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	Reg. No.:
	Question Paper Code: 90480
	B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.
	Fifth Semester
	Electronics and Communication Engineering
	EC 8553 — DISCRETE – TIME SIGNAL PROCESSING
	(Common to : Biomedical Engineering / Computer and Communication Engineering / Electronics and Telecommunication Engineering / Medical Electronics)
	(Regulations 2017)
,	Fime : Three hours Maximum : 100 marks
	Answer ALL questions.
V	PART A — $(10 \times 2 = 20 \text{ marks})$ I. Calculate the number of multiplications needed in the calculation of DFT and FFT with 8 pt sequence.
2	2. Compare overlap add and overlap save method.
5	3. What is the need for pre warping?
4	List the advantage of direct form II realisation when compared with direct form I realisation.
E	Define Gibb's Phenemenon.
6	What do you refer from limit cycle oscillations?
7	. Differentiate Fixed Point and Floating Point number representations.
8	. What is quantization error?
9	List the addressing modes of digital signal processer.
1	0. What do you understand from pipe line operation of Digital signal processer?
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PART B —  $(5 \times 13 = 65 \text{ marks})$ 

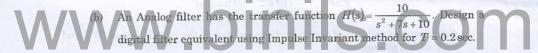
- 11. (a) Summarize the following properties of DFT:
  - (i) Periodicity
  - (ii) Symmetry
  - (iii) Circular convolution
  - (iv) Linear filtering.

Or

- (b) Illustrate the 8-pt DFT of a sequence  $x(n) = \{0.5, 0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0\}$ .
- (a) Obtain the direct form I, direct form II and cascade form realisation for the given system.

$$y(n) = 0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$$

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13. (a) Design an ideal low pass filter with a frequency response  $H_d(e^{jw}) = \begin{cases} 1 & \text{for } \frac{-\pi}{2} \le w \le \frac{\pi}{2} \\ 0 & \text{for } \frac{\pi}{2} \le w \le \frac{\pi}{2} \end{cases}.$ 

Find the values of h(n) for N=1. Find H(z).

Or

(b) Demonstrate the coefficients of a linear phase FIR filter of length M=15 which has a symmetric unit sample response and a frequency response that satisfier the condition.

$$H_r \left( \frac{2\pi K}{15} \right) = \begin{cases} 1 & k = 0, 1, 2, 3, 4 \\ 0.4 & k = 5 \\ 0 & k = 6, 7 \end{cases}$$

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14. (a) Describe the quantization process and errors introduced due to quantization.

Or

- (b) For the II order IIR filter, the system fraction is  $H(z) = \frac{1}{\left(1 0.5z^{-1}\right)\left(1 0.45z^{-1}\right)}.$  Examine the effect of shift in pole location with 3 bit coefficient representation in direct and cascade forms.
- 15. (a) Give detailed note about Arithmetic Instructions.

Or

(b) Draw the various architecture used in digital signal processer. Explain each in brief.

PART C —  $(1 \times 15 = 15 \text{ marks})$ 

16. (a) For the given specifications, design an Chebyshev digital filter using Impulse Invariance Transformation.

 $0.9 \le |H(w)| \le 1$  for  $0 \le w \le 0.25\pi$  $|H(w)| \le 0.24$  for  $0.5\pi \le w \le \pi$ 

Or

(b) Using linear convolution construct y(n) = x(n) \* h(n) for the sequence  $x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\}$  and  $h(n) = \{1, 2\}$ . Compare the result with by solving the problem with Overlap Add method and Overlap Save method.

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