Reg. No. : | | | | | | | | | | |

Question Paper Code: 31444

B.E. / B.Tech. DEGREE EXAMINATION, NOVEMBER 2015

Fourth Semester

Electronics and Communication Engineering

01UEC404 – SIGNALS AND SYSTEMS

(Regulation 2013)

Duration: Three hours　　　　　　　　　　　　　　　　Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Sketch the signal $x(t)=e^{-t}$ for an interval $0 \leq t \leq 2$.
2. Write the equations for energy and power of CT signals.
3. State Parseval's theorem for continuous time Fourier series.
4. Find the Fourier transform of signal $x(t)=\delta(t)$.
5. State the final value theorem and initial value theorem of Laplace transform.
6. What are the drawbacks of transfer function method?
7. What is the condition for the existence of DTFT?
8. Find $y(n)$ for the input $x(n)=\{1\ 2\ 3\}$ and $h(n)=\{1, 1\}$ using convolution.
9. Find the z- transform of the sequence $x(n)=\{3, 2, -1, -4, 1\}$.
10. What are the different methods evaluating inverse z- transform?

PART - B (5 x 16 = 80 Marks)

11. (a) Define and plot the following signals:

(i) unit step and unit impulse signals (6)

(ii) unit ramp and unit parabolic signals (6)

(iii) signum function (4)

Or

(b) (i) Check whether the system $\frac{d^3y(t)}{dt^3} + 4\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 2y^2(t) = x(t)$ is linear or non linear, causal or non-causal and time invariant or time variant. (12)

(ii) Find the energy and power of the signal $x(t) = \cos t$ (4)

12. (a) (i) Find the Fourier series for the periodic signal $x(t) = t \quad for\ 0 \leq t \leq 1$ and repeats every one sec's. (12)

(ii) Find Fourier transform of $x(t) = e^{at}u(-t)$. (4)

Or

(b) Find the Fourier transform of the following signals

(i) $x(t) = e^{-2t}u(t-1)$ (4)

(ii) $x(t) = te^{-3t}u(t)$ (4)

(iii) $x(t) = e^{-|t|}\ for - 1 \leq t \leq 1$ (8)

13. (a) (i) State and explain the time shifting and differentiation properties of continuous time signals using Laplace transform in time domain. (12)

(ii) Find the Laplace transform of the signal $x(t) = e^{-at}sin\omega t$. (4)

Or

(b) (i) Draw the Direct form I and Direct form II of the following systems differential equations $4\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 2y(t) = 3x(t)$ (10)

(ii) The LTI system is described by the differential equation $\frac{d^2y(t)}{dt^2} - \frac{dy(t)}{dt} - 2y(t) = x(t)$. Obtain the impulse response, if the system is causal. (6)

14. (a) List out and explain any four properties of DTFT. (16)

Or

(b) (i) Given $y(n) = x(n) + \frac{1}{8}x(n-1) + \frac{1}{3}x(n-2)$. Find whether the system is stable or not. (8)

(ii) Determine the response of the following system using convolution $x(n) = u(n+1) - u(n-4)\ \ and\ h(n) = \{1, 2, 3, 4\}$. (8)

15. (a) (i) Find Z-Transform and ROC of the following sequence of signal is $x(n) = a^n u(n) + b^n u(-n-1)$. (10)

(ii) State and prove frequency shifting property of Z-Transform. (6)

Or

(b) (i) Draw the block diagram for $H(z) = \frac{1+2z^{-1}+4z^{-2}}{1-z^{-1}+2z^{-2}}$ using Direct form I. (8)

(ii) For the state space representation of the system, find the transfer function of the system. A=$\begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, $C = [1 \quad 1]$. (8)
