M 23314

Reg. No. : .....

Name : .....

VI Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013
(2007 Admn. Onwards)
PT 2K6/2K6 EC/AEI 604 : DIGITAL SIGNAL PROCESSING

Time : 3 Hours Max. Marks : 100

PART – A

I. a) Explain the difference between Discrete Fourier Series (DFS) and Discrete Time Fourier Transform (DTFT).

b) x[n] denotes a finite-length sequence of length N. Show that $x[((-n))_N] = x[((N-n))_N]$.

c) Discuss what is meant by truncation and round off errors.

d) Obtain the direct form I realization of an FIR filter with impulse response

$$h(n) = \left(\frac{1}{2}\right)^n [u(n) - u(n-4)].$$

e) What is meant by warping ? Explain.

f) Explain the desirable characteristics of window functions.

g) What are the advantages of multirate signal processing ?

h) Explain about general purpose digital signal processor. **(8×5=40)**

PART – B

II. a) Let $X(e^{j\omega})$ denote the Fourier transform of the sequence $x[n] = \left(\frac{1}{2}\right)^n u(n)$. Let y[n] denote a finite duration sequence of length 10 i.e. y[n] = 0, n < 0 and y[n] = 0, n ≥ 10. The 10-point DFT of y[n] denoted by Y(K) corresponds to 10 equally spaced samples of $X(e^{j\omega})$ i.e. $Y[K] = X\left(e^{j2\pi K/10}\right)$. Determine y[n]. **15**

OR

b) Given x(n) = {0, 1, 2, 3, 4, 5, 6, 7}, find X(k) using DIT FFT algorithm. **15**

P.T.O.

III. a) Find the direct form I and direct form II realizations of a discrete time system represented by transfer function $H(z)=\frac{8z^3-4z^2+11z-2}{\left(z-\frac{1}{4}\right)\left(z^2-z+\frac{1}{2}\right)}$. **15**

OR

b) i) Explain coefficient quantization in direct form realization of FIR fillies. **12**

ii) Explain what is meant by dead bond. **3**

IV. a) Design a digital butterworth filter that satisfies the following constraint using bilinear transformation. Assume T = IS.

$$0.9 \le \left|H\left(e^{J\omega}\right)\right| \le 1 \qquad 0 \le \omega \le \pi/2$$
$$\left|H\left(e^{J\omega}\right)\right| \le 0.2 \qquad 3\pi/u \le \omega \le \pi$$

15

OR

b) The desired frequency response of a low pass filter is given by

$$H_d(e^{J\omega}) = H_d(\omega) = \begin{cases} e^{-J3\omega}, & |\omega| < 3\pi/4 \\ 0, & 3\pi/4 < |\omega| < \pi \end{cases}$$

15

Determine the frequency response of FIR filter if hamming window is used with N = 7. **15**

V. a) i) Explain different addressing modes of DSP processor with example. **7**

ii) With neat diagram explain address generation unit of DSP architecture. **8**

OR

b) Explain the principle of multirate DSP. **15**