Code No: RT21044 **R13** SET - 1

II B. Tech I Semester Supplementary Examinations, May/June - 2017
SIGNALS AND SYSTEMS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Obtain the expressions to represent trigonometric Fourier coefficients interms of exponential Fourier coefficients. (5M)
   b) State and prove time shift property of Fourier transform. (4M)
   c) Obtain the relationship between Laplace transform and Fourier transform (4M)
   d) State Parseval's theorem (3M)
   e) Write the differentiation in time property of laplace transform (3M)
   f) Write the time reversal property of z transform (3M)

PART –B

2. a) Define Fourier transform. Explain the properties of Fourier transform. (10M)
   b) Approximate a rectangular pulse of width T, amplitude A which is symmetric about origin using sint, sin2t, sin3t and sin4t. (6M)

3. a) State and prove sampling theorem for band limited signals. (10M)
   b) Find the Fourier transform of x(t) = u(2t), where u(t) is the unit step function. (6M)

4. a) Obtain the impulse response of an LTI system defined by dy(t)/dt + 2y(t) = x(t). Also obtain the response of this system when excited by $e^{-2t}u(t)$. (8M)
   b) What is an LTI system? Explain the properties involved. Check whether an ideal differentiator is LTI or not. (8M)

5. a) Graphically convolve the signals $x_1(t) = \begin{cases} 1 \; for -T \le t \le T \\ 0 \qquad else\ where \end{cases}$ and $x_2(t) = \begin{cases} 1 \; for -2T \le t \le 2T \\ 0 \qquad else\ where \end{cases}$. (12M)
   b) Present the relation between convolution and correlation. (4M)

6. a) Define Laplace Transform and explain the properties of Laplace Transform (8M)
   b) Find the Laplace transform of $x(t) = -t^2e^{-at}u(-t)$ and indicate its ROC. (8M)

7. a) Find the Inverse Z transform of $X(z)=\frac{z+2}{4z^2-2z+3}$ $|Z|<\sqrt{3/4}$ (8M)
   b) Find the Z transform of $x[n] = a^{n+1}\,u[n+1]$ (8M)
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