Total No. of Questions : 8]

SEAT No. :

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M.E. (E & TC) VLSI and Embedded Systems

EMBEDDED SIGNAL PROCESSOR

(2013 Credit Pattern) (Semester-II) (504209)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions***
2) ***Figures to the right indicate full marks.***

Q1) a) State the important issues in selecting hardware components and interfacing external hardware devices to the DSP processor. **[3]**

b) Draw and Explain block diagram of software development tools for designing DSP system. **[3]**

c) Given a second order transfer function

$$H(z) = \frac{0.5(1 - z^{-1})}{1 + 1.3z^{-1} + 0.36z^{-1}}$$

Perform the filter realization and write difference equation using direct form-I and direct form II, cascade via first order section, parallel via first order section. **[4]**

Q2) a) Compare the Computational Complexity of the DFT and FFT with the help of suitable example and equations. **[3]**

b) Consider a digital sequence sampled at the rate of 44.1 kHz. If we use 1024 data point and apply 1024 point DFT to compute the spectrum,

i) Determine the frequency resolution.

ii) Determine the highest frequency in the spectrum.

[3]

c) Draw 8 point decimation in time FFT butterfly algorithm and explain. **[4]**

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Q3) a) A filter is described by the following equation. Draw the Structure using Direct form-I and Direct form-II. $y(n) - 3/4y(n-1) + 1/4y(n-2) = x(n) + 1/2x(n-1)$. **[3]**

b) What is the need of Code Optimization? Explain different code optimization methods for developing DSP system. **[3]**

c) Explain the different addressing modes of TMS 320C54XX processor. **[4]**

Q4) a) Compare TMS 320C54XX and TMS 320C67XX with respect to architecture MIPS/Flops accumulator, memory on-chip peripherals and addressing modes. **[3]**

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

c) Explain the different on chip Peripherals of TMS 320C54xx series. **[4]**

Q5) a) Explain the use of DSP algorithms in developing digital image filtering applications. **[3]**

b) Explain adaptive filter algorithm used for noise cancellation and inverse modeling. **[3]**

c) Explain DTMF generation and detection application using DSP techniques. **[4]**

Q6) a) Compare FIR and IIIR digital filters. **[3]**

b) What is wavelet transform? How it is different from Fourier Transform and Short Time Fourier Transform? **[3]**

c) What is the need of Image enhancement? Explain the different methods of image enhancement. **[4]**

Q7) a) What are the advantages of using DSP processors? How DSP processors compared with application specific circuits (ASICs), general purpose microprocessor, and microcontrollers? Also, explain the meaning of "real time" in DSP applications. **[5]**

b) Write short note on audio coding and audio effects application using DSP techniques. **[5]**

Q8) a) Explain the steps for designing IIR digital filter using Bilinear Transformation Techniques (BLT). **[5]**

b) Draw and explain the architecture of Blackfin processor. How it is suitable for developing real time DSP applications. **[5]**

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