ELS 408

First Semester M.Sc. Degree Examination, Dec. 2018/Jan. 2019
(CBCS Scheme)
ELECTRONICS
Signals and Systems

Time : 3 Hours   Max. Marks : 70

PART – A

Answer **all** questions.   **(2×5=10)**

1. a) Define signal and system.

   b) What is LTI system ?

   c) State linearity and time shift properties of Fourier series.

   d) What is the difference between Laplace transform and Fourier transform.

   e) What is ROC ?

PART – B

(20×3=60)

2. a) Discuss the classification of signals.

   b) Explain the time shifting, time scaling and reflection operations on signals.
                                                                                  (10+10)

OR

3. a) State the properties of system.

   b) Find the even and odd components of the signal
      x(t) = cos(t) + sin(t) + sin(t) cos(t).

   c) Describe various operations that can be performed on the values of
      signals.   **(5+5+10)**

4. a) Describe frequency shift and convolution properties of continuous time Fourier series.

   b) Determine the Fourier series representation of square wave defined by

   $x(n) = 1$ for $-M \leq n \leq M$,

         0 for $M < n < N - M$ **(10+10)**

   OR

5. a) Describe linearity and convolution properties of discrete time Fourier transform.

   b) Find the Fourier transform of following :

   i) $x(t) = e^{-at}u(t)$

   ii) $x(t) = 1$ for $-T_0 \leq n \leq T_0$,

         0 for $M < n < N - M$ **(10+10)**

6. a) Describe eigenvalue property of e^{st}.

   b) Determine the Laplace transform of $x(t) = e^{at}u(t)$ and depict ROC, location and poles. Assume a is real.

   c) For a system with impulse response $h(n) = (3/4)nu(n)$, determine the output of the system at times $n = -5$, $n = 5$, $n = 10$ when the input is $x[n] = n[u]$.

                                                        (5+5+10)

   OR

7. a) Derive Parseval's relations for continuous time signals and hence explain energy density spectrum and power density spectrum.

   b) State the properties of unilateral Laplace transform. Find the Laplace transform of $x(t) = (-e^{3t} u(t)) * (tu(t))$.   **(10+10)**

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