Code No: 126EK **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, October/November - 2016
DIGITAL SIGNAL PROCESSING
(Common to ECE, EIE)

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 and may have a, b, c as sub questions.

PART – A
(25 Marks)

1.a) Define decimation and interpolation. [2]
b) State linear and static system with example. [3]
c) If $x(n) = \cos\frac{\pi}{3}n$, find spectra of the signal? [2]
d) How many multiplications and additions are required to compute N-point DFT using radix-2 FFT? [3]
e) State the properties of IIR filter. [2]
f) State the methods used to prevent overflow. [3]
g) Give the equations for Hamming window and Blackman window [2]
h) What is dead band of a filter? [3]
i) Give the steps in multistage sampling rate converter design. [2]
j) Write any four applications of Multi-rate signal processing. [3]

PART – B
(50 Marks)

2.a) If y(n) = 12x(n-1) + 11x(n-2), Find whether given system is time variant or not?
b) Find the frequency response of 1st order system y(n) = x(n) + ay(n-1). [5+5]

OR

3.a) y(n)-3y(n-1) – 4y(n-2) = 0 determine zero-input response of the system; Given y(-2) =0 and y(-1) =5.
b) Obtain the cascade and parallel form realization for the system.
$y(n) = -0.1\ y(n-1) + 0.2\ y(n-2) + 3x(n) + 3.6x(n-1) + 0.6\ x(n-2)$. [5+5]

4. Explain all properties of DTFT. [10]

OR

5.a) Explain Radix-2 Decimation-in-time FFT algorithm with example.
b) Find the DFT of a sequence x(n)= {1,1,0,0} and find the IDFT of Y(k)={1,0,1,0}. [5+5]

6. Design a Butterworth high pass filter satisfying:
$f_p = 0.32$Hz ; $\alpha_p = 0.5$ dB
$f_s = 0.16$Hz ; $\alpha_s = 30$ dB ; F = 1 Hz [10]

OR

7. Discuss the steps in design of IIR filter using bilinear transformation for any one type of filter. [10]

8. Realize the system function $\frac{2}{3}z + 1 + \frac{2}{3}z^{-1}$ by linear phase FIR structure. [10]

OR

9. Explain the designing of FIR filters using windows. [10]

10. With respect to finite word length effects in digital filters, explain over flow limit cycle oscillation with example. [10]

OR

11.a) Explain the applications of Multi rate signal processing.

b) What is meant by signal scaling? Explain. [5+5]

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