B. Tech. ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

December, 2013

BIEL-010 : DIGITAL SIGNAL PROCESSING

Time : 3 Hours   *Maximum Marks : 70*

Note : *Answer **any seven** questions. Each question carries **ten** marks. **Use** of scientific calculator is permitted.*

1. Compute four point IDFT for the given signal   10
    $X(K) = \left[1, -j\frac{1}{3}, \frac{1}{3}, j\frac{1}{3} \right]$ by using basic IDFT
    equation.

2. Discuss over-lap Add method and state its use.   **10**

3. Compute DFT for $N = 4$, if $x(n) = 1$, $0 \le n \le 3$ **10**
    using decimation in frequency algorithm.

4. Discuss in detail "Goertzel Algorithm".   **10**

5. A first Order Butterworth Low Pass transfer   **10**
    function with a 3dB cut off frequency at Ω_C is

    given by $H_a(s) = \dfrac{\Omega_C}{S + \Omega_C}$. Design a single pole

    low pass digital filter with 3dB band width of
    $0.2\ \pi$ using bilinear transformation.

6. What is warping effect ? What is its effect on magnitude and phase response ? **10**

7. Obtain cascade realization with minimum number of multipliers for the following system function : **10**

$$H(Z) = \left(\frac{1}{2} + Z^{-1} + \frac{1}{2} Z^{-2} \right)\left(1 - \frac{1}{3} Z^{-1} + Z^{-2} \right)$$

8. Compare the frequency domain characterstics of different window functions. **10**

9. What is group delay and phase delay ? State the effect of constant phase delay and group delay in time domain behaviour of the filter. **5+5**

10. Write short notes on **any two** of the following : **5+5**
    (a) Butterworth filter.
    (b) Lattice structure.
    (c) Kaiser window function.

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