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1 st half-09-nkD 197

BE (Comp) Sem VII (A)  
D. S. P.

16/05/09  
11-2

Con. 2768-09.

VR-4737

(3 Hours)

[ Total Marks : 100

**N.B.:** (1) Question No. 1 is compulsory.

(2) Attempt any **four** questions from the remaining **five**.

(3) Make the **necessary assumption** wherever required.

1. (a) Derive the relationship between Z-Transform, DTFT and DFT. 5  
(b) Determine whether following signals are periodic 5  
(i)  $\cos(0.3\pi_n + \pi/6)$  (ii)  $x(n) = \sin(0.01\pi n)$   
(c) Find the step response of a system having difference equation 5  
 $y(n) = x(n) - 0.4y(n-1) + 0.05y(n-2)$   
(d) Find the given system is linear phase or not prove your Answer : 5  
 $h(n) = \{ 1, -2, 0, 2 - 1 \}$
2. (a) Using DIF-FFT find DFT of the following sequence 10  
 $x(n) = \{ 1, 3, -2, 4, 1, 4, -2, 3 \}$   
(b) Determine the frequency response, magnitude response, phase response of 10  
the system given by  
 $y(n) - 1/2y(n-1) = x(n) - x(n-1)$ .
3. (a) A low pass filter has desired response is given below : 10  
$$H_d(e^{j\omega}) = \begin{cases} e^{-j3\omega} & 0 \leq \omega < \pi/2 \\ 0 & \pi \leq \omega \leq \pi \end{cases}$$
  
Determine the filter coefficient  $h(n)$  for  $M = T$  using frequency sampling technique.  
(b) Prove the following properties of DFT with example : 10  
(i) Periodicity property  
(ii) Convolution property.
4. (a)  $x(n) = \delta(n) + \delta(n-1) - \delta(n-2) + \delta(n-3) + \delta(n-4) + \delta(n-5)$  10  
 $h(n) = \delta(n) + 2\delta(n-1) - \delta(n-2)$   $\epsilon_1$   
Find  $y(n)$  by linear convolution  
Find  $y(n)$  by circular convolution.  
(b) What are the conditions to be satisfied by LTZ system ? 10

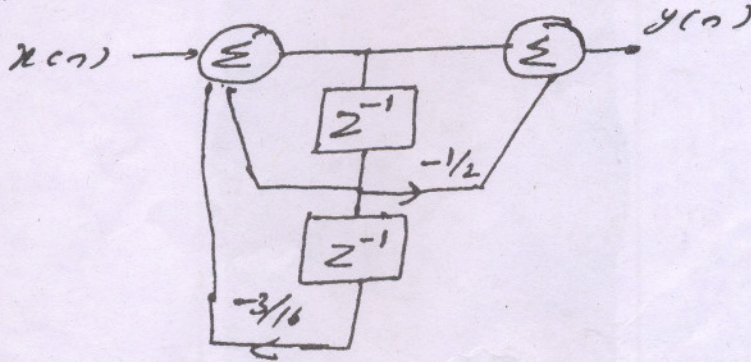
5. (a) Design a digital butterworth filter satisfying. The following constraints using bilinear transformation. Assume  $T = 1$  sec. 10

$$0.9 < |H(e^{j\omega})| \leq 1 \quad 0 \leq \omega \leq \pi/2$$

$$|H(e^{j\omega})| \leq 0.2 \quad 3\pi/4 \leq \omega \leq \pi$$

(b)

10



For the direct form-II realization of IIR filter find :

- Transfer function of filter
- Corresponding difference equation
- Impulse response fraction of filter
- Pole zero pattern of filter
- State whether filter is stable or not.

6. Write short notes on any two :—

- Fetal ECG monitoring
- DSP processors
- Chirp-2 Algorithm.

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