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305503

December, 2019

B.Tech. (ECE)-Vth Semester

Digital Signal Processing (ECC04)

Time : 3 Hours] [Max. Marks : 75

Instructions:

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART - A

1. (a) Sketch the waveform of discrete signal $x(n) = u(n) - (n-3)$. (1.5)

(b) Find the z-transform of unit impulse sequence $x(n) = \delta(n)$. (1.5)

(c) Compare static and dynamic system with example. (1.5)

(d) What are various elements for realization of digital filter? (1.5)

(e) Explain how IIR filters are designed from analog filters? (1.5)

(f) Write mathematical expression of Chebyshev polynomial. (1.5)

(g) Compare the IIR and FIR filter in short. (1.5)

(h) Explain about decimation process. (1.5)

(i) Discuss how finite-word length effect lead instability in digital filter. (1.5)

(j) Explain spectral estimation in brief. (1.5)

PART - B

2. (a) Explain the analysis of discrete time Linear Time Invariant system. And list the various properties of Linear Time Invariant System. (8)

(b) Explain the sampling of continuous function to generate a sequence. Discuss how continuous-time signals are reconstructed from discrete-time sequences. (7)

3. (a) Discuss linear filtering using Discrete Fourier Transform. (5)

(b) Explain radix-2 decimation in time using Fast Fourier Transform algorithms. (5)

(c) Describe the various properties of Region of Convergence of Z-Transform. (5)

4. (a) Explain designing of IIR filters from analog filters using bilinear transformation technique along with necessary mathematical analysis. (8)

(b) Explain Butterworth approximations for designing of filter. (7)

5. (a) Explain designing of FIR Filters using windows technique. (8)

(b) Convert analog filters with transfer function $H(s)=\frac{s+2}{(s+1)(s+3)}$ using impulse invariant method into digital filter. (7)

6. (a) Explain Parametric and non-parametric spectral estimation technique. (8)

(b) Discuss the effect of infinite-word length and effects of finite precision arithmetic on digital filters. (7)

7. (a) Explain the various application of DSP. (8)

(b) Explain how sampling rate conversion is achieved? Explain filter design and implementation for sampling rate conversion. (7)
