Code: 15A04603 **R15**

B.Tech III Year II Semester (R15) Supplementary Examinations December/January 2018/19

DIGITAL SIGNAL PROCESSING

(Common to ECE & EIE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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

(a) If DFT of x(n) is X(k), what is the DFT of x(n-1).
(b) Define circular convolution.
(c) How many computations are required for finding 1024 point DFT using FFT?
(d) Define correlation of two sequences.
(e) Sketch the direct form II realization for a first order IIR digital filter.
(f) What is a transposed structure?
(g) Write two important differences between FIR and IIR filters.
(h) Mention two commonly used analog filters.
(i) What is decimation? Sketch a signal and its signal decimated by 2.
(j) Mention few applications of multi rate signal processing.

PART – B

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

UNIT – I

2 Find the DFT of the sequence $x(n) = \left(\frac{1}{4}\right)^n$ for N = 16.

OR

3 (a) State and prove the time shifting property of DFT.
(b) Find the 3 point DFT of $h(n) = \frac{1}{3}\ for\ 0 \le n \le 2$.

UNIT – II

4 Compute the 8 point DFT of the sequence x(n) = {0.5, 0, 0.5, 0, 0.5, 0, 0.5, 0} using DIT-FFT algorithm.

OR

5 Explain with flow diagram the computation of split radix FFT for radix 6.

UNIT – III

6 (a) Realize the system $H(z) = 1/2 + 1/3\ z^{-1} + z^{-2} + 1/4\ z^{-3} + z^{-4} + 1/3\ z^{-5} + 1/2\ z^{-6}$ in direct form.
(b) Draw the structure of a single stage and two stage all-zero lattice FIR filter.

OR

7 Obtain the cascade form of realization for the system:

$$y(n) + 0.1\ y(n-1) = 0.2\ y(n-2) + 3\ x(n) + 3.6\ x(n-1) + 0.6\ x(n-2)$$

UNIT – IV

8 Determine the filter coefficients h(n) of a FIR filter obtained by frequency sampling method for N = 7, given:

$$H_d(e^{j\omega}) = \begin{cases} e^{-j(N-1)\,\omega/2}, & 0 \le |\omega| \le \pi/2 \\ 0, & -\pi/2 \le |\omega| \le \pi/2 \end{cases}$$

OR

9 Determine H(z) given H(s) = 1 / (s^2 + 7s + 10) using: (i) Impulse invariant transformation. (ii) Bilinear transformation method. Assume T = 0.2 sec.

UNIT – V

10 Describe the process of interpolation. With necessary equations and explain the spectrum of the interpolated signal.

OR

11 Explain with block diagrams multi stage implementation of decimator and interpolator.