

[4858] - 1089

T.E. (Computer Engineering) (Semester - II)
DIGITAL SIGNAL PROCESSING APPLICATIONS
(2012 Pattern) (End-Sem.)

*Time : 3 Hours]**[Max. Marks : 70**Instructions to the candidates:*

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

Q1) a) State the mathematical models used to represent a DT system. Define the Impulse response of the system. [5]

b) State the necessary condition for the existence of Fourier Transform. State and prove the convolution property of FT. [5]

OR

Q2) a) What is the use of Transducers in signal processing? State the sampling theorem. [5]

b) State the following properties of DT system and describe it by means of difference equation : [5]

- i) Time Invariant
- ii) Dynamicity
- iii) Causality

Q3) a) Draw a pole zero plot for a system described as [5]
 $y(n) = x(n) - x(n-1) + 3y(n-1) - 2y(n-2)$

b) Draw the basic butterfly structures for DIT and DIF FFT algorithms and hence obtain the computational complexity of FFT algorithm. [5]

OR

Q4) a) Use ZT properties to obtain ZT of a DT sequence $x(n) = a^n u(n-1)$. [5]

b) What is convolution property of DFT? Compare Linear Convolution with Circular Convolution. [5]

P.T.O.

- Q5)** a) Obtain and realize Direct Form – I and Direct Form – II IIR filter structure for a system described as – [9]

$$y(n) = y(n-1) - \frac{1}{2}y(n-1) + x(n) - x(n-1) + x(n-2)$$

- b) Discuss the form of Linear Phase FIR filter structure and realize it for $M = 7$ where M is the length of the filter (i.e. 6th order filter) [9]

OR

- Q6)** a) Obtain parallel form realization for IIR filter having transfer function

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}} \quad [9]$$

- b) What are filter structures? Explain how the Direct and Cascade form of FIR filters are obtained and realized from the system function $H(Z)$. [9]

- Q7)** a) Explain the characteristics of DSP processor. Explain basic building blocks of DSP processor. [8]

- b) What is OMAP? Explain the Software architecture of OMAP in brief. [8]

OR

- Q8)** a) Compare conventional microprocessor architecture with Harvard and SHARC DSP architectures with important features. [8]

- b) Draw and explain the architecture of SHARC DSP processor. [8]

- Q9)** a) What is Comanding? How important this process is in audio processing? Explain the Comanding process in brief. [8]

- b) What is image enhancement in digital image processing? Explain any two gray level transforms used for image enhancement. [8]

OR

- Q10)** a) Draw and explain block diagram of compact disk playback system. [8]

- b) Explain the operation of CCD (Charge Coupled Device) used in electronic cameras? [8]

