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

July/Aug 2025

~~May June 2025~~

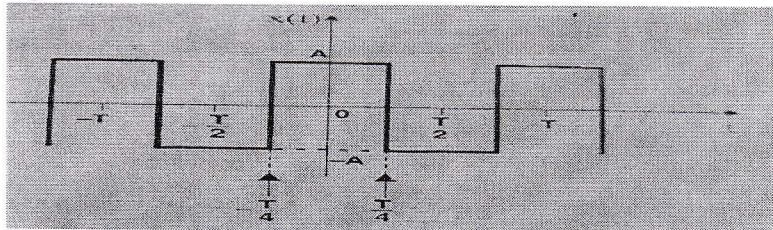|	
Program: B. Tech .Scheme IIB	
Supplementary ~~KT~~ Examination Semester: IV	
Course Code:EXC405 and Course Name: Signals and Systems	
Date of Exam:~~28/05/2025~~ 06/08/2025	Duration: 02.5 Hours	Max. Marks: 60

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)	State whether following signals x(t) is periodic or not ?if periodic, find fundamental period of following signals : $x(t)= 2 \cos(100\pi t)+ 3 \sin(50t)$		1	Ap
b)	Compute Autocorrelation function of : $x(t)=e^{-8t} u(t)$		2	Ap
c)	Determine Trignometric Fourier series coefficient a_n of the following signal: 		3	Ap
Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Find Fourier transform of following time functions and sketch their magnitude spectrum of $x(t)=e^{-at}. u(t)$; a>0.		4	Ap
b)	Determine Initial and final value for following signal using Laplace transform: $X(s) =(s+5)/[s^2(s+9)]$		5	Ap
c)	Determine z Transform and ROC in Z plane of following sequences: $x(n) = n(1/4)^n\ u(n)$		6	Ap

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Q.3	Solve any two questions out of three. (10 marks each)	20		
a)	Determine cross-correlation for the sequence $x_1(n)$= [1,2,3,4] and $x_2(n)$= [3,2,1,0] by using direct computation and tabular method.		1	Ap
b)	Obtain Convolution of given signals using Convolution Integral with neat sketches. x(t)= 1; $-1 \leq t \leq 1$ and h(t)=1 ; $0 \leq t \leq 2$		2	Ap
c)	Consider a causal LTI system with H(jw)=1/(jw+2). For particular input x(t), this system produces output $y(t)=e^{-2t} u(t)-e^{-3t} u(t)$,Compute x(t) using Fourier Transform.		4	Ap
Q.4	Solve any two questions out of three. (10 marks each)	20		
a)	Determine whether the system described by i)y(t)=tx(t)ii) y(n)=x(-n) is static/dynamic,linear/nonlinear,time-variant/time invariant,causal/noncausal,stable/unstable.		2	Ap
b)	The differential equation of the system is $(d^2y(t)/dt^2) + 3 (dy(t)/dt) + 2 y(t)= x(t)$ with zero initial conditions input $x(t)= e^{-3t} u(t)$.Using Laplace Transform determines output of the system.		5	Ap
c)	Determine Inverse z Transform of $X(z)=1 /(1-0.8z^{-1} +0.12 z^{-2})$ i) ROC : |z|>0.6 ii) ROC : |z|<0.2 iii) ROC : 0.2<|z|<0.6 by using partial fraction method.		6	Ap

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