FACULTY OF INFORMATICS

B.E. 2/4 (IT) II – Semester (Main) Examination, May 2013

Subject: 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. Define 'signal' and 'system.   (2)
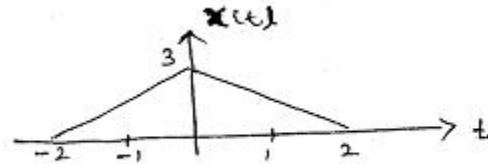2. A continuous-time signal $x(\epsilon)$ is shown in Figure (i). Plot x(2-t) and x(t/2).   (3)

Figure (i)

3. Prove that if $x(t) \leftrightarrow x(w)$ then $x(at) \leftrightarrow \dfrac{1}{|a|} x \left|\dfrac{w}{a}\right|$.   (3)
4. Distinguish between energy and power signal.   (2)
5. Draw a discrete signal and quantized signal.   (2)
6. Plot the amplitude spectrum of $x(\epsilon) = 5 \cos 2\pi (1K)t$.   (3)
7. Find $z\,[\delta\,((n-4)]$ (3)
8. Plot $y_1 = 4x(n)$ and $y_2(n) = x\,(2n)$ for the x(n) shown in Figure (ii).   (3)
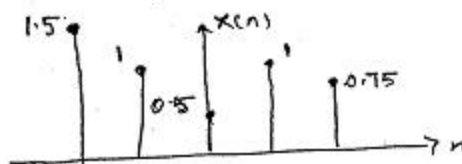

Figure (ii)

9. Distinguish between autocorrelation and cross correlation.   (2)
10. Define two-sided z-transform.   (2)

PART – B (50 Marks)

11.(a) Define the following commonly use of functions
     i) Unit step   (ii) Signum   (iii) sinc functions   (6)

  (b) State whether the signal $x(\epsilon) = Ae^{3t}$ is a power signal or energy signal. Justify your
      answer.   (4)

12.(a) Explain 3 different representations of Fourier Series.   (5)

  (b) Prove that $\delta\,(at) = \dfrac{1}{|a|}\,\delta\,(t)$.   (5)

13.(a) Find the Fourier transform of the signals   (6)
     i) $x(t)\sin(w_0 t)$
     ii) $x(t) = \delta\,(t + t_0) + \delta\,(t-t_0)$
  (b) Compare LT and FT.   (4)

14.   Find the solution of the following differential equation   (10)
      $\ddot{y}(t) + 6\dot{y} + \log\,(t) = x(t)$
      $y(0) = 2\,\dot{y}\,(0) = 1.5\ x(t) = (1-e^{-3t})y(t)$

15.(a) State and prove sampling theorem. (6)

    (b) What is the function of ADC? (4)

16.(a) Determine the sequence y(n) if

$$y(z) = \frac{1}{z^2 - 1.5z + 0.2}$$ (7)

    (b) What do you understand by BIBO stability? (3)

17.   Write a MATLAB program

    a) Fourier Series computation (5)

    b) Scaling of discrete-time signals. (5)

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