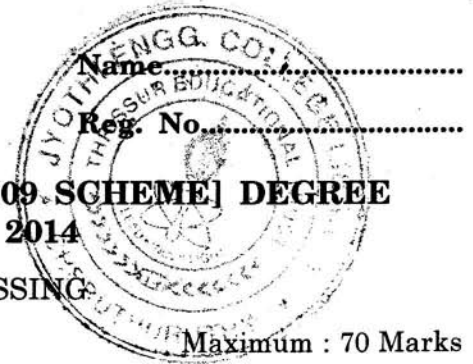(Pages : 2)

# FIFTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, NOVEMBER 2014

## CS/PTCS 09 503—SIGNAL PROCESSING

Time : Three Hours

Maximum : 70 Marks

## Part A

*Answer all questions.*
*Each question carries 2 marks.*

1. Define continuous time exponential and discrete time exponential signal.

2. Differentiate energy signal and power signal.

3. List any *four* elementary signals.

4. What is frequency response ?

5. What is initial value theorem ?

(5 × 2 = 10 marks)

## Part B

*Answer any four questions.*
*Each question carries 5 marks.*

1. What are linear and non-linear systems ? Give examples.

2. State and prove the Convolution theorem in relation to Fourier transform.

3. Explain Sampling function with neat sketch.

4. Write notes on time shifting property and time reversal property of Discrete-time Fourier transform.

5. What is the relationship between $z$-plane and $s$-plane ?

6. State the important properties of ROC for the $z$-transform.

(4 × 5 = 20 marks)

## Part C

*Answer all questions.*
*Each question carries 10 marks.*

1. (a) Explain the conditions for BIBO stability for discrete time signals in terms of impulse response.

*Or*

(b) Find the sequence $y(n) = 3x(n+2) + x(n-4) - 2x(n)$, where $x(n) = \{1, -2, 4, 6, -5, 8, 10\}$.

**Turn over**

2.  (a)  Find the Laplace transforms of the following :—

   (i)  $e\text{-}t \sin 4t$.                    (ii)  $2 - 2et + 0.5 \sin 4t$.

   (iii)  $\dfrac{4}{(s+1)^2 + 12}$.          (iv)  $\dfrac{s-1}{s(s+1)}$.

*Or*

   (b)  Define and explain the Parseval's theorem for power signals.

3.  (a)  Write notes on Sampling and Nyquist rate.

*Or*

   (b)  Determine the Fourier transform for the given Discrete-time signal $x(n) = a^n u(n)$, $|a| < 1$.

4.  (a)  Prove that the final value of $x(n)$ for $X(z) = \dfrac{z^2}{(z-1)(z-0.2)}$ is 1.25 and its initial value is unity.

*Or*

   (b)  Using long division, determine the inverse $z$-transform of $X(z) = \dfrac{1 + 2z^{-1}}{1 - 2z^{-1} + z^{-2}}$ if the system is casual.

(4 × 10 = 40 marks)