

SIGNALS & SYSTEMS
(Common to ECE and EIE)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 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: $X(z) = (1/1 + 2z) + (2z/z - 0.25)$
