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KAMALA INSTITUTE OF TECHNOLOGY & SCIENCE, SINGAPUR**23EC28PC602****III.B. Tech.II. Semester Regular Examinations, April/May- 2026****DIGITAL SIGNAL PROCESSING****(ECE)****Time: 3 Hours****Max. Marks: 60**

Note: Question paper consists of Part-A & Part-B.

i) **Part-A** for 10M, ii) **Part-B** for 50marks

- **Part A** is compulsory, consisting of 10 sub questions from all units carrying equal marks.
- **Part-B** consists of **10 questions** (numbered from 2 to 11) carrying **10marks** each. From each unit there are 2 questions and the students should answer one of them. Hence the student should answer **5 questions** from **Part-B**.

PART-A (10Marks)			
Q. No	Questions	Marks	BTL
1.a)	Define linear systems.	1M	1
1.b)	Give any 2 properties of causal systems.	1M	1
1.c)	Define DFT pair.	1M	1
1.d)	State the property time shifting of DFT.	1M	1
1.e)	What are the properties of bilinear transformation?	1M	1
1.f)	Compare FIR and IIR digital filters	1M	2
1.g)	In the design of FIR digital filter, how is Kaiser Window different from other windows?	1M	4
1.h)	List out the advantages of FIR filters.	1M	1
1.i)	What are the various basic building blocks used in realization of digital systems?	1M	1
1.j)	How does quantization produce round-off noise?	1M	2
PART-B (50Marks)			
Q.No	Questions	Marks	BTL
2. a)	Check for the stability and Causality of the following systems. i) $y(n) = x(-n-3)$ ii) $y(n) = nx(n)$	5M	4
b)	Determine the linear convolution for the two sequences $x(n)=\{3,2,1,2\}$, $h(n)=\{1,2,1,2\}$.	5M	3
OR			
3. a)	Find impulse response of the system described by the difference equation $y(n)+y(n-1)-2y(n-2)=x(n-1)+2x(n-2)$.	5M	3
b)	Discuss about the power signal and Energy signal.	5M	2
4. a)	Compute DFT of a sequence $x(n)=\{1,1,0,0\}$ and find IDFT of $Y(k)=\{1,0,1,0\}$	5M	3
b)	Write the differences between DIT and DIF algorithms	5M	2
OR			
5. a)	Compute the DFT of the following sequence using Radix -2, DIT-FFT algorithm $x[n] = [1, 1, 1, 1, 0, 0, 0, 0]$.	5M	3
b)	Describe computational complexity in direct computation of DFT	5M	2

6. a)	Explain the steps in designing an analog low pass chebyshev filter.	5M	2
b)	Using the bilinear transform, design a high pass filter, monotonic in pass band with cut off frequency of 100 Hz and down 10 dB at 350 H. the sampling frequency is 5000 Hz.	5M	6
OR			
7. a)	Obtain an Chebyshev filter transfer function that satisfies the constraints $0.707 \leq H(w) \leq 1; \quad 0 \leq w \leq 0.2\pi$ $ H(w) \leq 0.1; \quad 0.5\pi \leq w \leq \pi$	5M	6
b)	Give the advantages and disadvantages of the digital filters.	5M	5
8. a)			
	What is a Kaiser window? In what way is it superior to other window functions?	5M	4
b)	Using a rectangular window technique, design a low pass filter with pass band gain of unity, cut-off frequency of 1000Hz and working at a sampling frequency of 5 KHz. The length of the impulse response should be 7.	5M	6
OR			
9. a)	Explain the design procedure of an FIR digital filter	5M	2
b)	Explain different windows techniques in FIR digital filters.	5M	2
10.a)			
	Realize the Direct form-I structure of the system given by $y[n] + 2 y[n-1] + y[n-2] = x[n] + 0.75 x[n-1]$	5M	6
b)	What is Round-off Noise in IIR Digital Filters? Discuss its effects in IIR filters.	5M	3
OR			
11.a)	Find the impulse response of the system described by difference equation $y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$ using z transform.	5M	6
b)	Discuss the effect of finite word length on pole-zero locations of IIR filters.	5M	3

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