

B.Tech II Year I Semester (R15) Regular Examinations November/December 2016

**SIGNALS & SYSTEMS**  
(Common to ECE and EIE)

Time: 3 hours

Max. Marks: 70

**PART – A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- Define Unit impulse and Unit Step Signals.
  - Sketch the following signals:  $x(t) = r(-t+2)$ .
  - Write short notes on Dirichlet conditions for Fourier transform.
  - How the aliasing process is eliminated?
  - What is meant by impulse response of any system?
  - What do you mean by distortion less transmission through a system?
  - If  $x(n) = a|n|, 0 < a < 1$ , find the DTFT of  $x(n)$ .
  - Determine the DTFT of a DT signal.
  - Determine the Laplace transform of  $\delta(t)$  and  $u(t)$ .
  - Obtain the relationship between DTFT and Z transform.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 (a) Write the various operations on signals.  
(b) Check whether the following system is static or dynamic and also causal or non-causal system:  $x(n) = 2n$ .
- OR**
- 3 (a) Determine whether the following system are time invariant or not.  $y(t) = tx(t)$ .  
(b) Explain about the properties of continuous time Fourier series.

**UNIT – II**

- 4 (a) State and prove Time shifting property and modulation property of CTFT.  
(b) Determine and sketch the Fourier transform of the following signals:  
(i)  $x(t) = 10 \sin 2\pi f_0 t$  (ii)  $x(t) = \text{rect}\left(\frac{t}{\tau}\right)$ .

**OR**

- 5 (a) Find the Fourier transform of  $x(t) = \begin{cases} \cos \pi t; & -\frac{1}{2} \leq t \leq \frac{1}{2} \\ 0; & \text{otherwise} \end{cases}$ .  
(b) State and prove linearity property of CTFT.

**UNIT – III**

- 6 Let the system function of an LTI system be  $1/(j\omega + 2)$ . What is the output of the system for the input  $(0.8)^t u(t)$ ?

**OR**

- 7 A stable LTI system is characterized by the differential equation  $\frac{d^2 y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 4y(t) = \frac{dx(t)}{dt}$ . Find the frequency response & Impulse response.

**UNIT – IV**

- 8 State and prove any five properties of DTFT.

**OR**

- 9 An LTI discrete system is specified by the equation:  
 $y[n] - 0.5y[n-1] = x[n]$ . Find  $H(\Omega)$ , the frequency response of the system. Also determine the (zero state) response  $y[n]$ , if the input  $x[n] = (0.8)^n u[n]$ .

**UNIT – V**

- 10 Find the Inverse Laplace transform of  $G(s) = \frac{s}{(s+3)(s^2+4s+5)}$  for all possible ROC.

**OR**

- 11 Find the inverse Z Transform of  $X(z) = 1/(1-0.5z^{-1} + 0.5z^{-2})$  for ROC  $|z| > 1$ .

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