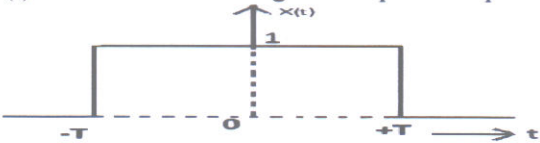


**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
(AUTONOMOUS)  
**II B.Tech I Semester Supplementary Examinations, June – 2024**  
**SIGNALS AND SYSTEMS**  
(ECE)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit  
All Questions Carry Equal Marks

Q. No.	Questions	BTL	CO	Marks
<b>UNIT – I</b>				
1.	a) Find which of the following signals are causal or non – causal: (i) $x(t) = e^{-2t} u(t - 1)$ . (ii) $x(t) = \cos 2t$ . (iii) $x(t) = 2 u(-t)$ . (iv) $x(n) = u(-n)$ . (v) $x(n) = u(n + 4) - u(n - 2)$	K3	CO1	10M
	b) Determine whether the following system is Linear and Time Invariant or not $y[n] = n x[n-1]$ .	K3	CO1	4M
<b>OR</b>				
2.	Check whether the following systems are: (i) Static or dynamic. (ii) Linear on non-linear. (iii) Causal or non-causal. (iv) Time invariant or time variant. (v) Stable on not stable. The given system is $y(n) = a^n u(n)$ .	K2	CO1	14M
<b>UNIT – II</b>				
3.	a) A train of rectangular pulses, making excursions from zero to one volt has a duration of $2\mu s$ and are separated by interval $10 \mu s$ . Assuming that the centre of one pulse is located at $t = 0$ , obtain the trigonometric Fourier series of pulse train.	K3	CO2	10M
	b) Find the Fourier Series coefficient for signal $x(t) = 2\cos 10t$ .	K2	CO2	4M
<b>OR</b>				
4.	a) How discrete time filters are described with differential equations? Explain with suitable example.	K2	CO2	7M
	b) State and prove following properties of DTFS: (i) Time shifting. (ii) Time reversal. (iii) Frequency shifting	K2	CO2	7M
<b>UNIT – III</b>				
5.	a) Obtain the time domain representation of $X(w) = \frac{jw}{(2 + jw)^2}$	K3	CO3	7M
	b) Find the Fourier transform of $x(t) = e^{-at} u(t)$ . Draw its magnitude spectrum.	K3	CO3	7M
<b>OR</b>				
6.	a) For the rectangular pulse shown below, determine the Fourier Transform of $x(t)$ and sketch the magnitude-phase representation with respect to frequency	K3	CO3	8M
				
	b) Define Discrete-Time Fourier Transform and write any three properties of	K2	CO3	6M

		DTFT.			
<b>UNIT – IV</b>					
7.	a)	The signal $g(t) = 10 \cos(20\pi t) \cos(200\pi t)$ is sampled at the rate of 250 samples per second. What is the Nyquist rate for $g(t)$ as a low-pass signal and determine the lowest permissible sampling rate for this signal?	K3	CO4	8M
	b)	What is the anti-aliasing filter? Explain about its usage	K2	CO4	6M
<b>OR</b>					
8.	a)	Find the Laplace Transform $X(S)$ and sketch the pole-zero plot with the ROC for the following signals $x(t)$ : i) $e^{-2t} u(t)$ ii) $e^{-2t} u(-t)$ iii) $e^{2t} u(t)$ iv) $e^{2t} u(-t)$	K2	CO4	10M
	b)	List any eight Laplace Transformable pairs (Expressions are enough)	K2	CO4	4M
<b>UNIT – V</b>					
9.	a)	State and prove z –transform time reversal property	K2	CO5	7M
	b)	Determine the inverse Z-Transform of $X(z) = 1/(1 - az^{-1})$ ; ROC $ Z  > a$ .	K3	CO5	7M
<b>OR</b>					
10.	a)	Get the Z-Transform for $x(n) = 3(1/2)^n u(n) + 2(1/3)^n u(n)$ .	K3	CO5	7M
	b)	Solve the difference equation $y(n) - 2y(n-1) = x(n)$ with $x(n) = (1/3)^n u(n)$ .	K3	CO5	7M