P-830

Total No. of Pages : 3

Seat No.	

T.E.(ETC) (Semester - VI) (Revised) Examination, April - 2016
DIGITAL SIGNAL PROCESSING
Sub. Code : 66916

Day and Date : Saturday, 16 -04 - 2016 **Total Marks : 100**

Time : 3.00 p.m. to 6.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

Q1) Solve any Three: **[18]**

a) What is sectioned convolution? Explain in detail overlap add method.

b) Find the circular convolution of two finite duration sequences $x_1(n) = \{1, -1, -2, 3, -1\}$ and $x_2(n)=\{1,2,3\}$ using concentric method.

c) Find the DFT of the given sequence x(n)={1,–1, –1, –1, 1, 1, 1,–1} using DIT FFT algorithm.

d) Determine the IDFT of the sequence X(k)={1, –2–j, 0, –2+j}.

Q2) Solve any two: **[16]**

a) Explain in detail symmetrical properties of DTFT.

b) Find Fourier transform of

i) $\delta(n+2)-\delta(n-2)$.

ii) $x(n)=(0.5)^n u(n)+2^{-n}u(-n-1)$.

c) Find the convolution of the signals given below using Fourier transform

$$x_1(n)=\left(\frac{1}{2}\right)^n u(n);\quad x_2(n)=\left(\frac{1}{3}\right)^n u(n)$$

P.T.O.

Q3) Solve any two: **[16]**

a) Using frequency sampling, design a bandpass filter with the given specifications:

Sampling Frequency: F=8000Hz

Cut-off Frequencies: Fc_1= 1000Hz Fc_2= 3000Hz

Determine the filter coefficients for N=7.

b) Design a filter with

$$H_d(e^{j\omega}) = 1 \qquad \frac{-\pi}{4} \le \omega \le \frac{\pi}{4}$$

$$= 0 \qquad \omega \le \frac{\pi}{4}$$

Using Hanning window for N=11.

c) Explain windowing technique used in FIR filter. Explain rectangular window.

Q4) Solve any Three: **[18]**

a) Explain impulse invariant method for IIR filter design. What are the disadvantages of this technique.

b) Find out H(z) using impulse invariance method at 5KHz sampling frequency from $H(s) = 2/(s+1)(s+2)$.

c) Design a digital filter using BLT method if, $H(s) = \frac{(s+0.1)}{(s+0.1)^2+16}$ and resonant frequency is at $\omega_r = \frac{\pi}{2}$.

d) Design the first order high-pass digital Butterworth filter whose cut-off frequency is 1KHz at sampling frequency of 10^4 sample/sec. Use BLT method.

Q5) Solve any Two: [16

a) Realize the system given by difference equation $y(n) = -0.1y(n-1) - 0.72y(n-2) + 0.7x(n) - 0.252x(n-2)$ in parallel form.

b) Realize the system function

i) $H(z) = \frac{1}{2} + \frac{1}{3}z^{-1} + z^{-2} + \frac{1}{4}z^{-3} + z^{-4} + \frac{1}{3}z^{-5} + \frac{1}{2}z^{-6}$.

ii) $H(z) = 1 + 2z^{-1} - 3z^{-2} - 4z^{-3} + 5z^{-4}$.

c) Explain methods of FIR filter realization.

Q6) Solve any Two: [16]

a) Explain general DSP processor with block diagram.

b) Compare microprocessor and DSP processor.

c) Explain different architectures of DSP's.