

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ECE) (Sem-5)
DIGITAL SIGNAL PROCESSING

Subject Code : BTEC-502

M.Code : 70546

Date of Examination : 03-06-2023

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 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

1. Write briefly :

- a) Differentiate between linear & nonlinear systems.
- b) What do you mean by stability of discrete time systems?
- c) Give the difference between Fourier Transform and Discrete Fourier Transform.
- d) Give the difference between Linear and Circular Convolution.
- e) Give the two properties of ROC.
- f) What is Gibbs phenomenon?
- g) What are the advantages of representing the digital filter in the block diagram form?
- h) Why is folding of signal required in convolution of two signals?
- i) What is meant by frequency warping? What is the cause of this effect?
- j) What do you mean by pipelined structure in DSP processor?

SECTION-B

2. What are the basic building blocks of digital signal processing? Give the advantages of digital signal processing over analog signal processing.
3. Determine the Z-transform and sketch the ROC of :

$$x(n) = \begin{cases} \left(\frac{1}{3}\right)^n, & n \geq 0 \\ \left(\frac{1}{2}\right)^{-n}, & n < 0 \end{cases}$$

4. An LTI system is characterized by the transfer function,

$$H(z) = \frac{3 - 4z^{-1}}{1 - 3.5z^{-1} + 1.5z^{-2}}$$

Determine $h(n)$ for the following conditions :

- a) The system is stable.
 - b) The system is causal.
 - c) The system is non-causal.
5. Compute the auto correlation of the signal $x(n) = a^n u(n)$, $0 < a < 1$
 6. The system function of the analog filter is given as :

$$H_a(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}$$

Obtain the system function of IIR digital filter by using impulse invariance method.

SECTION-C

7. Explain the different types of structures for the realization of FIR filter.
8. With the help of $N=8$, explain radix-2 Decimation-In-Time (DIT) FFT algorithm for computation of DFT.
9. Explain the data memory and program memory maps for ADSP 2181 processor.

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.