(Pages : 3) **1503**

Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, May 2012
(2008 Scheme)
Branch : COMPUTER SCIENCE AND ENGG.
08.604 : Digital Signal Processing

Time : 3 Hours Max. Marks : 100

C.E.T. MEMORIAL CSI INSTITUTE OF TECHNOLOGY
TRIVANDRUM-11
KANNAMMOOLA

PART – A

Answer **all** questions. **Each** question carries **4** marks.

1. Define and sketch four standard elementary discrete time sequences.
2. Explain the time invariant property of a system.
3. List the differences between linear convolution and circular convolution.
4. What is the relation between impulse response and unit step response of an LTI system ?
5. What is the relation between Fourier transform and Z-transform ?
6. What is the relation between DTFT and DFT ?
7. What is DIT radix-2 FFT ?
8. Define FIR and IIR systems with examples.
9. Compare the direct form and linear phase structures of an N^{th} order FIR system.
10. What is the advantage of linear phase realization of FIR system ?

PART – B

Answer **any one** full question from **each** Module. **Each** full question carries **20** marks.

Module – I

11. a) Differentiate time variant and time invariant systems. Given the following linear systems, find which one is time invariant.

    i) $y(n) = -5x\ (n - 10)$

    ii) $y(n) = 4x(n^2)$.

    b) For the following linear system, find the unit-impulse response, and draw the block diagram.

    $y(n) = x(n) + 0.5x\ (n - 1)$

12. a) Explain convolution sum.

    b) The impulse response of an LTI system is $h(n) = \{1, 2, 1, -1\}$. Determine the response of the system to the input signal $x(n) = \{2, 1, 3, 1\}$.

Module – II

13. a) Find the Z-transform of the signal $x(k) = k\, b^k u\ (k)$ using differentiation property.

    b) Compute the DFT of the sequence $x(n) = \{0, 1, 2, 3\}$. Sketch the magnitude and phase spectrum.

14. a) Define DFT of a discrete time sequence.

    b) Compute 8-point DFT of a sequence $x(n) = \{0, 1, 2, 3\}$ by

    i) DIT radix-2 FFT and

    ii) DIF radix-2 FFT.

Module – III

15. a) Explain the realization of cascade structure of an IIR system.

    b) Realize the direct form – I and direct form – II of the IIR system represented by the transfer function $H(z) = \frac{2(z+2)}{(z-0.1)(z+0.5)(z+0.4)}$

16. a) Explain different structures used for FIR filters.

    b) Realize the following FIR systems with minimum number of multipliers :

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

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