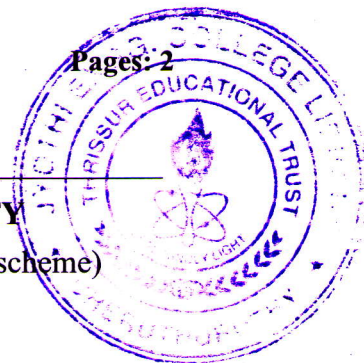Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Examination December 2021 (2019 scheme)

Course Code: ECT303

Course Name: DIGITAL SIGNAL PROCESSING

Max. Marks: 100   Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)

Marks

1	What are the methods of filtering long sequence? explain.	3
2	Give any three properties of DFT.	3
3	Calculate the 4- point DFT of $\cos(\pi n)$	3
4	Find Circular time reversal of [8, 5, 3, 1]	3
5	Explain the design steps of IIR filter using Butterworth Approximation	3
6	What is the advantages of frequency sampling technique in FIR filter design	3
7	What is Cascade implementation of IIR filter?	3
8	What is a linear phase filter? What conditions are to be satisfied by an FIR flter in order to have linear phase?	3
9	Give any three differences between DSP processor and general purpose microprocessors.	3
10	Write down any three applications of DSP Processor.	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Using an example elaborate the working of Overlap Save method while filtering a long sequence with small sequence	7
	b)	Differentiate between Overlap methods and normal filtering	7
12	a)	Explain how DFT can be used as a linear Transformation	7
	b)	Calculate the DFT of [3, 19,6 ,15]. Also plot the magnitude and phase response	7

Module -2

13	a)	Derive the Decimation in Time algorithm for Fast Fourier transform.	7

	b)	Find the DFT of [3,4,8,1] using the above method	7
14	a)	Illustrate the procedure for finding IDFT using radix-2 FFT algorithm	5
	b)	Find the IDFT of [15,21,2,13] using the above method	9

Module -3

15 a) Design a digital Butter worth lowpass filter satisfying the constraints 10

$$0.707 \leq \left|H(e^{jw})\right| \leq 1 \quad \text{for } 0 \leq w \leq \frac{\pi}{2}$$
$$\left|H(e^{jw})\right| \leq 0.2 \quad \text{for } \frac{3\pi}{4} \leq w \leq \pi$$

Using bilinear Transformation, T=1 Sec

b) What is Gibb's phenomenon? 4

16 a) Design a maximally flat analog filter of order 2 with cut-off frequency 0.6 rad/sec 4

b) Design a digital lowpass filter and implement the above question using Impulse Invariance method. 10

Module -4

17 a) Obtain the Direct form-I ,Direct form-II cascade and parallel form realization of y[n]= - 0.1 y[n-1] + 0.2 y[n-2] + 3 x[n] + 3.6 x[n-1] + 0.6x[n-2] 10

b) Find the impulse response of a filter given by $H(Z) = 1 - Z^{-1} + 2Z^{-1} + 3Z^{-1} + 5Z^{-1}$. Does this represent a linear phase realization? Comment. 4

18 a) Represent the output of a signal being upsampled by a factor of 3, then down sampled by a factor of 12 followed by upsampled by a factor of 4 7

b) Explain what is aliasing in Multi-rate signal processing. What is the use of Anti-aliasing filter? Explain. 7

Module -5

19 a) In detail, explain the architecture of DSP Processor TMS 320C6713 7

b) Illustrate the quantisation noise in ADC. 7

20 a) List out the advantages and disadvantages of floating point DSP Processors. 7

b) Explain the usage of a DSP Processor for any two day to day applications. 7

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