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

April – May 2023
(B.Tech / M.Tech.) Program: B. Tech Scheme I/II: I
Examination: SY Semester: IV
Course Code: 1UEXC405 and Course Name: Signal and Systems

Date of Exam: 03/06/2023 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 $\delta(t)$, $\delta(t+2)$, $\delta(-t)$ and $-\delta(t)$	2	CO1	2
ii)	If $x(t) = 5$, $0 \leq t \leq T$, and zero elsewhere. Sketch $0.5x(t)$, $2x(t)$, $x(t/2)$ and $x(2t)$	2	CO1	2
iii)	Explain Auto correlation and Cross correlation	2	CO2	3
iv)	Explain types of Fourier series with example	2	CO3	1
v)	Write short note on time domain and frequency domain (spectrum) representation with suitable example	2	CO3	1
vi)	State Merits and limitations of Fourier transform	2	CO4	1
vii)	List out applications of Laplace Transform.	2	CO5	3
viii)	What is the need of the Z- transform and advantages of the z-transform.	2	CO6	3
Q.2	**Solve any four questions out of six.**	**16**		
i)	Find Energy and Power of Signal: (i) $x[n] = \cos(\pi n)$ $-4 \leq n \leq 4$ otherwise $x[n] = 0$	4	CO1	3
ii)	Compute Linear convolution of the following sequence: $x[n] = \{\underline{1},2,3,1\}$, $h[n] = \{1,\underline{2},2,-1\}$	4	CO2	3

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iii)	Compare CTFS and DTFS	4	CO3	3
iv)	Obtain Fourier transform of delta function	4	CO4	3
v)	Obtain Laplace Transform of A sin wt u(t).	4	CO5	3
vi)	Perform convolution of $x_1(n)$ and $x_2(n)$ using the property of z-transform. $x_1(n) = \{\underline{1},-2,1\}$ $x_2(n) = \{\underline{1},1,1,1,1,1\}$	4	CO6	3
Q.3	**Solve any two questions out of three.**	**16**		
i)	Determine x[n] = u[n], signal is Continuous or discrete?, periodic or aperiodic?, Even or Odd? and Energy or Power?	8	CO1	3
ii)	What is convolution, autocorrelation and Cross correlation, explain with formula and example.	8	CO2	3
iii)	State any eight properties of Fourier transform. Give proof of any one property	8	CO4	3
Q.4	**Solve any two questions out of three.**	**16**		
i)	Distinguish between autocorrelation and Cross correlation.	8	CO2	3
ii)	Find Fourier transform of x(t) is given by x(t) = u(t) and using properties of Fourier transform find Fourier transform of y(t) = u(2t) + u(t-1)	8	CO4	3
iii)	Find the inverse z-transform using the partial fraction method and sketch x[n]. $X[z] = 3z^2 + 2z + 1 / z^2 + 3z + 2$	8	CO5	3

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