Question Paper

Exam Date & Time: 05-Jan-2018 (10:00 AM - 01:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SCHOOL OF INFORMATION SCIENCES FIRST SEMESTER MASTER OF ENGINEERING - ME (Embedded Systems) DEGREE EXAMINATION (MAKE - UP) - JANUARY 2018 DATE : FRIDAY, JANUARY 05, 2018 TIME : 10:00AM - 1:00PM Digital Signal Processing [ESD 602]

Marks: 100

Duration: 180 mins.

Answer all the questions.

| 1) | Compute the DFT of the sequence $x(n) = [0.707, 1, 0.707, 0, -0.707, -1, -0.707, 0]$ using DIT-FFT algorithm. Draw the flow graph indicating the intermediate values. | (10) |
|----|---|------|
| 2) | Realize the following system functions using Direct form-I, Direct form-II, Cascade / Parallel form $H(z) = [(1 - 0.25z^{-1}) (z^{-2} - 5z^{-1} + 6)] / [(z^{-2} - 2z^{-1} + 2.5) (1 - 2z^{-1})]$ | (10) |
| 3) | - $0.75z^{-1}$] Implement the frequency sampling structure for the impulse responses h(n) = δ (n) + 2δ (n-1) + δ (n-2) | (10) |
| 4) | Explain Gibb's Phenomenon in FIR filters. How can it be reduced? | (10) |
| 5) | A third ordered Butterworth lowpass filter with 3 dB frequency of 5k Hz is to be realized using digital system. The sampling period is 10μ sec. Realize the filter using Impulse Invariance technique. | (20) |
| 6) | What is Multirate Signal Processing? Obtain the expressions both in time domain and frequency domain for the signal, which is up sampled by a factor I. | (10) |
| 7) | Design a phase shifter that shifts the phase of the spectrum of a signal by a value less than one unit. Also explain how a phase shift of more than one unit, can be achieved. | (10) |
| 8) | Explain LMS adaptive algorithm. Explain how LMS adaptive algorithm is made use to make the Weiner Noise Canceller Configuration adaptive based on the steepest descent | (10) |

technique.

⁹⁾ Explain the internal and external memory organization in ⁽¹⁰⁾ TMS320C6X DSP Processor.

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