

**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)

- Express discrete impulse function in terms of unit step function. Also show graphical illustration.
- Describe BIBO stability of a system.
- Describe the convergence of Fourier series.
- Explain about recursive discrete time filter.
- What is the condition for existence of Fourier transform?
- Distinguish between spectrums of CFT and DTFT.
- Define group delay.
- What is aliasing?
- Write the Laplace transform of  $f(t) = e^{j2t} u(t)$ .
- Name the signal which has ROC in entire z- plane and justify your answer.

**PART – B**

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

**UNIT - I**

2 Find which of the following signals are causal or non – causal:

- (i)
- $x(t) = e^{2t} u(t - 1)$
- . (ii)
- $x(t) = \cos 2t$
- . (iii)
- $x(t) = 2 u(-t)$
- . (iv)
- $x(n) = u(-n)$
- . (v)
- $x(n) = u(n + 4) - u(n - 2)$
- .

OR

3 Check whether the following systems are:

- (i) Static or dynamic. (ii) Linear or non-linear. (iii) Causal or non-causal.
- 
- (iv) Time invariant or time variant. (v) Stable or not stable. The given system is
- $y(n) = a^n u(n)$
- .

**UNIT - II**4 Expand following function  $f(t)$  by exponential Fourier series over the interval (0,1). In this interval  $f(t)$  is expressed as  $f(t) = At$ .

OR

5 State and prove following properties of DTFS:

- (i) Time shifting. (ii) Time reversal. (iii) Frequency shifting.

**UNIT - III**6 Find Fourier transform of  $\cos \omega_0 t$  and sketch its spectrum.

OR

7 Find the DTFT of:

- (i)
- $x(n) = (1/3)^n u(n + 3)$
- 
- (ii)
- $x(n) = (1/2)^n$
- for
- $n = 0, 2, 4, \dots$
- 
- $= 0$
- other wise

**UNIT - IV**

8 Sketch the characteristics of ideal LPF and obtain the impulse response of it. Is this filter is realizable? If not why?

OR

9 State and prove sampling theorem for band limited signals using graphical approach.

**UNIT - V**10 (a) Find the Laplace transform of:  $x(t) = e^{-(t-2)} (t-2) u(t-2)$ 

(b) Find inverse of following Laplace transform:

$$X(s) = (1/(s + 1)) - (2/(s - 1))$$

If ROC is  $-1 < \text{Re}(s)$ 

OR

11 (a) State and prove z –transform time reversal property .

(b) Find the inverse z – transform of:  $X(z) = (1/1 + 2z) + (2z/z - 0.25)$ 

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