M
   i) y(t) = t.x(t+2)
   ii) y(t) = x(t-2) + $e^{x(t)}$

12 Find the Cosine & Trigonometric Fourier series for the signal x(t) shown in figure and sketch magnitude, phase spectra. 10 M



13 a) For the signal x(t) shown in the Figure, Find the Fourier Transform. 6M



b) Find the Inverse Laplace Transform of $X(S) = \frac{6(S+34)}{S(S^2+10S+34)}$ 4M

14 a) Explain any three properties of Laplace Transform with suitable examples. 6M

b) Find the Inverse Z - Transform of $X(Z) = \frac{(8z-19)}{(z-2)(z-3)}$ 4M

15 a) State and Explain Sampling theorem for band limited signals. 7M

b) Find the Nyquist Rate and Nyquist Interval for the signal
x(t) = sinc (100πt) + 2 sinc (50πt)

16 Solve the following difference equation $y(n) - \frac{5}{6} y(n-1) + \frac{1}{6} y(n-2) = 5\,x(n-1) - x(n-2)$. If the initial conditions are y(-1)=2 , y(-2)=0 and input x(n)=u(n). Separate the system response into zero input and zero state components. 10M

17 Write Short notes on

a) Properties of DTFT. 4M

b) Orthogonal Signals 3M

c) Ideal Filters 3M

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