R13

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)

(a) Define Signum function in time domain and sketch waveform.

(b) Distinguish between static and dynamic systems.

(c) State time scaling property of Fourier Series.

(d) Explain about non recursive discrete time filter.

(e) What is the Fourier transform impulse signal and sketch its time and frequency domains.

(f) State time reversal property of DTFT.

(g) Sketch ideal LPF characteristics.

(h) What is the sampling interval for proper sampling following signal

$$f(t) = A\,Sin\,(200\pi t)$$

(i) Compute the initial value of signal with Laplace transform

$$X(s) = 7s + 10/s(s+2)$$

(j) 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:

$(i)\ x(t) = e^{-5t}u(t)$ $(ii)\ x(t) = t^2\,u(t)$ $(iii) x(t) = 2\,u(t) - u(t-3)$

$(iv) x(n) = r(n) - r(n-4)$

(OR)

3 Check whether the following systems are time invariant or not.

$(i)\ y(t) = t^2\,x(t)$ $(ii)\ y(t) = x(-2t)$ $(iii)\ y(t) = e^{3x(t)}$ $(iv)\ y(n) = x(n)$

$(v)\ y(n) = x^2(n-2)$.

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:

$$h(n) = 1 \quad 0 \le n \le 2$$
$$= -1 \quad -2 \le n \le -1$$
$$= 0 \quad otherwise$$

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: $y(n) - 0.5y(n-1) = x(n) + 2x(n-1) + x(n-2)$

Contd. in page 2

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:

$x(t) = e^{-a|t|}$

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 $1 < Re(s) < 2$

(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.

*****