

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)

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)