

16193(D) - 0 DEC 2016

B. Tech 7th Semester Examination

Digital Signal Processing (NS)

EC-413

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

- Note :** (i) Attempt five questions in all selecting one question each from sections A, B, C & D. Section-E is compulsory,
(ii) All parts of a question should be answered at one place.
(iii) Answers should be brief and to-the-point supplemented with neat sketches.

SECTION - A

1. (a) What are the types of representation of discrete-time signals? Represent a sequence in all the types. (10)
(b) Define the convolution of finite sequences and explain the Tabular Array method to find linear convolution. (10)
2. (a) Derive the relation between discrete-time Fourier transform and Z-transform. (10)
(b) Explain the Initial and final value theorem of Z-transform. Using final value theorem, find the $X(\infty)$, if $X(Z)$ is given by

$$\frac{(Z + 2)}{4(Z - 1)(Z + 0.7)} \quad (10)$$

SECTION - B

3. (a) Explain the parallel form realization of the IIR system. (10)
(b) Find the digital network in direct form-I and transposed form of system with difference equation:
$$y(n) = 2x(n) + 0.3x(n-1) + 0.5x(n-2) - 0.7y(n-1) - 0.9y(n-2)$$
 (10)
4. (a) Explain the Time reversal and differentiation in the frequency domain property of discrete time fourier transform. (10)
(b) What are the applications of discrete time fourier transform? (10)

SECTION - C

5. (a) Describe the procedure to compute the IDFT using radix-2 FFT. (10)
(b) Compare the radix-2 DIT and DIF FFTs. (10)
6. (a) Develop a DIF FFT algorithm for decomposing the DFT for $N=6$ and draw the flow diagrams for $N=3 \times 2$. (15)
(b) What is the importance of radix-2 in FFTs? (5)

SECTION - D

7. (a) Describe the significance and applications of the STFT. (10)
(b) Explain the features of Haar wavelets. (10)
8. (a) Explain the features of a digital signal processor with block diagram. (10)
(b) List the various addressing schemes for digital signal processors. (10)

[P.T.O.]

SECTION - E

9. (a) Distinguish between deterministic and random signals.
- (b) Define a static system.
- (c) List the properties of discrete convolution.
- (d) What is autocorrelation?
- (e) What is the ROC of a finite duration two-sided sequence?
- (f) List the advantages of Z-transform.
- (g) List the different type of structures for realization of FIR systems.
- (h) Define the inverse discrete time fourier transform of a function $X(w)$.
- (i) What is slow and fast convolutions?
- (j) List the applications of wavelet transform. (2×10=20)