II B. Tech I Semester Regular Examinations, November 2015
SIGNALS AND SYSTEMS
(Electronics and Communication Engineering)

Time: 3 Hours   **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
            Answer any **FOUR** questions from **Part-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

1. Define Energy Signal and Power Signal.

2. State Dirichlet's Conditions.

3. What are the conditions to be satisfied for the existence of Fourier transform.

4. State Paley-Wiener Criterion.

5. Give the relationship between Convolution and Correlation.

6. State the properties of ROC of Laplace Transform

PART-B

4 × 12 = 48M

1. a) Explain the approximation of a function by a set of mutually orthogonal functions   (6M)
   b) Determine Energy and Power of the following signals   (6M)

   (i) $e^{-5t}u(t)$ (ii) $A\,Sin\,(\omega t + \theta)$

2. a) Derive the relationship between Trigonometric and Exponential Fourier Series.   (6M)
   b) A periodic signal $x(t) = A\,Sin\,\omega_0 t : 0 \leq t \leq \pi$

                        $= 0$ $: \pi \leq t \leq 2\pi$ over one period (0, 2π). Find Trigonometric Fourier series.   (6M)

3. a) Find Fourier Transform of the following   (6M)
            (i) $e^{-at}u(t)$ (ii) $Sin\,\omega_0 t$
   b) State and explain Sampling Theorem   (6M)

4. a) Explain any four properties of LTI systems   (6M)
   b) Explain the relationship between Bandwidth and Rise time of LTI system.   (6M)

5. a) Explain Power Spectral Density. Derive the relationship between Energy Spectral Density and Auto Correlation function   (6M)
   b) A filter has input $x(t) = e^{-t}u(t)$ and $h(t) = e^{-3t}u(t)$. Find Energy Spectral Density of output.   (6M)

6. a) Find Unilateral Laplace Transform of the following   (6M)
            (i) $\delta(t)$ (ii) $u(t)$ (iii) $tu(t)$
   b) Explain any four properties of Unilateral Laplace Transform   (6M)