

Code: 13A04302

B.Tech II Year I Semester (R13) Supplementary Examinations June 2015

SIGNALS & SYSTEMS

(Common to ECE & EIE)

Time: 3 hours

Max. Marks: 70

PART - A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Define Signum function in time domain and sketch waveform.
 - Distinguish between static and dynamic systems.
 - State time scaling property of Fourier Series.
 - Explain about non recursive discrete time filter.
 - What is the Fourier transform impulse signal and sketch its time and frequency domains.
 - State time reversal property of DTFT.
 - Sketch ideal LPF characteristics.
 - What is the sampling interval for proper sampling following signal
 $f(t) = A \sin(200\pi t)$
 - Compute the initial value of signal with Laplace transform
 $X(s) = 7s + 10/s(s + 2)$
 - What is the inverse z-transform of
 $X(z) = z/(z - 1)$ if its ROC is $|z| < 1$

PART - B

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

UNIT - I

- 2 Find whether the following signals are energy or power signal or neither:
- $x(t) = e^{-5t}u(t)$
 - $x(t) = t^2 u(t)$
 - $x(t) = 2u(t) - u(t - 3)$
 - $x(n) = r(n) - r(n - 4)$

(OR)

- 3 Check whether the following systems are time invariant or not.
- $y(t) = t^2 x(t)$
 - $y(t) = x(-2t)$
 - $y(t) = e^{3x(t)}$
 - $y(n) = x(n)$
 - $y(n) = x^2(n - 2)$.

UNIT - II

- 4 Discuss the concept of exponential Fourier series and derive the expressions for coefficients. Also discuss the concept of line spectrum.

(OR)

- 5 Consider the discrete time LTI system with impulse response:

$$h(n) = \begin{cases} 1 & 0 \leq n \leq 2 \\ -1 & -2 \leq n \leq -1 \\ 0 & \text{otherwise} \end{cases}$$

Given the input to this system is

$$x(n) = \sum_{k=-\infty}^{\infty} \delta[n - 4k]$$

Determine the Fourier Series coefficients of the output $y(n)$.**UNIT - III**

- 6 (i) Find the correlation of symmetrical gate pulse with amplitude and time duration '1' with itself.
(ii) Evaluate $u(t) * e^{-t}u(t)$

(OR)

- 7 (a) A linear shift – invariant system has a frequency response:
 $H(e^{i\omega}) = e^{i\omega}(1/1.1 + \cos \omega)$
Find its input – output relation in time domain.
- (b) Find frequency response of a LSI system whose input and output satisfy the following difference equation: $y(n) - 0.5y(n - 1) = x(n) + 2x(n - 1) + x(n - 2)$

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UNIT - IV

- 8 Derive the relationship between rise time and bandwidth.
(OR)
9 State and prove sampling theorem for band limited signals.

UNIT - V

- 10 (a) Describe the ROC of the signal:
 $x(t) = e^{-at}$
for $a > 0$ and $a \leq 0$.
(b) Find the inverse Laplace transform of:
 $X(s) = (-5s - 7)/(s + 1)(s - 1)(s + 2)$
When ROC is $1 < \text{Re}(s) < 2$
- (OR)
- 11 (a) Determine z-transform. Pole – zero locations and sketch of ROC of following signal:
 $x(n) = -u(-n - 1) + (1/3)^n u(n)$.
(b) Find the inverse z-transform of:
 $x(z) = (2 + z^{-1})/(1 - 0.25z^{-1})$ with ROC $|z| > 1/4$
Using power series expansion.
