Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech (ECE) (Sem.–6)

DIGITAL SIGNAL PROCESSING

Subject Code : EC-308

Paper ID : [A0321]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS 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 have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1. Answer briefly :

a. Differentiate between time invariant and time variant systems.

b. What do you mean by linear phase response?

c. State the convolution property of Z-transform.

d. How the stability of the linear time variant system is calculated?

e. Illustrate the difference between cascade-form structure & parallel-form structure of discrete-time systems.

f. In the implementation of a digital system what are the effects of quantization of coefficients?

g. What is Gibbs phenomenon?

h. What are the advantages of representing a digital filter in the block diagram form?

i. State the features of ADSP-2100.

j. Give the computational efficiency of FFT over DFT.

SECTION-B

Q2. What are the basic building blocks of digital signal processing? Give the advantages of digital signal processing over analog signal processing.

Q3. Determine Z-transform and ROC of the signal :

$$x(n) = n(-1)^n u(n)$$

Q4. Obtain the linear convolution of two sequences defined as,

$$x(n) = \left(\frac{1}{2}\right)^n, \quad n = 0,1,2,3$$

$$h(n) = [1\,1\,1]$$

Q5. Consider an LTI system which is stable and for which $H(z)$, the Z- transform of impulse response is given by,

$$H(z) = \frac{3 - 7z^{-1} + 5z^{-2}}{1 - 2.5z^{-1} + z^{-2}}$$

Suppose $x(n)$, the input to the system is unit step. Determine the output.

Q6. Explain any one method used for linear filtering of long data sequences.

SECTION-C

Q7. Draw and explain the flow graph of an 8-point DIT FFT algorithm.

Q8. Obtain the direct form I&II,cascade and parallel form realization for the following system :

$$y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$$

Q9. The desired frequency response of a high pass filter is

$$H_d(\omega) = \begin{cases} 0, & -3\pi/4 \le \omega \le 3\pi/4 \\ e^{-j5\omega}, & 3\pi/4 < |\omega| \le \pi \end{cases}$$

Determine the frequency response $H(e^{j\omega})$ using a Blackman window.