Code No. 6329

FACULTY OF ENGINEERING

B.E. 3/4(EEE) II – Semester (Main) Examination, April / May 2014

Subject: Digital Signal Processing

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1 Given x(n) = {0, 1, 2, 3}, find X(k) using DIT – FFT algorithm. (3)

2 How is FFT computationally efficient? (2)

3 Define a stable system and what is the condition for stability? (2)

4 State Parsavels theorem. (2)

5 Assume two finite duration sequences $x_1(n)$ and $x_2(n)$ are linearly combined.
Let $x_3(n) = a\,x_1(n) + b\,x_2(n)$. What is the DFT of $x_3(n)$? (3)

6 Find the digital filter H(z) from given analog filter below using impulse invariant method. (3)

7 Compare are FIR and IIR systems. (2)

8 Show whether the system is linear? $Y(n) = nx^2(n)$. (2)

9 Calculate DFT of the sequence x(n) = {1,1, 2, 2}. (3)

10 What is the relation between DFT and DTFT? (3)

PART – B (5x10 = 50 Marks)

11 Determine the order of cheybshev filter that meets the following specification. (10)
i) 1db ripple in the pass band $0 \le |\omega| \le 0.36$
ii) Atleast 60 db attenuation in the stop band $0.35\,\pi \le |\omega| \le \pi$ use bilinear transformation.

12 Design a digital filter equivalent to this using impulse invariant method $H(s) = \frac{10}{s^2+7s+10}$ (10)

13 Find 8 point DFT of $x(n) = \begin{cases} 0.5, & 0 \le n \le 3 \\ 0, & 4 \le n \le 7 \end{cases}$ using DIF FFT. (10)

14 (a) Determine the response of causal system. (5)
$y(n)-y(n-1) = x(n) + x(n-1)$ to input $x(n) = u(n)$ and $x(n) = 2^{-n}u(n)$ test its stability
(b) Determine the IZT of $X(z) = 1/(1-Z^{-1})\,(1-Z^{-1})^2$. (5)

15 Design of FIR filter using Bartley and Kaiser window. (10)

16 (a) Write the design procedure of FIR filter using rectangular window technique. (5)
(b) State and prove the condition for minimum sampling frequency to avoid aliasing in time domain sampling. (5)

17 For a FIR linear phase digital filter approximating the ideal frequency response. (10)
$Hd(\omega) = \begin{cases} 1 & |\omega| \le \pi/6 \\ 0 & \pi/6 \le |\omega| \le \pi \end{cases}$
Determine the co-efficient of a 5 tap filter using rectangular windows.

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