

**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 :  $x(n) = \sin \omega_0 n u(n)$