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B.Tech. (Sem. - 6th)

DIGITAL SIGNAL PROCESSING

SUBJECT CODE : EC - 308

Paper ID : [A0321]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A

Q1)

(10 × 2 = 20)

- a) What is Gibb's phenomenon?
- b) Differentiate floating point and fixed point number system?
- c) What is the function of MAC in DSP processors?
- d) State scaling property of z transform?
- e) Determine the z-transform of the following signal and sketch the pole-zero pattern:
$$x(n) = (-1)^n \cdot (2)^{-n} \cdot u(n).$$
- f) What is a linear phase filter?
- g) Explain causal and non-causal LTI systems. Give examples of each?
- h) Explain sampling function or sinc function.
- i) What is the relation between z transform and laplace transform?
- j) What are the various methods to find out inverse z transform?

Section - B

(4 × 5 = 20)

Q2) What are the advantages of FIR filters over IIR filters?

Q3) State and prove convolution property of z transform?

Q4) Obtain the cascade realization of the system characterized by transfer function

$$H(z) = 2(z+2) / z(z-0.1)(z+0.5)(z+0.4)$$

Q5) State five properties of Discrete Fourier Transform (DFT)?

Q6) Given an analog transfer function as

$$H(s) = 1 / (s+1)(s+2)$$

Obtain H(z) using impulse invariant method. Take T=1s.

Section - C

(2 × 10 = 20)

Q7) Find the inverse DFT of $X(k) = \{1,2,3,4\}$

Q8) Draw the architecture of TMS 320C5x?

Q9) (a) Show that for LTI discrete-time system to stable, all the poles should lie within the unit circle?

(b) Write a short note on Bilinear transformation method?

