B TECH
(SEM-III) THEORY EXAMINATION, 2018-19
SIGNALS AND SYSTEMS

Time: 3 Hours   *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   2 x 7 = 14
   a) Distinguish between energy and power signal.
   b) define power spectral density
   c) Explain significance of convolution in a communication system.
   d) What are advantages of Laplace transform?
   e) What are the limitations of Fourier transform?
   f) define a signal
   g) What is interpolation in sampling?

SECTION B

2.   **Attempt any *three* of the following:**   7 x 3 = 21
   a) Classify signals according to signal characteristics.
   b) Explain the principle of linearity of DT system.
   c) Explain the following properties of Fourier transform: time scaling, conjugate functions.
   d) state and prove initial and final value theorem of Laplace transform
   e) State and prove sampling theorem

SECTION C

3.   **Attempt any *one* part of the following:**   7 x 1 = 7
   a) What is Shannon's sampling theorem? Also discuss aliasing by taking an example.
   b) Explain the impulse train sampling of discrete time signals.

4.   **Attempt any *one* part of the following:**   7 x 1 = 7
   a) State whether the following signals x (t) is periodic or not giving reasons. If it is periodic, find the corresponding period.
      $X (t) = 2 \cos 100 \pi t + 5 \sin 50 t$
   b) for an LTI system with unit impulse response $h(t) = e^{-2t} u(t)$ .determine the output to the input $x(t) = e^{-t} u(t)$

5.   **Attempt any *one* part of the following:**   7 x 1 = 7
   a) Find the energy spectral density of $f(t) = e^{-st} u(t)$
   b) Find impulse response of system described by the equation $2y'(t) + 3y(t) = x(t)$

6.   **Attempt any *one* part of the following:**   7 x 1 = 7
   a) State and prove frequency shifting theorem of DTFT.
   b) Explain Fourier transform of single sided exponential pulse.

7.   **Attempt any *one* part of the following:**   7 x 1 = 7
   a) Find Laplace transform of following signal and Draw ROC $x(t) = \cos (3t + \pi/4) u(t)$
   b) Determine z transform of : $x(n) = \sin \omega_0 n\ u(n)$