

Code No: P18ECT02

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HALL TICKET NUMBER

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PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)

II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, JAN - 2023
SIGNALS AND SYSTEMS
(ECE Branch)

Time: 3 hours

Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer all the questions in Part-A (5X2=10M)

Q.No.	Questions	Marks	CO	KL
1	a) Define and sketch real exponential signal in different cases.	[2M]	1	
	b) State the condition for convergence of Fourier series.	[2M]	2	
	c) State sampling theorem.	[2M]	3	
	d) Define linear system. When the system is said to be LTI system.	[2M]	4	
	e) Mention any two properties of ROC of Z-transform.	[2M]	5	

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.	Questions	Marks	CO	KL
UNIT-I				
2.	a) Define orthogonal functions. Give some examples of orthogonal functions.	[5M]	1	
	b) Obtain the condition under which two signals $f_1(t)$ and $f_2(t)$ are said to be orthogonal to each other. Hence prove that $\cos n\omega_0 t$ and $\cos m\omega_0 t$ are orthogonal over any interval $(t_0, t_0 + 2\pi/\omega_0)$ for integer values of n and m .	[5M]	1	
OR				
3.	a) Define and sketch the following elementary continuous time signals. i) Unit impulse signal ii) Signum function iii) unit step function	[5M]	1	
	b) Determine the power and rms value of the signal $x(t) = u(t)$.	[5M]	1	
UNIT-II				
4.	a) Find the Fourier transform of a gate pulse of unit height, unit width and centered at $t=0$	[5M]	2	
	b) Find the Fourier Transform of $f(t) = t \cos(2t)$	[5M]	2	
OR				
5.	a) Find the Fourier series coefficients of the signal $x(t) = \sin(\omega_0 t)$	[5M]	2	
	b) Explain how Fourier transform is developed from Fourier series	[5M]	2	
UNIT-III				
6.	a) State and prove sampling theorem for band limited signals using graphical approach	[5M]	3	
	b) What is aliasing? Explain its effect on sampling.	[5M]	3	
OR				
7.	Determine the Nyquist sampling rate and Nyquist sampling interval for the signal $x(t) = \text{sinc}^2(200\pi t)$	[5M]	3	
UNIT-IV				
8.	a) What is an LTI system? Explain its properties. Derive an expression for the transfer function of an LTI system	[5M]	4	

	b)	Obtain conditions for the distortion less transmission through a system.	[5M]	4	
OR					
9.	a)	Let the system function of a LTI system be $1/j\omega+2$. What is the output of the system for an input $(0.8)^t u(t)$	[5M]	4	
	b)	Explain how Impulse Response and Transfer Function of a LTI system are related.	[5M]	4	
UNIT-V					
10.	a)	Prove the scaling and time shifting properties of Laplace transform	[5M]	5	
	b)	State and prove initial and final value theorems of z-transform	[5M]	5	
OR					
11.	a)	Find the Z-transform of the given signal $x(n)$ and find ROC: $X(n) = [\sin(\omega_0 n)] u(n)$	[5M]	5	
	b)	State and prove time shifting and time convolution properties of z- transform	[5M]	5	
