

Code No: 117CK

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, November/December - 2016

DIGITAL SIGNAL PROCESSING

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks.

Part- A

(25 Marks)

1. a) Discuss the stability criterion for digital filter. [2]
- b) Explain the frequency representation of discrete time systems. [3]
- c) Write any two properties of DFS. [2]
- d) Differentiate between Decimation-in-time and Decimation-in-frequency. [3]
- e) Why is the Butterworth response called a maximally flat response? [2]
- f) What is Prewarping? [3]
- g) Give the equations for Hamming window and Blackmann window. [2]
- h) What are the features of FIR filter design using Kaiser's approach? [3]
- i) What is truncation? [2]
- j) What is sub band coding? [3]

Part-B

(50 Marks)

2. Explain the canonical form of digital filter realization. [10]
- OR
3. Discuss the concept of stability and causality with examples. [10]
4. Explain the properties of DFT. [10]
- OR
5. Explain Radix- 2 Decimation- in-Time algorithms. [10]
6. For the analog transfer function $H(s) = 2 / \{(s+2)(s+3)\}$. Determine $H(z)$ using impulse invariance method. Assume $T = 1$ sec. [10]
- OR
7. Design a digital second order Low-Pass Butterworth filter with cut-off frequency 2.2KHz using Bilinear Transformation. Sampling rate 8 KHz. [10]
8. Using a rectangular window technique, design a low pass filter with pass band gain of unity, cut-off frequency of 1000Hz and working at a sampling frequency of 5 KHz. The length of the impulse response should be 7. [10]

OR

9. Consider a second order IIR filter with $H(z) = \frac{1}{(1 - 0.5z^{-1})(1 - 0.45z^{-1})}$. Find the effect on quantization on pole locations of the given system function in direct form and in cascade form. Assume $b=3$ bits. [10]

10. Explain how reduction of product round-off error is achieved in digital filters. [10]

OR

11. Explain in detail the decimation and interpolation. [10]

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