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

August 2023
(B.Tech) Program: ExC Scheme I/II: I
Examination: SY Semester: IV Supplementary exam
Course Code: ExC 405 and Course Name: Signals and Systems

Date of Exam: 01/09/2023 Duration: 2.5 Hours Max. Marks: 60

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

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	Sketch unit step function and unit impulse function	2	1	U
ii)	What is the difference between causal and non-causal systems?	2	1	U
iii)	Define the impulse response for a continuous time system	2	2	U
iv)	Define autocorrelation function for a discrete time energy signal	2	2	U
v)	How to present continuous time periodic signal using exponential Fourier series?	2	3	U
vi)	How to determine the Fourier transform of a discrete time periodic signal?	2	4	U
vii)	What is s-plane in Laplace transform?	2	5	U
viii)	What is z-plane in z-transform?	2	6	U
Q.2	Solve any four questions out of six.	16		
i)	Explain linear and non-linear systems with examples	4	1	U
ii)	Explain PSD and ESD with examples	4	2	U
iii)	Explain the Dirichlet's conditions for the existence of Fourier transform	4	3	U
iv)	Show the time shifting and frequency shifting properties of CTFT and DTFT	4	4	U
v)	Explain RoC, Poles and Zeros in Laplace transform	4	5	U
vi)	Write initial and final value theorems for z-transform	4	6	U

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Q.3	Solve any two questions out of three.	16		
i)	Explain energy and power signals with examples and determine the energy and power of the selected signals	8	1	A
ii)	What is step response of a discrete time system? Find the relationship between step and impulse responses for a discrete time system.	8	2	A
iii)	Compare Fourier series and Fourier transform with suitable examples and sketch the waveforms	8	3	A
Q.4	Solve any two questions out of three.	16		
i)	Explain modulation and demodulation with the help of Fourier transform	8	4	A
ii)	Define CTFT and Laplace transform for a continuous time signal x(t) and determine the relationship between the two	8	5	A
iii)	Find the inverse z-transform using partial fraction method $X(z) = 1 / 1- 1.5\ z^{-1} + 0.5z^{-2}$	8	6	A

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