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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2023

DIGITAL SIGNAL PROCESSING

[Maximum Marks: **100**] [Time: **3** Hours]

PART-A

[Maximum Marks: **10**]

I. (Answer ***all*** questions in one or two sentences. Each question carries ***2*** marks)

1. Define Causal Signal.
2. Define Circular Convolution.
3. Define Z transform of a signal.
4. What are the advantages of FFT?
5. Write an example for Floating point DSP. (5 x 2 = 10)

PART-B

[Maximum Marks: **30**]

II. (Answer ***any five*** of the following questions. Each question carries ***6*** marks)

1. Explain Scalar Multiplication and time scaling with suitable examples for discrete time signals.
2. Explain Z transform of unit step and unit impulse signals.
3. Describe decimation in time algorithm.
4. Perform addition and multiplication of the discrete time signal $x_1(n)=\{2,2,1,2\}$ and $x_2(n)=\{-2,-1,3,2\}$
5. Explain the various windows used in the design of FIR Filters
6. List some Applications of DSP.
7. Draw the basic butterfly diagram for DIT Algorithm. (5 x 6 = 30)

PART-C

[Maximum Marks: **60**]

(Answer ***one*** full question from each Unit. Each full question carries **15** marks)

UNIT – I

III. a. Explain the following with examples
(i) Periodic and Aperiodic signals (ii) Even and Odd signals (8)

b. Check whether the following systems are time - invariant or time variant.

(i) y(n) = x(n) + x(n - 1)

(ii) y(n) = x(-n) (7)

OR

IV. a. Determine whether the system described by the following equations are Linear or Non-linear.

(i) $y(n) = x(n) + \frac{1}{x(n-1)}$

(ii) $y(n) = nx(n)$ (10)

b. Explain shifting, time reversal and time scaling operation in Digital signal Processing. (5)

UNIT – II

V. a. Find the DFT of the sequence $x(n) = 1$ for $0 \leq n \leq 2$,

$= 0$ otherwise for N=4 (8)

b. State and prove the linearity property of DFT. (7)

OR

VI. a. Find the inverse Z-transform of $X(z) = \frac{1}{1+4.5Z^{-1}+3.5Z^{-2}}$ $|Z| > 3.5$

using partial fraction Method. (10)

b. Find the Z-transform of x(n)={1,0,3,-1,2} (5)

UNIT- III

VII. a. Explain 8-point FFT using radix 2 DIT block diagram. (8)

b. Compare DIT & DIF radix 2 FFT (7)

OR

VIII. a. Find the 8-point DFT of the sequence x(n) = {2, 2, 2, 2, 1,1,1,1} using DIT, radix2 FFT algorithm. (8)

b. Explain 8-point FFT using radix2 DIF butterfly diagram. (7)

UNIT - IV

IX. a. Draw the architecture of TMX320c50 DSP and explain. (10)

b. List the advantages of Digital filters. (5)

OR

X. a. Explain different addressing modes of TMX320c50 DSP. (10)

b. Explain the factors governing the selection of a DSP processor for a given Application (5)

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