No. of Printed Pages : 2

BIEL-010

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00464 **Term-End Examination**

June, 2014

BIEL-010 : DIGITAL SIGNAL PROCESSING

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. Compute 4-point DFT of causal three sample sequence given by $x(n) = \frac{1}{3}, 0 \le n \le 2$

$= 0$, elsewhere

by using the basic equation for DFT. *10*

2. Prove that N-point DFT of $r_{xy}(l)$ is $R_{xy}(l) = X(k) \cdot Y^*(k)$, where $r_{xy}(l)$ is circular cross-correlation sequence of x(n) and y(n). *10*

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

4. Discuss in detail "Chirp z-transform algorithm." *10*

5. Convert the analog filter with system function $H_a(s) = \frac{s + 0{\cdot}1}{(s + 0{\cdot}1)^2 + 16}$ into a digital IIR filter by means of bilinear transformation. Resonant frequency of digital filter is given as $\omega_r = \pi/2$. *10*

6. What is the disadvantage of impulse invariant method ? State the ways to overcome it. *10*

7. Determine direct form and cascade form realisation for the transfer function of an FIR digital filter which is given by : *10*

$$H(z) = \left(1 - \frac{1}{4}z^{-1} + \frac{3}{8}z^{-2}\right)\left(1 - \frac{1}{8}z^{-1} - \frac{1}{2}z^{-2}\right)$$

8. Discuss the desirable features of the window functions. What is the effect of windowing on filter response ? *5+5*

9. What is meant by Linear phase FIR filter ? Derive the conditions for the same. *5+5*

10. Write short notes on any ***two*** of the following : *5+5*

    (i) Chebyshev filter

    (ii) Lattice structure

    (iii) Bartlett window function
