

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

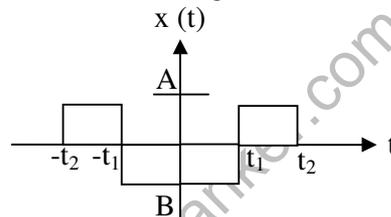
Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answer **ALL** the question in **Part-A**3. Answer any **THREE** Questions from **Part-B****PART -A**

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 $x(t) = \begin{cases} 1 & \text{for } 0 \leq t \leq 2 \\ 0 & \text{else where} \end{cases}$ 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 $x(t) = e^{-at} \sin(\omega_0 t)u(t)$ and indicate its ROC (8M)
7. a) Find the Inverse Z transform of $X(z) = \frac{z+0.3}{z^2+0.8z+0.16} |Z| > 0.4$ (8M)
- b) Find the Z Transform of $x[n] = 3\left(-\frac{1}{2}\right)^n u[n] - 2(3)^n u[-n-1]$ (8M)

