Code: 13A04602 **R13**

B.Tech IV Year I Semester (R13) Supplementary Examinations June 2017

DIGITAL SIGNAL PROCESSING

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define unit impulse and unit step signals.
(b) Sketch the following signals: x(t) = r(-t+2).
(c) Write down DFT pair of equations.
(d) What are the computational saving (both complex multiplication and complex addition) using N point FFT algorithm.
(e) Draw the Direct form I structure of the FIR filter.
(f) State the condition for a digital filter to be causal and stable.
(g) What are the limitations of impulse invariance method?
(h) Explain the advantage and drawback of Bilinear transformation.
(i) What is Multirate digital signal processing?
(j) Write the different applications of Multirate DSP.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Explain, how linear convolution of two finite sequences are obtained via DFT.
(b) Find the Z-transform of the following sequences : x(n) = (0.5)nu(n) + u(n −1).

OR

3 (a) By means of the DFT and IDFT, determine the response of the FIR filter with impulse response h(n) = {1, 2, 3} to the input sequence x(n) = {1, 2, 2, 1}.
(b) State and prove any two properties of DFT.

UNIT – II

4 Compute the eight point DFT of the given sequence x(n) = { ½, ½, ½, ½, 0, 0, 0, 0} using radix-2 DIT-DFT algorithm.

OR

5 Find DFT for {1, 1, 2, 0, 1, 2, 0, 1} using FFT DIT butterfly algorithm and plot the spectrum.

UNIT – III

6 Draw the direct form implementation of the FIR system having difference equation:

y(n) = x(n) – 2x(n-1) + 3x(n-2) – 10x(n-6)

OR

7 Draw two different FIR structures for the H(z) given below: $H(Z) = (1 + 5Z^{-1} + 6Z^{-2})(1 + Z^{-1})$.

UNIT – IV

8 Using a rectangular window technique, design LPF with band pass gain of unity, cutoff frequency 1 kHz and sampling frequency 5 kHz. The length of the impulse response is 7.

OR

9 Convert the analog filter into a digital filter whose system function is $H(S) = \frac{S+0.2}{(S+0.2)^2+9}$. Use the impulse invariant technique. Assume T = 1s.

UNIT – V

10 Explain the poly phase decomposition for:

(a) FIR filter structure
(b) IIR filter structure.

OR

11 Explain in detail about Interpolation and decimation with examples.

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