[4958]-1089

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 -

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

[5]

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

OR

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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 –

$$y(n)= y(n-1)-\tfrac{1}{2}y(n-1)+x(n)-x(n-1)+x(n-2)$$ **[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

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