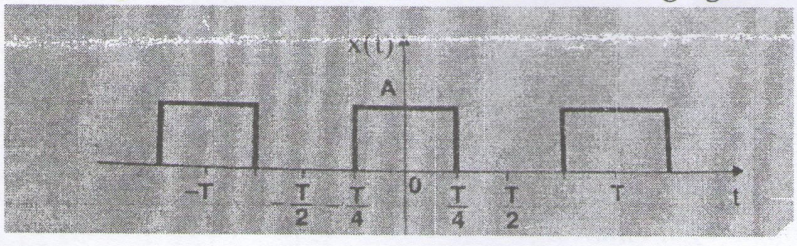
K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

July / Aug ~~May -June~~ 2024
Program: B.Tech .(Electronics and Telecommunication) Scheme IIB/ Scheme II
Regular/ Backlog Examination: SY Semester: IV
Course Code: EXC405 and Course Name: Signals and Systems
Date of Exam: 3/8/2024 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)	Define memoryless and memory system?	02	CO 1	U
ii)	If x[n] = [1, 2, 3, 4], Sketch x[n+2].	02	CO 1	Ap
iii)	State any two properties of Autocorrelation function of DT power signal.	02	CO 2	R
iv)	Write Relation between PSD and Autocorrelation Function.	02	CO 2	R
v)	State analogy between Continuous Time Fourier Series (CTFS) and Discrete Time Fourier Series (DTFS).	02	CO 3	U
vi)	Find Fourier transform of following time functions: x(t)=u(t)	02	CO 4	U
vii)	Find the Laplace Transform of unit step function.	02	CO 5	U
viii)	Define Z transform and Inverse Z Transform.	02	CO 6	R
Q.2	Solve any four questions out of six.	16		
i)	Find out even and odd component of following signals: $x(t) = \cos^2(\pi t/2)$	04	CO1	Ap
ii)	Find Autocorrelation function of continuous time given by : x(t)=A rect(t/2).	04	CO2	Ap
iii)	Explain Gibbs phenomenon.	04	CO3	U

iv)	Obtain the Fourier transform of $A\cos\omega_0 t$.	04	CO4	Ap
v)	Determine the Laplace Transform of continuous time signals and sketch its ROC in s plane. $x(t)= t\,u(t)$	04	CO5	Ap
vi)	Determine z Transform of following sequences: $x(n)= n\,u(n)$	04	CO6	Ap
Q.3	Solve any two questions out of three.	16		
i)	Determine whether given system is i) memory less ii) causal iii) time invariant iv)linear. a) $y(t)=x(2t)$ b) $y[n]= x[-n]$	08	CO1	Ap
ii)	Find Fourier transform of following time functions and sketch their amplitude and phase spectra(Fourier spectra) i)$x(t)=e^{-at}.u(t)$; $a>0$ ii) $x(t)=sgn(t)$	08	CO4	Ap
iii)	The differential equation of the system is $[d^2y(t)/dt^2]+ 7*[dy(t)/dt]+12*y(t) = x(t)$, With $y(0-)= -2$ and $dy(0-)/dt =0$ for $x(t)=u(t)$,unit step input applied at t=0. Using Laplace Transform determine complete response of the system.	08	CO5	Ap
Q.4	Solve any two questions out of three.	16		
i)	Perform between $x(t)=e^{-2t}u(t)$ and $h(t)=u(t+2)$ using convolution Integral.	08	CO2	Ap
ii)	Find Trigonometric Fourier series for the following signal: 	08	CO3	Ap
iii)	Determine Inverse z Transform of $X(z)= (z^3 -4z^2 +5z) / [(z-1)(z-2)(z-3)]$ i) ROC :$\|z\|> 3$ ii) ROC : $\|z\|< 1$ iii) ROC : $2 <\|z\|< 3$	08	CO6	Ap

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