

Total No. of Questions : 12]

SEAT No. :

P882

[Total No. of Pages : 2

[4659]-341

B.E. (Instrumentation and Control)
c-ADVANCED DIGITAL SIGNAL PROCESSING
(2008 Pattern) (Elective-II) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) Write a short note on: **[16]**

- a) Decimation by 2.
- b) Polyphase filter structure.
- c) Interpolation by 2.
- d) Sampling rate conversion by I/D.

OR

Q2) a) Evaluate the z-transform for the following operations. **[8]**

- i) Decimation by a factor D.
- ii) Interpolation by a factor I.
- b) Explain the effect of down-sampling and up-sampling of time-domain signal in frequency-domain representation. **[8]**

Q3) a) Explain the Levinson-Durbin Algorithm in detail. **[8]**

- b) An AR(3) process is characterized by the prediction coefficients as:

$$a_3(1) = -1.5, a_3(2) = 1.5, a_3(3) = -3/2$$

Hence determine reflection coefficients. **[8]**

OR

Q4) a) Explain that the forward prediction coefficients and backward prediction coefficients are in reverse order. **[8]**

- b) Obtain the reflection coefficients of the lattice filter corresponding to the FIR filter described by the system function as

$$H(z) = A_2(z) = 1 + 2z^{-1} + 0.333 z^{-2}. \quad \text{[8]}$$

P.T.O.

- Q5)** a) Determine and draw the periodogram for the following signal
 $x[n] = \{3, 2, 1, -2\}$. Use DTFT. [9]
- b) Explain the estimation of power spectra with the help of averaging periodogram method. [9]

OR

- Q6)** Explain the following: [18]
- a) Bartlett method of power spectrum estimation.
- b) Welch method of power spectrum estimation.
- c) Parametric methods of power spectrum estimation.

SECTION-II

- Q7)** a) Explain the process of recursive computation for filter coefficients in recursive least square Algorithm. [9]
- b) Explain the concept of adaptive filter with the help of neat diagram. List out the application of adaptive filters. [9]

OR

- Q8)** a) List out the application of adaptive filters. Explain any one in detail. [9]
- b) Explain the least-mean-square (LMS) algorithm for the optimization of FIR filter coefficients. [9]

- Q9)** a) Compare the general purpose processor and digital signal processor in detail. [8]
- b) Write an ALP to compute the output of the FIR filter to an input sequence using on-board units of digital signal processor. [8]

OR

- Q10)** a) State the salient features of TMS 320 C 6713. [8]
- b) Explain and draw the Harvard architecture of digital signal processor in detail. [8]

- Q11)** a) Explain the step-wise computation of STFT. Also state the advantages of STFT over Fourier Transform. [8]
- b) Write a short note on Wavelet Transform. [8]

OR

- Q12)** a) Write a short note on Discrete Wavelet Transform (DWT). [8]
- b) State the properties of FT, STFT and CWT. [8]

