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Total No. of Questions : 09

B.Tech (ECE) (Sem.–6)
DIGITAL SIGNAL PROCESSING
Subject Code : EC-308
M.Code : 57538

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) Why the ROC of Z-transform can not contain any pole?

   b) Determine whether the system is linear or non-linear $y(n) = 2x(n) + 3u(n - 3)$.

   c) Give the relation between Z-transform and discrete time Fourier transform (DTFT).

   d) Find the z-transform of the signal $x(n) = \delta(n–3)$.

   e) What are the three quantization errors due to finite word length registers in digital filters?

   f) Give the advantages of digital filter over analog filter.

   g) What are the limitations of impulse invariant method?

   h) How the order of the filter affects the frequency response of Chebyshev filter?

   i) What is instruction pipelining? Briefly explain the pipeline operation.

   j) What are the advantages of DSP processors over conventional processors?

SECTION-B

2. With an example, discuss in detail time invariance and causality for a discrete-time system.

3. Compute the convolution $y(n)$ of $x(n) = \{1, -2, 3, -4, 5\}$ and $h(n) = \{1, 1, -2\}$.

4. What is DITFFT algorithm? Give the computation efficiency of FFT over DFT.

5. Determine output response $y(n)$ of the FIR filter using overlap add method for

    $x(n) = [3, 0, -2, 0, 2, 1, 0, -2, -1, 0]$ and $h(n) = [2, 2, l]$

6. With the help of a block diagram, explain the architecture of a TMS processor.

SECTION-C

7. Determine the direct Forms I and II realizations for second-order filter given by :

    $$y(n) = 2b\cos\omega_0 y(n-1) - b^2 y(n-2) + x(n) - b\cos\omega_0 x(n-1)$$

8. Obtain the mapping formula and discuss the stability for bilinear transformation technique. Apply bilinear transformation to

    $$H(s) = \frac{2}{(s+1)(s+5)}$$

    With T = 0.1 s.

9. Write short notes on :

    a) One sided Z-transform

    b) Quantization of filter coefficients

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.