Salman Raju Talluri
ECE

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

END TERM TEST- JULY -2016

B.TECH-SUMMER SEMESTER

COURSE CODE: 10B11EC301 MAX. MARKS: 50

COURSE NAME: SIGNALS AND SYSTEMS

COURSE CREDITS: 04 MAX. TIME: 2 HRS

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Q1. (a) Sate and prove the convolution in time domain property of continuous-time Fourier transform (CTFT). [5]

(b) Sate and prove the differentiation in frequency domain property of discrete-time Fourier transform (DTFT). [5]

Q2. Consider the Fourier transform pair $e^{-|t|} \overset{F}{\leftrightarrow} \frac{2}{1+\omega^2}$. Determine the Fourier transform of

(a) $x(t) = te^{-|t|}$, (b) $x(t) = \frac{4t}{(1+t^2)^2}$ [5+5]

Q3. Determine the Laplace transform, the associated ROC and pole-zero plot for each of the following signals:

(a) $x(t) = e^{-4t}u(t) + e^{-5t}(sin5t)u(t)$

(b) $x(t) = te^{-|t|}$ [5+5]

Q4. (a) Explain various properties of ROC of z-transform. [5]

(b) Let $y[n] = \left(\frac{1}{9}\right)^n u(n)$. Determine two distinct signals such that each signal has a z-transform $X(z)$ which satisfies both of the follwong conditions:

(i) $\frac{[X(z)+X(-z)]}{2} = Y(z^2)$

(ii) $X(z)$ has only one pole and only one zero in the z −plane. [5]

Q5. (a) Prove the sampling theorem. [5]

(b) Describe the following:

(i) Nyquist rate, under-sampling and over-sampling

(ii) Types of practical sampling [3+2]