

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**

PART -A

1. a) Obtain the expressions to represent trigonometric Fourier coefficients in terms 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 $\sin t$, $\sin 2t$, $\sin 3t$ and $\sin 4t$. (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 $x_1(t) = \begin{cases} 1 & \text{for } -T \leq t \leq T \\ 0 & \text{else where} \end{cases}$ and $x_2(t) = \begin{cases} 1 & \text{for } -2T \leq t \leq 2T \\ 0 & \text{else where} \end{cases}$. (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 $x(t) = -t^2 e^{-at} u(-t)$ 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)