[Total No. of Questions: 09] [Total No. of Pages: 02]

Uni. Roll No. .....

Program/ Course: B. Tech (Sem.5th)
Name of Subject: Digital Signal Processing
Subject Code: EC-14503
Paper ID: 15431

**Time Allowed: 3 Hours** **Max. Marks: 60**

**NOTE:**

1) **Section-A** is **compulsory**
2) Attempt any **four** questions from **Section-B** and any **two** questions from **Section-C**
3) Any missing data may be assumed appropriately

## Section – A [Marks: 02 each]

**Q1.**

a) Calculate z-transform of sequence x(n) = {1,-2,1,0,3} and draw its ROC.
b) Draw block diagram of DSP System.
c) What is the computational complexity of Radix-2 DIT FFT and DIF FFT Algorithm?
d) List the advantages and disadvantages of digital signal processing over analog signal processing.
e) Give an example of general purpose and special purpose digital processor.
f) Classify correlation of discrete time signals.
g) List the conditions for digital filter to have linear phase response.
h) How DFT can be used in linear filtering?
i) List the different structures for the realization of IIR filter.
j) Define frequency warping. How it can be removed?

## Section – B [Marks: 05 each]

**Q2.** Find the discrete time sequence x(n) for the following X(z)

$$X(z) = \frac{z^2}{(z-0.5)(z-1)^2}$$

**Q3.** Prove any two properties of z-transform.

**Q4.** Obtain direct form I and direct form II realization for the following system function:
y(n) = - 0.1 y(n-1) + 0.2 y(n-2) + 3 x(n) + 3.6 x(n-1) + 0.6 x(n-2)

**Q5.** Explain finite word length effects in the design of digital filters.

**Q6.** Find convolution of the following signals:
$x(n) = 3^n u(-n)$ and $h(n) = [1/3]^n.u(n-2)$

## Section – C [Marks: 10 each]

**Q7.** Determine the system function of IIR digital filter for the analog transfer function

$$H(s) = \frac{10}{s^2 + 7s + 10} \quad \text{with } T = 0.2 \text{ s}$$

using impulse invariance method.

**Q8.** Compute 8-point DFT of the sequence x(n) = {1,-1,1,-1,0,0,0,0} using radix-2 DIF algorithm.

**Q9.** Explain the architecture of TMS320C50 digital processor in detail.

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