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

II B. Tech I Semester Supplementary Examinations, May/June - 2016
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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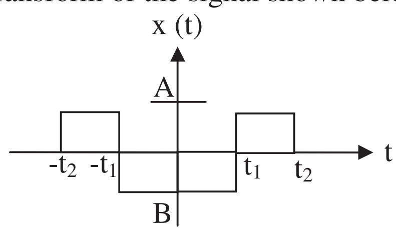
PART –A

1. a) Obtain the trigonometric Fourier series for the signal $x(t) = \sin 2t + \cos^3 t$ (5M)
   b) State and prove time scaling property of Fourier transform. (4M)
   c) Compare Laplace, Fourier and Z transforms. (4M)
   d) Define signal bandwidth. (3M)
   e) Write the time scaling property of Laplace transform. (3M)
   f) Define cross correlation function. (3M)

PART -B

2. a) Derive the expression for the mean square error obtained when a signal x(t) is approximated by a set of orthogonal functions. (10M)
   b) Obtain the complex exponential Fourier series for periodic impulse train with period T. (6M)

3. a) Find the Fourier transform of the signal shown below, where A=1, B=-1, t_1=1, t_2=2. (10M)



   b) Define Hilbert transform of a signal and obtain the transfer function of a Hilbert transformer. (6M)

4. a) Discuss different kinds of distortion and also the conditions for distortion less transmission. (10M)
   b) Are the systems represented by the following equations LTI system or not? (6M)
   i) $y(t) = 3x(t) + 4x(t-1) + x(t/2)$ ii) $y(t) = x(t-1) + 3x(t) + tx(t)$

5. a) Graphically convolve the signals $x(t) = \begin{cases} 1 \; for \; 0 \le t \le 2 \\ 0 \quad else \; where \end{cases}$ and $y(t) = e^{-2t}u(t)$. (10M)
   b) State the properties of autocorrelation function. (6M)

6. a) Find the Laplace Transform of following signal and its ROC (8M)
   $x(t) = e^{-2t}[u(t) - u(t-2)]$
   b) Obtain the Laplace transform of $x(t) = e^{-at}\sin(\omega_o t)u(-t)$ and indicate its ROC (8M)

7. a) Find the Inverse Z transform of $X(z) = \dfrac{z + 0.3}{z^2 + 0.8z + 0.16} \; |Z| > 0.4$ (8M)
   b) Find the Z Transform of $x[n] = 3\left(-\dfrac{1}{2}\right)^n u[n] - 2\,(3)^n u[-n-1]$ (8M)

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