D 23146 **(Pages : 2)** **Name**.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2011

EE 04 702 – DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

I. (a) Explain BIBO stability theorem.

(b) Determine the impulse response of the casual system for the difference equation

$$y[n]-3y[n-1]+2y[n-2]=x[n]+3x[n-1]+2x[n-2].$$

(c) State and prove shifting property of DFT.

(d) Describe the in-place computation in FFT algorithms.

(e) Discuss the truncation error in quantization process. Discuss the truncation error in quantization process.

(f) What are the characteristics on which the DSPs are selected ?

(g) Write the steps in designing Chebyshev filter.

(h) What is the necessary condition for linear phase in FIR filter ? What is meant by impulse invariant method ?

(8 × 5 = 40 marks)

II. (a) Explain the following properties of a system with an example :

(i) Stability.

(ii) Time invariance.

(iii) Linearity.

(iv) Causality. (15 marks)

Or

(b) Determine the impulse response for the cascade of two LTI systems having impulse responses $h1(n) = (1/2)\,\hat{}\,n * u(n)$, $h2(n) = (1/4)\,\hat{}\,n * u(n)$.

(15 marks)

III. (a) (i) Write short notes on energy spectral density and power spectral density. (7 marks)

(ii) State and prove circular convolution and circular conjugate properties of DFT. (8 marks)

Or

(b) Find the DFT of the following sequence x using the DIT – FFT algorithm

$x = (1, -1, -1, -1, 1, 1, -1)$.

(15 marks)

Turn over

IV. (a) Obtain the direct–form I, direct–form II, cascade and parallel form realization structures for the following system :

$$H(z) = \frac{(1+2z^{-1})(1-5z^{-1}+z^{-2})}{(1-2z^{-1}+z^{-2})(1+z^{-1}+z^{-2})}.$$

(15 marks)

Or

(b) Explain the architecture of DSP processor.

(15 marks)

V. (a) Explain the procedural steps the design of low-pass digital Butterworth filter and list its properties.

(15 marks)

Or

(b) (i) Explain the design steps for FIR filters using windowing method in frequency domain.

(7 marks)

(ii) Write short notes on finite length effects in digital filters.

(8 marks)

[4 × 15 = 60 marks]