

Roll No.

Total No. of Pages : 02

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B.Tech. (EEE) (Sem.-5)  
**DIGITAL SIGNAL PROCESSING**

Subject Code : BTEC-502-18

M.Code : 78298

Date of Examination: 30-12-2023

Max. Marks : 60

Time : 3 Hrs.

**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**

1. Write briefly :

- a) Discuss significance of ROC in z-transform.
- b) What are the important features of DSP processors?
- c) Compare digital filters and analog filters.
- d) Differentiate linear convolution and circular convolution.
- e) What are steps involved in the design of FIR filter.
- f) Relate Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT).
- g) Differentiate between FIR and IIR filter.
- h) What are auto-correlation and cross-correlation in signals?
- i) List properties of linear time-invariant discrete time system.
- j) What is twiddle factor?

## SECTION-B

2. Design a digital filter using Bilinear Transformation technique for following system :

$$H_a(s) = \frac{3}{(s+2)(s+3)}$$

Assume  $T = 0.1$  sec.

3. Describe Matched Z-transformation methods for design of IIR filter.
4. Realize following digital filter using cascade form and parallel form :

$$y[n] = \frac{3}{4} y[n-1] - \frac{1}{8} y[n-2] + x[n] + \frac{1}{3} x[n-1]$$

5. Determine output of the system  $h[n] = \left(\frac{1}{4}\right)^n u(n)$  for input  $x[n] + \left(\frac{1}{2}\right)^n u(n)$ .
6. Explain the concept of multi-rate signal processing.

## SECTION-C

7. Discuss different types of structures used in realization of FIR filter.
8. a) Discuss the memory architecture of TMS Series using a labelled diagram.  
b) Compare DSP processor and general-purpose processor.
9. Find 8-point DFT of following sequence using the radix-2 decimation-in-time algorithm :

$$x[n] = \{1, 0, 2, 0, 3, 0, 4, 0\}$$

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**