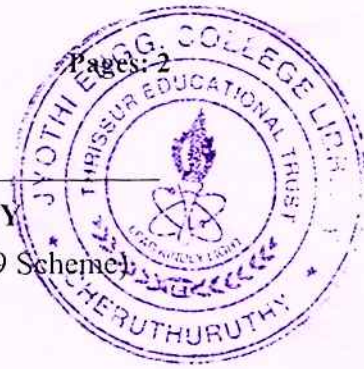




Reg No.: _____

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
