Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026

Third Semester

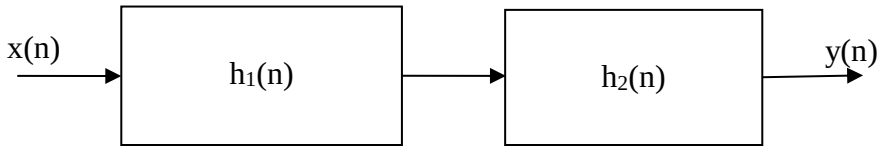
Electronics and Communication Engineering

UECT24301 - SIGNALS AND SYSTEMS

Regulations – 2024

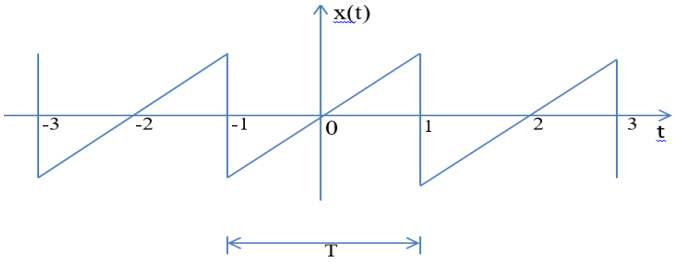
Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	Questions	BTL	CO	Marks
1.	Draw the signal u(t)-u(t-3).	L1	1	2
2.	Mention the condition for a system to be static. Check the system $y(n)=x^2(n)$ is static or dynamic.	L2	1	2
3.	List the conditions for the existence of Fourier series of periodic signal.	L1	2	2
4.	State and prove the Parseval's relation in Laplace transform.	L1	2	2
5.	Find the output y(n) if two systems $h_1(n)$ and $h_2(n)$ are cascaded. 	L2	3	2
6.	An LTI system is described by the difference equation $\frac{d^3y(t)}{dt^3}+2\frac{d^2y(t)}{dt^2}+4\frac{dy(t)}{dt}+3y(t)=\frac{dx(t)}{dt}$. Find the transfer function of the system.	L2	3	2
7.	Calculate the Discrete Time Fourier Transform of δ(n-3).	L2	4	2
8.	Define Region of Convergence (RoC) and mention its importance.	L1	4	2
9.	Compare recursive and non-recursive systems.	L2	5	2
10.	State any two properties of convolution sum.	L1	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No		Questions	BLT	CO	Marks
11.	a	Determine whether the following signals are energy or power signal a) $x(t)=e^{j(3t+(\pi/2))}$ b) $x(n)=(1/5)^n u(n)$	L3	1	8
		Find the fundamental period of the following signals if it is periodic. a) $x(t)=5\sin 300\pi t+2\cos 200\pi t$ b) $x(n)=\sin(3n\pi/9+1)$	L3	1	8
		Or			
	b	Determine whether the systems described by the following input-output equations are linear, dynamic. a) $\frac{d^2y(t)}{dt^2}+5\frac{dy(t)}{dt}+6y(t)=\frac{dx(t)}{dt}+x(t)$ b) $y(n)=nx(n)+bx^2(n)$	L3	1	8
		Check whether the following systems are causal, time invariant a) $y(n)=x(n^2)$ b) $y(t)=x(t)+x(-t)$	L3	1	8

12.	a	Find the trigonometric Fourier series for the periodic signal x(t) shown in fig 	L3	2	16
		Or			
	b i	Find the Fourier Transform of the signal $x(t)=\cos\Omega_0 t\ u(t)$.	L3	2	8
	ii	Determine the Laplace transform of $x(t)=e^{-a\|t\|}$.	L3	2	8
13.	a	The input- output of a causal LTI system are related by the differential equation $\frac{d^2y(t)}{dt}+7\frac{dy(t)}{dt}+12y(t)=2x(t)$. a) Find the impulse response h(t) b) Find the response y(t) of this system if x(t)=u(t). Use Laplace Transform	L3	3	16
		Or			
	b	Realize the LTI system described by the differential equation $\frac{d^2y(t)}{dt}-4\frac{dy(t)}{dt}-5y(t)=5x(t)$ in cascade and parallel form.	L3	3	16
14.	a	State and prove sampling theorem for low pass band limited signal and derive the reconstructed signal from its samples.	L2	4	16
		Or			
	b	Determine the ZT and sketch the pole zero plot with ROC for the signal $x(n)=(5)^n u(-n)-\left(\frac{1}{4}\right)^n u(-n-1)$.	L2	4	16
15.	a	Compare the impulse and step response of the following system with difference equation $y(n)-\frac{3}{4}y(n-1)+\frac{1}{8}y(n-2)=x(n)$.	L4	5	16
		Or			
	b i	Perform convolution to find the response of the system h(n) for the input sequences $x_1(n)=\{1,-1,2,3\}$ and $x_2(n)=\{1,-2,3,-1\}$.	L4	5	10
	ii	Realize the following system in direct form II structure $H(z)=\frac{1}{\left(1-\frac{1}{2}z^{-1}\right)\left(1-\frac{1}{4}z^{-1}\right)}$.	L4	5	6