

Total No. of Questions : 10]

SEAT No. :

**P1759**

**[5058]-399**

[Total No. of Pages : 3

**T.E. (COMPUTER ENGINEERING)**  
**Digital Signal Processing Applications**  
**(2012 Course)(End Semester ) (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 diagram must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

**Q1) a)** Classify DT systems as: **[5]**

- i) FIR and IIR systems.
  - ii) Causal and Noncausal systems
- b) How DFT is different than Fourier Transform (FT)? State the convolution property of DFT. **[5]**

OR

**Q2) a)** Using ZT properties obtain the ZT of **[5]**

$$x(n) = \left(\frac{1}{4}\right)^n u(-n) \text{ Sketch the ROC.}$$

- b) Define quantizer, quantization levels, quantization error and quantization step w.r.t. quantization process of ADC. **[5]**

**Q3) a)** Obtain the computational complexity of Radix - 2 DIT FFT algorithm. **[5]**

- b) Why problem of aliasing is observed during the sampling process? State the sampling theorem and write the relationship between CT and DT frequencies. **[5]**

OR

**P.T.O.**

**Q4)** a) Compute 5 point Circular Convolution using matrix method for a given DT signals: [5]

$$x_1(n) = \{1, -1, -2, 3, -1\} \text{ and } x_2(n) = \{1, 2, 3\}$$

b) A system is described by means of system function. [5]

$$H(Z) = \frac{2Z}{Z-1} - \frac{Z}{Z-3}$$

Determine the impulse response  $h(n)$  if –

- i) The system is causal
- ii) The system is Non-causal
- iii) The system is stable

**Q5)** a) 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]

b) Obtain the system function and impulse response of the system. Realize it using Direct Form - II filter structure. [9]

$$2y(n) + y(n-1) - 4y(n-3) = x(n) + 3x(n-1)$$

OR

**Q6)** a) Derive the Direct Form-I IIR filter structure from system function  $H(Z)$  and represent it using multipliers, adders and delay elements. [9]

b) Obtain and realize Linear Phase FIR filter structure for a DT system.

$$y(n) = x(n) + \frac{1}{3}x(n-1) + \frac{1}{4}x(n-2) + \frac{1}{4}x(n-3) + \frac{1}{3}x(n-4) + x(n-5)$$

What are the advantages of this filter structure? [9]

**Q7)** a) What is OMAP? Explain the features and applications of OMAP in brief. [8]

b) Explain the features of SHARC DSP processor. List the number of DAGs with its capabilities and memory pointer registers supported by DAG. [8]

OR

**Q8)** a) Draw and explain the SIMD (Single Instruction Multiple Data) architecture of SHARC DSP processor. [8]

b) Compare conventional Microprocessor with DSP Processor architecture. Draw and explain basic building blocks of DSP processor. [8]

- Q9)** a) How digital image is represented by means of digital computer? How gray scale image is different than colour image? What is Histogram of an image? [8]
- b) Draw and explain Human Speech Model in speech synthesis and recognition. [8]

OR

- Q10)** a) With mathematical form, explain any two gray level transforms used for image enhancement. [8]
- b) What is Compounding? What is its significance in audio processing? What is the impact of data rate on sound quality? [8]

