

Reg. No.:

Name :

Sixth Semester B.Tech. Degree Examination, May 2014 (2008 Scheme)

Branch: Computer Science and Engineering 08.604: DIGITAL SIGNAL PROCESSING (R)

Time: 3 Hours

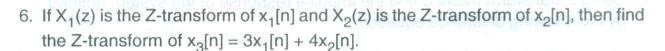
Max. Marks: 100

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PART-A

Answer all questions. Each question carries 4 marks.

- 1. Define and plot any two elementary discrete time signals.
- 2. What do you mean by impulse response?
- 3. Define convolution. What is its significance in a LTI system
- 4. What do you mean by linearity?
- 5. What is the relation between DTFT and DFT?



- 7. Find the 4-point circular convolution of the two sequences x(n) = [1, 1, 1, 1] and h(n) = [1, -1, 1].
- 8. Which of the following systems are FIR? Justify your answer.

$$y[n] = 0.75y[n - 1] + 0.125y[n - 2] + x[n] + 0.66x[n - 1]$$

 $y[n] = x[n] + 2x[n - 1] + 3x[n - 2] + 2x[n - 3] + x[n - 4]$

- 9. Explain the cascade form realization of IIR filters.
- 10. Find the difference equation of the following system.

H(z) = (1 + 2z - 1 + 3z - 2) / (3z - 3 + 2z - 4 + 1)

(10×4=40 Marks)



PART-B

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

Module - 1

11. a) A system's impulse response is given by h(n) = 2u[n] - u[n-2] - u[n-3]. Find the response y(n) of the system if an input x(n) = u(n) - (n-1)u(n-1) is given to the system.

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00 b) What is the relation between impulse response and unit step response of a system? Find the unit step response of a system with impulse response h[n] = u[n] - u[n - 4].

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- 12. A discrete time signal x(n) = [1, 2, 3, 4, 3, 2, 1]. Sketch and label each of the following signals:
 - a) x[2-n]
 - b) -2x[n+1]
 - c) x[-2n]
 - d) 3x[n]u[n-2]
 - e) $x[n] \delta (n-2) + x[n] \delta (n-4)$. (5x4=20 Marks)

Module - 2

- 13. a) Find the inverse Z-transform of the following signal $X(z) = \frac{z}{(z^2 5z + 6)}$.
 - b) Using Z-transform method find the impulse response of the system defined by the following difference equation.

$$y[n] = x[n] + 3y[n-1] - 2y[n-2]$$
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- 14. Compute 8-point DFT of the sequence $x(n) = \{1, 1, 2, 3\}$ by :
 - a) DIT radix-2 FFT and
 - b) DIF radix-2 FFT

Module - 3 13 - 10/25/10 - [1 - 11/25/10 = 11/2

- 15. Realize the direct form I and direct form II structures of the IIR system represented by the transfer function $H(z) = \frac{8z^3 - 4z^2 + 11z - 2}{(z - 0.25)(z^2 - z + 0.5)}$
- 16. Realize the following FIR systems with minimum number of multipliers.
 - a) $H(z) = 0.5 + 0.3z^{-1} + 2z^{-1} + 3z^{-2} + 2z^{-1}$
 - b) $H(z) = (1 + z^{-1} + 2z^{-1}) (1 + 2z^{-1} + 3z^{-2})$