B.Tech. Sem. V (2020 course) Electronics & Communication - Winter 2022

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2020 COURSE)
B.Tech.Sem - V Electronics & Communication : WINTER- 2022
SUBJECT : DIGITAL SIGNAL PROCESSING

Day : Thursday | Time : 02:30 PM-05:30 PM
Date : 8/12/2022 | **W-24611-2022** | 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

Q.1 Prove the following properties of DFT **(10)**
i) Linearity
ii) Complex conjugate property

OR

Q.1 Find IDFT of the sequence **(10)**
X (k) = {5, 0, 1 - j, 0,1, 0, 1 + j, 0}

Q.2 An 8 point sequence is given by x (n) = { 2, 2, 2, 2, 1, 1, 1, 1} Compute 8 point DFT of x(n) by radix - 2 DITFFT. **(10)**

OR

Q.2 Describe the following algorithm **(10)**
i) Chirp Z transform
ii) Goertzel algorithm

Q.3 Design an ideal bandpass filter with a frequency response **(10)**

$H_d(e^{j\omega}) = 1 \quad for \ \frac{\pi}{4} \le |\omega| \le \frac{3\pi}{4}$

$= 0 \quad$ otherwise

Find the values of h (n) for N = 11 & plot the frequency response.

OR

Q.3 Describe design of FIR filters using different windows. **(10)**

Q.4 Design a chebyshev filter with a maximum passband attenuation of 2.5 dB at Ωp = 20 rad / sec. of 30 dB at Ωs = 50 rad / sec. **(10)**

P.T.O.

OR

Q.4 **a)** Apply bilinear transformation $H(s)=\frac{2}{(s+1)(s+2)}$ with T = 1 sec and find H(z). **(05)**

b) Obtain the direct form-I realization for the system described by difference equation. $(y(n) = 0.5\ y(n-1) - 0.5\ y(n-2) + x(n) + 0.4\ x(n-1)$ **(05)**

Q.5 **a)** Compare fixed point and floating point arithmetic in DSP processor. **(05)**

b) Discuss product equalization and coefficient quantization errors. **(05)**

OR

Q.5 Describe limit cycle oscillations and signal scaling. **(10)**

Q.6 Elaborate decimation and interpolation in multirate signal processing. **(10)**

OR

Q.6 Describe following applications. **(10)**

i)Digital processing of audio signals

ii) Radar signal processing

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