Digital Signal Processing & Processors
(New) (1230)

P. Pages : 2

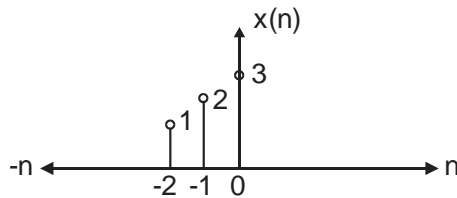**Time : Three Hours**   **Max. Marks : 100**

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions from each unit .
5. Figure to the right indicate full marks.
6. Assume suitable data if necessary.
7. Use of non - programmable calculator is allowed.

UNIT - I

1 a) What is signal ? What is the objective of signal processing ? State Advantages of DSP over ASP.   **10**

b) Determine Symmetric and Antisymmetric parts of signal.   **10**

c) Classify the discrete time system   **10**
   $y(n) = x(n) + n\,x(n+1)$

UNIT - II

2. a) Find Z - transform of the signal   **10**
   $x(n) = \left[3\,(3)^n - 4\,(2)^n\right] u(n)$ Also, clearly indicate the ROC.

b) State and prove following properties of Z - transform.   **10**
   i) Differentiation in Z domain   ii) Convolution properly

c) Solve the following difference equation using the Z - transform method for $n \geq 0$ **10**

$x(n-2) - 9x(n-1) + 18\ x(n) = 0$ where the initial conditions are

$x(-1) = 1$ & $x(-2) = 9$

UNIT – III

3. a) Compute output response of the system   **10**

h (n) = {5, 3, 2, 1} to the input signal

x (n) = {2, 1, 0, 1, 2} using Circular Convolution.

b) What is Radix - 2 FFT ? Derive expression for Decimation in time fast Fourier transform Algorithm. For N = 8   **10**

c) Given x (n) = n + 1 and N = 8. Find x (k) using DIF - FFT algorithm.   **10**

UNIT - IV

4. a) Obtain direct form and cascade form realisations for the transfer function of an FIR system given by.   **10**

$H(z) = \left(1 - \frac{1}{4} z^{-1} + \frac{3}{8} z^{-2}\right)\left(1 - \frac{1}{8} z^{-1} - \frac{1}{2} z^{-2}\right)$

b) Explain how an IIR filter can be designed by using bilinear transformation.   **10**

c) Design a filter with   **10**

$H_d\left(e^{jw}\right) = e^{-j3w}$ $\frac{-\Pi}{4} \leq w \leq \frac{\Pi}{4}$

        $= 0$ $\frac{\Pi}{4} < |w| \leq \Pi$

Using Hamming window with N = 7.

UNIT - V

5. a) Explain the difference between Digital signal processor and general purpose processor in detail.   **10**

b) State and explain different types of addressing modes of digital signal processors.   **10**

c) Write short note on   **10**
i) Pipelining
ii) On chip peripherals with programmable DSP processor's.

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