Total No of Questions: [8] *SEAT NO. :*

[Total No. of Pages : 2]

M.E. 2013 (VLSI and Embedded Systems)

Embedded Signal Processors

(Semester - II)

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

Instructions to the candidates:

1) ***Answer any Five questions***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary***

SECTION I

Q1) a) Write a note on real time embedded signal processing. [3]

b) Obtain auto-correlation for DT sequence given below and sketch the result. [3]

$x(n) = \{\underset{\uparrow}{4},3,2,1\}$

c) Explain the given system with respect to following properties: i) Time invariance II) Linearity iii) Causality iv) Stability [4]

y(n)=sgn[x(n)]

Q2) a) Obtain linear convolution of following sequences $x(n) = \{\underset{\uparrow}{1},2,1,2\}$ and [3]

$h(n) = \{\underset{\uparrow}{1},1,1\}$.

b) What are linear and non-linear filters? Compare them. [3]

c) What is correlation? What are different types of correlation? Explain properties of correlation. [4]

Q3) a) Determine the z-transform and its ROC for the given DT signal: [3]

$x(n)=2^n u(n)-3^n u(-n)$.

b) Explain Adaptive filter and its features. [3]

c) Compute the length-4 sequence from its DFT which is given by [4]

X(k)={4,1-j,-2,1+j}

Q4) a) Explain the methods of linear filtering of long data sequences [5]

b) Explain design of linear phase FIR filter using windows. What are various window functions used. [5]

Q5) a) Explain finite word length effects [3]

b) What is Discrete Wavelet Transform? Explain how is it better than DFT. [3]

c) Let x(n)={-1,0,2,0,-4,0,2,0}, find X(k) using DIT FFT flow graph [4]

Q6) a) Compare TMS 320C54XX and TMS 320C67XX with respect to architecture, MIPS/Flops, accumulator, memory, on-chip peripherals and addressing modes. [3]

b) The transfer function of an analog filter is given by: [3]

$H_a(s) = \frac{3}{(s+2)(s+3)}$ with T=0.1 sec. Design the digital IIR filter using BLT.

c) Justify the necessity of MAC and Barrel shifter in DSP processor. [4]

Q7) a) Explain the different buses of TMS 320C54XX and their functions. [3]

b) Determine the direct form I ,direct form II and cascade realization of the following difference equation: [4]

y(n)=0.5y(n-1)-0.25y(n-2)+x(n)+0.4x(n-1)

c) Explain the use of DSP algorithms in digital image filtering. [3]

Q8) a) Draw and explain the architecture of Blackfin processor [5]

b) Explain adaptive filter algorithm used for noise cancellation and inverse modelling. [5]