Reg. No.										

MANIPAL UNIVERSITY
SCHOOL OF INFORMATION SCIENCES

SECOND SEMESTER MASTER OF ENGINEERING – **ME** (EMBEDDED SYSTEMS) /
FOURTH SEMESTER MSc Tech (VLSI DESIGN / EMBEDDED SYSTEMS)
DEGREE EXAMINATION – APRIL / MAY 2016

SUBJECT: ESD 602 / EDA 602 / ESD 602 – DIGITAL SIGNAL PROCESSING

Monday, May 9, 2016

Time: 10.00 – 13.00 Hrs. Max. Marks: 100

1. Find the DFT of the sequence x(n) = [1, 1, 1, 0, 0, 1, 1, 1] using DIF-FFT algorithm. Using this result obtain the DFT of the sequence y(n) = [1, 1, 1, 1, 1, 0, 0, 1] (10 marks)

2. Realize the following system functions using Direct form-I, Direct form-II and Cascade form
$H(z) = [(z^{-2} + z^{-1} + 1) / (z^{-2} - 1)] + [(z^{-1} + 1) / (z^{-2} + 2z^{-1} + 2)]$ (10 marks)

3. Explain in detail the frequency sampling technique for the design of FIR filters (10 marks)

4. It is desired to filter to remove low frequencies in an analog signal with a digital linear phase FIR filter. The 3 dB frequency is 2 KHz, transition width is 500 Hz and the stop band attenuation is 50 dB. Use suitable window function to design the filter to meet the above specification. The filter employs a sampling frequency of 10 KHz (10 marks)

5. Design a lowpass Chebychev digital filter for the following specifications.
$|H(j\Omega)| \geq -0.5$ dB $\quad 0 \leq \Omega \leq 50$ rad/sec
$|H(j\Omega)| \leq -50$ dB $\quad \Omega \geq 500$ rad/sec.
Assume the sampling frequency to be 4k rad/sec. Use impulse invariance technique (20 marks)

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 marks)

7. What is a digital filter bank? Explain how an uniform DFT filter bank can be implemented using multirate signal processing (10 marks)

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 technique (10 marks)

9. Draw the architecture of a TMS320C6X DSP processor and give the functionality of each of the block (10 marks)

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