B.Tech. DEGREE EXAMINATION, OCTOBER/NOVEMBER 2022.

End Examinations

Sixth Semester

ECE

DIGITAL SIGNAL PROCESSING

(Academic Year 2021-22)

(RU 19 Regulations)

(Regular)

Time : 3 Hours *Max. Marks : 70*

PART — A

Compulsory questions. **(10 × 2 = 20 Marks)**

Answer the following.

1. (a) What are the advantages of DFT over DTFT? Also state the applications of DFT.

(b) What is FFT? How many multiplications and additions are required to compute N point DFT using redix-2 FFT?

(c) Why IIR filters do not have linear phase?

(d) What is Warping effect and how it is eliminated?

(e) Why FIR filters are always stable

(f) Distinguish between FIR and IIR filters.

(g) Discuss about the various sources of errors in the computation using DSP processor implementations.

(h) Give the features of Fixed and Floating point DSP's.

(i) List out the on chip peripherals of TMS320C5X processor.

(j) Discuss in detail the Pipeline Operation of TMS320C54XX Processors.

PART — B

Answer ONE full questions from each Unit. **(5 × 10 = 50 Marks)**
All questions carry equal marks.

UNIT I

2. (a) Determine the discrete Fourier series coefficients of the periodic signal $x(n) = \left(\cos\frac{2\pi}{3}n\right)\left(\sin\frac{2\pi}{5}n\right)$. Also, sketch its magnitude spectrum. (5)

(b) State and prove any two properties of DFT. (5)

Or

3. (a) Find the 4-point DFT of the sequence $xn = 2, 1, 4, 3$ by using DIF FFT algorithm? Also, plot its magnitude and phase spectra. (5)

(b) Find the 4-point IDFT of $(k) = \{10, -2 + j2, -2, -2, -j2\}$ using DIF FFT algorithm. (5)

UNIT II

4. Design a digital Chebyshev low pass filter using bilinear transformation with the following specifications: 3 dB ripple in the pass band $0 \le w \le 0.2\pi$; 25 dB attenuation in the stop band $0.45\pi \le w \le \pi$; Assume $T = 1$ sec. (10)

Or

5. (a) Distinguish between Butterworth and Chebyshev filters. (5)

(b) What are the advantages of parallel form realization? Implement the IIR filter with difference equation

$y(n) = -0.1(n-1) + 0.72\,y(n-2) + 0.7x(n) - 0.252x(n-2)$ in parallel form. (5)

UNIT III

6. Design an FIR digital filter to approximate an ideal low pass filter with pass band gain of unity, cut-off frequency of 850 Hz and sampling frequency of 5000 Hz. The length of impulse response should be 5. Use Hamming window. (10)

Or

7. (a) Sketch the direct form realization of linear phase FIR filter with $h(n) = \{1, 2, 3, 4, 3, 2, 1\}$. (5)

(b) Explain the frequency domain characteristics of various window functions used in FIR filter design. (5)

UNIT IV

8. (a) Discuss in detail the Basic Architectural features of programmable DSP devices. (5)

(b) Explain about DSP Computational building blocks. (5)

Or

9. (a) Explain the Bus Architecture of DSP Processor. (5)

(b) Explain about Address Generation unit and Speed issues of DSP's. (5)

UNIT V

10. With a neat diagram, explain about the architecture of TMS320C54XX DSP processor. (10)

Or

11. (a) Explain the various pipeline programming models that are adapted in DSP processors. (5)

(b) What is the difference between internal and external modes of clocking of TMS320C54XX Processor? (5)
