Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S5 (S,FE) (FT/WP/PT) Examinations May/June 2026 (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		Find the Circular time shifting of [3, 6, 4, 1, 8] by 3 to right	3
2		State and Prove Circular Convolution Property.	3
3		If x[n]={1,0,1,0}, Find DFT[DFT[DFT[DFT(x[n])]]]	3
4		Derive the relationship of DFT and other Transforms	3
5		What is the advantages of windowing technique in FIR filter design	3
6		Explain the design of FIR filter using Fourier Series method	3
7		What is Cascade implementation of filter?	3
8		List any two methods of implementation each of an FIR and IIR filter.	3
9		Give any three differences between DSP processor and general purpose microprocessors.	3
10		Give 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)	Find the DFT of the sequence $x[n] = [4,5,9,1]$	7
	b)	State and prove any three properties of DFT.	7
12	a)	Find the circular convolution of the two signals , x[n]=[9, 2, 3, 8, 1] and y[n]=[8, 1, 2, 6, 7,2]	7
	b)	Find the Liner convolution of the given two sequences using Circular convolution, x[n]=[4, 5, 9, 1] and y[n]=[8, 3, 2, 4]	7

Module -2

13	a)	Derive the Radix-2 Decimation in Time algorithm for Fast Fourier transform.	7

	b)	Given g[n]={1,0,1,0} and h[n]={1,2,2,1} Find the 4-point DFTs of these sequence using a single 4- point DFT	7
14	a)	Find the 8-Point DFT of a sequence x[n]={0.5,0.5,0.5,0.5,0,0,0,0} using DIT-FFT algorithms	10
	b)	Find the Number of complex multiplication involved in the calculation of 1024 point DFT using Direct and Radix 2 FFT	4

Module -3

15	a)	Design a linear phase FIR low pass filter using Hanning window with cut off angular frequency of 1.2 rad/sec and N=7;	9
	b)	With equations explain how impulse response of an FIR filter is obtained using frequency sampling method	5
16	a)	Design a 3rd order butter worth LPF filter with cut-off frequency of 2 rad/sec	7
	b)	In the above question, using bilinear transformation design a digital filter.	7

Module -4

17	a)	A filter is represented by the transfer function $H(z) = \frac{1-2z^{-1}}{1-4z^{-1}+3z^{-2}}$ Implement the filter with Direct form I structure	7
	b)	In the above question, implement in to transposed direct form II	7
18	a)	Differentiate between cascade and parallel form implementation of filters.	6
	b)	Obtain the 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]	8

Module -5

19	a)	Differentiate between Harvard architecture and Von-Neumann architecture.	6
	b)	Elaborate on the finite word length effects in FIR filer	8
20	a)	Differentiate between floating point DSP Processors and Fixed point DSP Processors	6
	b)	What are the merits of using pipelining and Multiply and Accumulator {MAC) registers in DSP Processors	8

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