

Total No. of Questions :10]

SEAT No. :

P2896

[4958]-1089

[Total No. of Pages :3

T.E. (Computer Engineering)
DIGITAL SIGNAL PROCESSING APPLICATIONS
(2012 Pattern) (Semester - II) (310253)

Time : 2½ 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 diagrams 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 -

$$y(n) = x(n) - x(n-1) + 3y(n-1) - 2y(n-2) \quad \text{[5]}$$

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

OR

P.T.O.

- 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]

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

$$y(n) = y(n-1) - \frac{1}{2} y(n-1) + x(n) - x(n-1) + x(n-2) \quad [9]$$

- 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 Compounding? How important this process is in audio processing? Explain the Compounding 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]

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