B.Tech.(Electronics Engg.) (2012 Batch)
B.Tech.(ECE)/ETE) (2011 Onwards)   (Sem.--5)
# DIGITAL SIGNAL PROCESSING
Subject Code : BTEC-502
Paper ID : [A2104]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Write briefly :

   (a) Define a unit sample sequence.

   (b) What do you mean by Nyquist rate ?

   (c) Differentiate between energy and power signals.

   (d) Differentiate between stable and unstable systems.

   (e) What is the ROC of z-transform of a finite duration casual signal ?

   (f) Give the time reversal property of the z-transform.

   (g) What is the difference between linear convolution and circular convolution?

   (h) What is Gibbs phenomenon?

   (i) What is Frequency Warping ?

   (j) What are limit Cycle Oscillations ?

SECTION-B

2. Determine the range of values of the parameter 'a' for which the linear time-invariant system with impulse response $h(n) = a^n u(n)$ is stable.

3. How is DFT used in linear filtering? Explain.

4. Determine the z-transform and the ROC of the signal

$$x(n) = [3(2^n) - 4(3^n)]u(n)$$

5. Explain the Impulse Invariance method of IIR filter design.

6. What are limit cycle oscillations? Why do they arise? Explain.

SECTION-C

7. Explain the architecture of TMS processors.

8. Obtain the direct form I, direct form II, cascade and parallel structures for the system :

$$y(n) = 0.5y(n-1) + 0.25 \, y(n-2) + x(n) + x(n-1). \text{ Is the system stable?}$$

9. Compute the 8-point DFT of the sequence using decimation-in time FFT algorithm:

$$x(n) = \begin{cases} 1, & 0 \ n \le 7 \\ 0, & \text{otherwise} \end{cases}$$