C 26882

(Pages : 2)

Name............................

Reg. No............................

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION MAY 2012

EE 09 403/PTEE 09 402—SIGNALS AND SYSTEMS

Time : Three Hours

Maximum : 70 Marks

Part A

All questions are compulsory :

1. Define energy and power signals.

2. State Parseval's Theorem for CT Fourier Series

3. What is nyquist rate ?

4. Find the Fourier Transform e^{at} $u(t)$

5. Determine the inverse z transform $X(z) = 1/z\text{-}a$

$(5 \times 2 = 10 \text{ marks})$

Part B

Answer any *four* questions :

1. Sketch the following signals

   (i) $r(t)\, u\, (2\text{-}t)$.

   (2.5 marks)

   (ii) $r(t) - 2r(t-1) + r(t-2)$.

   (2.5 marks)

2. Determine $y(t)$ by convolution integral if $x(t) = e^{at}\, u(t)$ and $h(t) = u(t)$.

3. Determine the continuous time signal of the following transforms :

   $X(jw) = \cos(4w + \Pi/3)$

4. Find the Z transform of the following sequence :

   $x[n] = u[n\text{-}2] - 5u[n+3] - u[n]$.

5. Determine the pole zero plot and ROC of the given equation :

   $X[n] = -a^n u[n\text{-}1]$

6. Verify the causality and time invariance of the system $y(n+2) = ax(n+1) + bx(n+3)$.

$(4 \times 5 = 20 \text{ marks})$

Turn over

Part C

1 (a) Check whether the given system is stable or dynamic, linear or non-linear, causal or non-casual, time-invarient or time-varient

$$d^3y \ (t)/ \ dt^3 + 4d^2 y \ (t)/dt^2 + 5dy \ (t)/dt + 2y(t) = x(t).$$

Or

(b) Explain the Classification of signals with examples.

2 (a) A system is described by the differential equation,

$$d^2 y(t) \ /dt^2 + 3dy \ (t) \ /dt + 2y(t) = dx \ (t) \ /dt$$

if $y \ (0) = 2$; $dy \ (0) \ /dt = 1$ and $x(t) = e^{-t} \ u(t)$

Determine the response of the system to a unit step input applied at $t = 0$.

Or

(b) Define exponential Series and derive the Fourier coefficients with example.

3 (a) Find the DTFT of :

   (i) $x[n] = 2n \ u[n]$

   (4 marks)

   (ii) $x[n] = (0.5) \ n + 2 -n \ u[-n-1]$

   (6 marks)

Or

(b) State and Prove Sampling Theorem

4 (a) Determine the inverse z transform of the following function :

   (i) $x(z) = 1/ \ (1 + z^{-1}) \ (1 - z^{-1})2 \ ROC : |Z > 1|$

   (7 marks)

   (ii) $X(z) = 1/z$-a, $|z| > |a|$

   (3 marks)

Or

(b) Consider an LTI system for which the input x[n] and output y[n] satisfy the linear constant difference equation :

$Y[n] - 1/2 \ y[n-1] = x[n] + 1/3 \ x[n-1]$.

Find H(z) with ROC $|Z > 1/2|$.

(4 × 10 = 40 marks)