Total No. of Questions : 10]

SEAT No. :

P1345

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[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

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$$ **[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 Companding? How important this process is in audio processing? Explain the Companding 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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