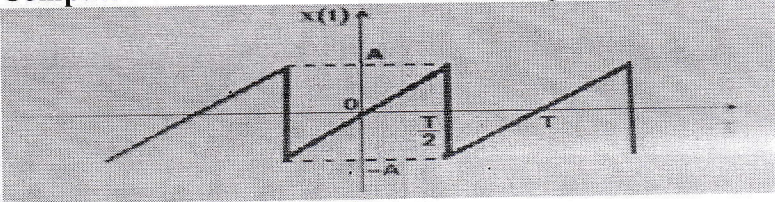


K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

May-June 2026		
Program: B. Tech Scheme III/IIB/II		
Regular Examination: SY Semester: IV		
Course Code: EXC404/EXC405 and Course Name: Signals and Systems		
Date of Exam: 26/5/2026	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)	If $x[n] = [1, 2, 3, 4]$, Sketch $x(n+1)$, $x(n+2)$.		1	Ap
b)	Define Autocorrelation function of signal. State four properties of Autocorrelation function of DT power signal.		2	U,R
c)	Compute Fourier coefficient b_n for the signal shown in fig 		3	Ap
Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Find Fourier transform of following time functions: $x(t) = e^{at} \cdot u(-t)$; $a > 0$		4	Ap
b)	Determine the Laplace Transform of following continuous time signals and sketch its ROC in s plane. $x(t) = t u(t)$		5	Ap
c)	Determine z Transform of following sequences: $x(n) = (n+1)u(n)$ using linearity properties		6	Ap
Q.3	Solve any two questions out of three. (10 marks each)	20		
a)	Determine whether given following system is i) memory less ii) causal iii) time invariant iv) linear. a) $y(t) = t * x(t)$, b) $y[n] = x[-n]$		1	Ap
b)	Convolve $x(n) = (1/3)^n u(n)$ with $h(n) = (1/2)^n u(n)$ using		2	Ap

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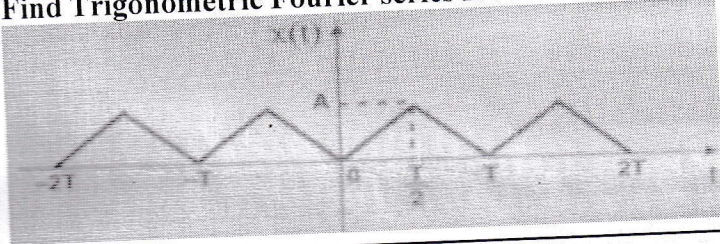
Regular Examination: SY Semester: IV

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	convolution Integral .			
c)	Find Trigonometric Fourier series for the following signal: 		3	Ap
Q.4	Solve any two questions out of three. (10 marks each)	20		
a)	Find Fourier transform of following time functions and sketch their magnitude spectra. i) $u(t)=1 ; t \geq 0$ ii) $x(t)=\text{sgn}(t)$		4	Ap
b)	The differential equation of the system is $[d^2y(t)/dt^2] + 6 \cdot [dy(t)/dt] + 8 \cdot y(t) = dx(t)/dt + 3x(t)$, With $y(0^-)=1$ and $dy(0^-)/dt=2$ for input $x(t)=u(t)$, Using Laplace Transform determine complete response of the system.		5	Ap
c)	Determine Inverse z Transform of $x(z)=1/(1-0.8z^{-1}+0.12z^{-2})$ i) ROC : $ z >0.6$ ii) ROC : $ z <0.2$ iii) ROC : $0.2< z <0.6$		6	Ap
