[4860]-1258

M.E. (E & TC) (VLSI & Embedded Systems)
EMBEDDED SIGNAL PROCESSORS
(2013 Credit Pattern) (Semester-II) (504209)

Time : 3 Hours]   *[Max. Marks : 50*
Instructions to the candidates:
   1)   *Answer any 5 questions.*
   2)   *Neat diagrams must be drawn wherever necessary.*
   3)   *Figures to the right side indicate full marks.*
   4)   *All questions carry equal marks.*
   5)   *Use of calculator is allowed.*
   6)   *Assume suitable data, if necessary.*

Q1) a) What are the challenges in real time embedded signal processing? **[3]**

    b) Explain the structure of 5-point and 10-point running average filter with suitable equations and also explain how increase in sampling frequency affects the output? **[5]**

    c) What is the concept of moving window in signal processing. **[2]**

Q2) a) Realize the FIR transfer function $H(z) = 1 - 3.6z^{-1} + 5.4z^{-2} - 4.32z^{-3} + 1.944z^{-4} - 0.466z^{-5} + 0.0467z^{-6}$ in the following forms: **[6]**

       i) Direct form I

       ii) Direct form II

       iii) Cascade of six first order sections.

    b) Explain how median filter reduces the impulse noise. **[4]**

Q3) a) Find out the transfer function and the frequency response of the Hanning filter with coefficients {0.1, 0.2, 0.4, 0.2, 0.1}. Plot the magnitude and phase response. **[5]**

    b) Design notch filter with suitable equations and explain how the location of pole affects its behavior. **[5]**

Q4) a) Draw the signal flow graph of 4 pt DIT-FFT. **[4]**

b) Explain adaptive FIR filter with the least mean square (LMS) algorithm. **[4]**

c) Evaluate the stability of system $H(z) = z/(z - a)$ for different values of coefficient a. **[2]**

Q5) a) Discuss finite wordlength effects. **[4]**

b) What are the important features of TMS320C67XX processor? Draw and explain the block diagram of TMS320C67XX. **[6]**

Q6) a) Explain different addressing modes of TMS320C54XX. **[4]**

b) Compare TMS320C54XX and TMS320C67XX with respect to architecture, MIPS, memories and addressing modes. **[6]**

Q7) a) Explain with an example how FFT algorithm can be implemented in TMS320C67XX. **[4]**

b) Compare and contrast fixed and floating point processors. **[3]**

c) Justify the necessity of MAC and barrel shifter in DSP processor. **[3]**

Q8) a) Explain how performance of DSP processor can be improved with pipelining. **[4]**

b) Explain how Dual Tone Multi Frequency is generated using two IIR filters connected in parallel. How Goertzel filters are used for DTMF detection. **[6]**

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