

Total No. of Questions : 8]

SEAT No. :

P4324

[4860]-1280

[Total No. of Pages : 2

M.E. (Electronics-Digital Systems)
DIGITAL SIGNAL PROCESSING ARCHITECTURES
(2013 Credit Pattern) (Semester-I) (504102)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Answer any five questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of scientific calculator is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data, if required.*

Q1) a) Explain Goertzel Algorithm with suitable equations. **[4]**

b) Compute 4-Point DFT of the following Sequence:

$$X[n] = \{1, 2, 3\} \quad [3]$$

c) Explain computational complexity of DFT with and without use of Radix-2 FFT algorithm. **[3]**

Q2) a) Why ideal low pass filter cannot be designed? Explain in detail. **[3]**

b) Determine impulse response $h(n)$ of a filter having ideal LPF frequency response as:

$$H_d(e^{j\omega}) = \begin{cases} e^{-\frac{j(M-1)\omega}{2}} & 0 \leq \omega \leq \pi/2 \\ 0 & \pi/2 \leq \omega \leq \pi, \end{cases}$$

where $M = 7$ **[4]**

c) Write a short note on mapping between S domain and Z domain. **[3]**

P.T.O.

- Q3)** a) Explain Polyphase Filter Structure with suitable diagram and equations. [4]
b) Explain the design of sampling rate converter for a factor of $I/D = 3/4$. [3]
c) What is a DCT? Discuss in short along with properties of DCT. [3]
- Q4)** a) What is code composer studio? Explain the use of CCS. [4]
b) Explain important features of TMS320C54 \times DSP Processor along with block diagram. [4]
c) Explain the difference between fixed and floating point processor. [2]
- Q5)** a) Explain Booth's Multiplication Algorithm. [4]
b) Explain STFT. [4]
c) Explain computational complexity of DFT with and without use of Radix-2 FFT Algorithm. [2]
- Q6)** a) Determine the linear convolution using circular convolution for the given two sequences
 $X(n) = (2, 3, 1, 1)$ and $h(n) = (1, 3, 5, 3)$ [5]
b) Explain FIR filter design using Windowing Technique, which window is the best and why? [5]
- Q7)** a) Write a short note on wavelet Transform and explain concept of mother wavelet. [5]
b) Explain Overlap and save method for filtering long length sequences. [5]
- Q8)** a) How will you make use of program cache for efficient implementation on FIR filter? [4]
b) Explain in detail the frequency spectrum at the output of each block in a decimator. [4]
c) What is the difference between: [2]
i) Upsampler and Interpolator.
ii) Downsampler and Decimator.

