BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)
B.Tech.Sem - VI ELECTRONIC : : SUMMER - 2022
SUBJECT : DIGITAL SIGNAL PROCESSING

Day : Monday
Date : 13-06-2022

S-13388-2022

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Assume suitable data if necessary.

Q.1 Compute 8-point DFT of the following sequence x(n) = {1, 1, 1, 1, 1, 1, 1, 1} using direct computation method. **[10]**

OR

a) State and prove the relationship between z-transform and DFT. **[05]**

b) Compute circular convolution of the following sequences using concentric circle method, N = 4 **[05]**
x(n) = (1, 2, 3) , h(n) = (–1, –2).

Q.2 Determine the 8-point DFT of the sequence x(n) = {1, 2, 2, 1, 1, 2, 2, 1} using DIF-FFT algorithm. **[10]**

OR

Compute 8-point DFT of x(n) = {2, 2, 2, 2, 1, 1, 1, 1} using radix-2 DIT-FFT algorithm. **[10]**

Q.3 Design a linear phase FIR Low Pass Filter using Hanning window. The frequency characteristics of the filter is given as **[10]**

$$H_d(\omega) = e^{-j3\omega} \quad ; \quad \frac{-\pi}{4} \le \omega \le \frac{\pi}{4}$$

$$= 0 \quad ; \quad \frac{\pi}{4} \le \omega \le \pi$$

OR

a) Obtain cascade realization with minimum number of multipliers for the system function. **[05]**

$$H(z) = \left(\frac{1}{2} + z^{-1} + \frac{1}{2}z^{-2}\right)\left(1 + \frac{1}{3}z^{-1} + z^{-2}\right)$$

b) What are the characteristics of FIR filters? **[05]**

P.T.O.

Q.4 The system transfer function of analog filter is given by $H(s)=\frac{s+0.1}{(s+0.1)^2+16}$ using Bilinear transformation method. Determine the transfer function of digital filter H(z). The resonant frequency is $\omega_r = \pi/2$. **[10]**

OR

Obtain direct form I and II realization of a system described by $y(n)-\frac{3}{4}y(n-1)-\frac{1}{2}y(n-2)+\frac{1}{8}y(n-3)=x(n)+\frac{5}{4}x(n-2)$. **[10]**

Q.5 **a)** Explain in detail (zero-input) limit cycle oscillations. **[06]**

b) What is truncation? What is the error that arises due to truncation in floating point number? **[04]**

OR

Explain in detail coefficient quantization effects in direct form realization of FIR filters. **[10]**

Q.6 With a neat sketch, explain in detail the architecture of TMS320C6XX processor. **[10]**

OR

a) Discuss the mechanism of pipelining to speed up the execution of an instruction. **[05]**

b) Explain how a higher throughput is obtained using VLIW architecture. Give an example of a DSP processor that has VLIW architecture. **[05]**

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