Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –I Examination Feb. - 2012

Subject code: 714204N **Date: 21/02/2012**

Subject Name: Advanced DSP System & Architecture

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Determine the inverse z-transform of **07**

$$X(z) = \frac{1}{1 - z^{-1} + 0.1875 z^{-2}}$$

if (a) ROC: |z|>0.75
(b) ROC: |z|< 0.25
(c) ROC: 0.25<|z|<0.75

(b) Perform circular convolution of the following two causal sequences **04**
$x_1(n)=\{2,1,2,1\}$ and $x_2(n)=\{1,2,3,4\}$

(c) Derive condition of stability of linear time invariant systems. **03**

Q.2 **(a)** How to design Linear-Phase FIR filters using windows? **07**

(b) Convert the analog filter with system function **07**

$$H_a(s) = \frac{s + 0.1}{(s + 0.1)^2 + 16}$$

into a digital IIR filter having $\omega_r=\pi/2$ by using bilinear transformation.

OR

(b) How to do frequency transformations in the analog domain and frequency domain? **07**

Q.3 **(a)** Explain Direct form and Cascade form structures of IIR systems. **07**

(b) Explain radix-2 decimation-in-frequency FFT algorithm. **07**

OR

Q.3 **(a)** Explain Goertzel algorithm using necessary equations. **07**

(b) Explain radix-4 decimation-in-time FFT algorithm. **07**

Q.4 **(a)** Draw the internal architecture of TMS320C6X devices and explain each block in brief. **07**

(b) Classify the TMS320C6X processor instruction set into different categories and explain each of them. **07**

OR

Q.4 **(a)** Differentiate fixed point and floating point data representation. **07**

(b) Explain interrupts of ’C6X processor. **07**

Q.5 **(a)** Explain the procedure of code generation in code composer studio. **07**

(b) Write assembly code to perform convolution operation in CCS. **07**

OR

Q.5 **(a)** Write basic features of general purpose DSP and explain any three of them. **07**

(b) Write applications of DSP and explain multirate signal processing in detail. **05**

(c) Describe the functional units of TMS320C6X processor in brief. **02**

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