

Roll No.

24422

B. Tech. 7th Sem. (AEIE)

Examination – May, 2015

DIGITAL SIGNAL PROCESSING

Paper : ECE-409-F

Time : Three Hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. 1 is *compulsory*. Attempt *one* question from each Unit.

1. (a) What do you mean by a deterministic signal ?
State an example. 4
- (b) State sampling theorem. 4
- (c) What is z-transform of $\frac{1}{1-az^{-1}}$? 4

(d) What is digital filter banks ? 4

(e) Explain LTI systems. 4

UNIT - I

2. (a) Explain the classification of signals in detail. 10
- (b) Explain the unit step response of an LTI system. 10
3. Explain in detail the properties of Discrete Fourier Transform. <http://www.HaryanaPapers.com> 20

UNIT - II

4. (a) Find the z-transform of the following functions : 10
- (i) $x(n) = -a^n u(-n-1)$
- (ii) $x(n) = a^{-n} u(-n-1)$
- (b) Explain the reconstruction of band-limited signal from its samples. 10

5. (a) Find the inverse z-transform of 10

$$X(z) = \frac{2 + z^{-2} + 3z^{-4}}{z^2 + 4z + 3} \quad |z| > 0$$

- (b) Explain how the sampling rate can be changed using discrete time processing. 10

UNIT - III

6. (a) Derive the expression for Bilinear Transformation of design of IIR filter. What is meant by frequency wrapping and how it can be removed? 10
- (b) Explain in detail how DSP hardware/algorithm can improve speech processing. 10
7. (a) What is an IIR digital filter? Compare an IIR filter with an FIR filter. 10
- (b) Explain the rectangular window technique for FIR filter design. 10

UNIT - IV

8. (a) What do you understand by decimation factor and interpolation factor in sampling rate conversion, used in the field of multirate digital signal processing. 10
- (b) Explain filter structures in detail. 10
9. What do you mean by multirate digital signal processing? Enumerate areas of application of multirate digital signal processing. Find the expression for the spectra of response sequence $y(n)$ obtained by down sampling sequence $x(n)$ by a factor D. 20

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