

C 18222

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Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
JUNE 2011

EC/AI/BM 04 602—DIGITAL SIGNAL PROCESSING

(2004 admissions)



Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

- I. (a) Check whether the following sequence is causal sequence and find the Fourier transform.

$$X[n] = \alpha^n \mu[n], \quad \alpha < 1.$$

- (b) Explain the Decimation-In Time FFT algorithm.
- (c) What is a Linear Phase FIR structure ? Explain.
- (d) How to reduce the product Round-off errors using error feedback ? Explain.
- (e) Briefly explain the terms : (i) Peak passband ripple ; (ii) minimum stop band attenuation.
- (f) Consider the fourth order high pass transformation

$$G(z) = (P_0 + P_1 Z^{-1} + P_2 Z^{-2} + P_3 Z^{-3} + P_4 Z^{-4}) / (1 + d_1 Z^{-1} + d_2 Z^{-2} + d_3 Z^{-3} + d_4 Z^{-4}).$$

Find the magnetic scaled version.

- (g) Explain the difference between Von-Neuman architecture and Harvard Architecture.
- (h) Explain the advantages and disadvantages of VLIW architectures.

(8 × 5 = 40 marks)

Part B

- II. (a) Determine the 8-point DFT for the sequence $x(n)$ {1, 1, 1, 1, 1, 1, 0, 0}.

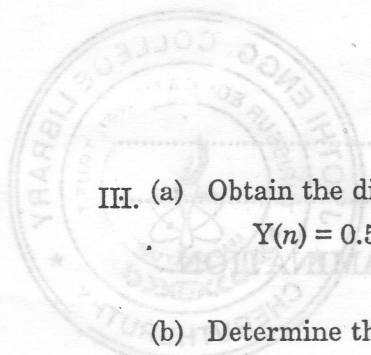
Or

- (b) Evaluate and compare the 8-point DFT for the following sequences using DIT-FFT algorithm :

$$(i) \quad x_1(n) = \begin{cases} 1 & \text{for } -3 \leq n \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

$$(ii) \quad x_2(n) = \begin{cases} 1 & \text{for } 0 \leq n \leq 6 \\ 0 & \text{otherwise} \end{cases}$$

Turn over



III. (a) Obtain the direct form – I realization for the system described by difference equation

$$Y(n) = 0.5 y(n - 1) - 0.25 y(n - 2) + x(n) + 0.4 x(n - 1).$$

Or

(b) Determine the direct form–II realization for the following system

$$Y(n) = -0.1 y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.252 x(n-2).$$

IV. (a) (i) Write a note on Warping effect.

(ii) Explain the steps to design a digital filter using bilinear transform technique.

Or

(b) (i) Write a note on Matched Z Transform.

(ii) Given the specifications $\alpha_p = 3\text{dB}$; $\alpha_s = 16\text{ dB}$; $f_p = 1\text{ kHz}$ and $f_s = 2\text{ kHz}$.

Determine the order of the filter using Chebyshev approximation. Find $H(s)$.

V. (a) (i) What is Pipelining and Pipeline depth ? What is the pipeline depth of TMS 320 processors ?

(ii) What are the different stages in pipelining ? Explain.

Or

(b) With neat sketch, explain the architecture of a TMS 320 series processor.

(4 × 15 = 60 marks)

(8 × 5 = 40 marks)

Part B

II. (a) Determine the 8-point DFT for the sequence $x(n) = (1, 1, 1, 1, 1, 1, 1, 0)$.

Or

(b) Evaluate and compare the 8-point DFT for the following sequences using DIT-FFT algorithm :

$$(i) \quad x_1(n) = \begin{cases} 1 & \text{for } -3 \leq n \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

$$(ii) \quad x_2(n) = \begin{cases} 1 & \text{for } 0 \leq n \leq 6 \\ 0 & \text{otherwise} \end{cases}$$

Turn over