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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