PVP 20

Code: 20EC3303, 20EE3302

II B.Tech - I Semester – Regular / Supplementary Examinations DECEMBER 2023

SIGNALS AND SYSTEMS

(Common for ECE, EEE)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1	a)	Define and sketch the following signals i) Signum Function ii) Impulse function iii) Unit step function.	L2	CO1	7 M
	b)	Determine whether the following signals are energy or power signals i) x(t)=tu(t) ii) x(t)= e^{-at} u(t)	L2	CO1	7 M
		OR			
2	a)	Find the even and odd components of the following signal x(t) = cost + sint +2sint+4cost	L2	CO1	7 M
	b)	Check whether the following systems are time invariant or not i) $y(t) = t^2 x(t)$ ii) $y(t) = x(-2t)$ iii) $y(n) = x(n)$	L2	CO1	7 M

UNIT-II					
3	a)	Explain the difference between the following systems. i) Linear and non-linear systems. ii) Time variant and time invariant systems.	L2	CO1 CO2	7 M
	b)	The output response of a continuous time LTI system is $y(t)= 2e^{-3t}u(t)$ when the input x(t) = u(t). Find the Transfer function of the system.	L3	CO1 CO2	7 M
OR					
4	a)	Define LTI system and briefly explain about properties of a LTI system.	L2	CO1 CO2	7 M
	b)	What is the difference between Convolution sum and convolution integral and derive the expression for a convolution sum.	L3	CO1 CO2	7 M
UNIT-III					
5	a)	Find the exponential Fourier series for the full-wave rectified sine wave $x(t) = A\sin\pi t$, over the interval (0, 1).	L3	CO2 CO3	7 M
	b)	Explain in detail about complex Fourier spectrum?	L2	CO2 CO3	7 M
OR					
6	a)	State and prove Differentiation and integration properties of Fourier Transform.	L3	CO2 CO3	7 M

	b)	Find the Fourier Transform of following signals i) e^{-3t} u(t) (ii) cos ω_ot u(t)	L3	CO2 CO3	7 M
UNIT-IV					
7	a)	Determine the DTFT of a signal $x(n)=n(1/2)^n u(n)$.	L3	CO2 CO4	7 M
	b)	State and prove Parseval's relation in DTFT.	L3	CO2 CO4	7 M
OR					
8	a)	Determine the impulse response h(n) for the system described by the second order difference equation y(n) – 2y(n-1) = x(n) + x(n-1).	L3	CO2 CO4	7 M
	b)	Consider a discrete-time LTI System with impulse response $h(n)=(1/3)^n u(n)$. Determine the response of the system to the input $x(n)=(1/4)^n u(n)$.	L3	CO2 CO4	7 M
UNIT-V					
9	a)	Discuss any 3 properties of Laplace transform	L2	CO1 CO5	7 M
	b)	Find the inverse Laplace transform of X(S) = 5(s+5)/ s(s+3) (s+7); Re(s) > -3	L3	CO1 CO5	7 M
OR					
10	a)	State and prove the final-value theorem of z-transform.	L3	CO1 CO5	7 M
	b)	Find the inverse z- transform of $X(Z) = \frac{1+3Z^{-1}}{1+3Z^{-1}+2Z^{-2},}$; $\lvert Z\rvert > 2$	L3	CO1 CO5	7 M