K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Carry on , ~~Nov – Dec 2024~~ June 2025
(B. Tech.) Program: EXTC Scheme I/II/IIB/III:____
Regular/Supplementary Examination: TY/ Semester: V
Course Code: EXC503 and Course Name: Discrete Time Signal Processing__
Date of Exam: ~~02/12/2024~~ 30/06/2025 Duration: 02.5 Hours Max. Marks: 60

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any **two** questions out of three: (05 marks each)	10		
a)	Explain how the location of zeros in the complex plane affects the classification of a system as maximum-phase. What are the consequences for frequency response?		CO1	U
b)	Compute the DFT of the sequence x[n] = {1, 2, 3, 4,5,6}.		CO2	U
c)	Discuss sub-band coding of speech signals.		CO6	U
Q 2	Solve any **two** questions out of three: (05 marks each)	10		
a)	Design digital IIR filter using IIM method. Given: Analog filter with system transfer function $H(s) = \frac{10}{s^2+7s+10}$ Given: Fs=1 Hz		CO3	A
b)	Draw and explain the Cascade Form realization of an FIR filter?		CO4	A
c)	Compare floating point with fixed point arithmetic.		CO5	U
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Write short note on i)Notch Filter ii)Comb Filter		CO1	U
b)	Realize the cascade and parallel structure of the filter- $H(z) = \frac{10(1-\frac{1}{2}z^{-1})(1-\frac{2}{3}z^{-1})(1+2z^{-1})}{(1-\frac{3}{4}z^{-1})(1-\frac{1}{8}z^{-1})[1-(\frac{1}{2}+j\frac{1}{2})z^{-1}][1-(\frac{1}{2}-j\frac{1}{2})z^{-1}]}$		CO4	A

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c)	Consider the LTI system governed by the equation- $y(n)+0.8301y(n-1)+0.7348y(n-2)=x(n-2)$ Discuss the effect of coefficient quantization on pole locations, when the coefficients are quantized by 3-bits by truncation.		CO5	A
Q.4	Solve any **two** questions out of three. (10 marks each)	20		
a)	If x (n) = {2, 1, 2, 1, 1, 2, 1, 2}. Find X (k) using Radix-2 DIT-FFT algorithm.		CO2	U
b)	Design a linear phase FIR low pass filter using hamming window with cutoff frequency $\omega c = 0.1\ \pi$ rad/samples by taking 9 samples.		CO3	A
c)	Write short note on-Dual Tone Multi-Frequency Signal Detection with example.		CO6	U

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