Code No.: EC303PC	R20	H.T.No.			8	R						

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Supply) – June - 2025
SIGNALS AND SYSTEMS
(ECE)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a)	Explain any two basic operations on signals.	[2M]
b)	Compare continuous-time and discrete –time signals	[2M]
c)	Write the expression for Fourier transform of aperiodic signal.	[2M]
d)	Find the Fourier transform of Unit step function.	[2M]
e)	Define system bandwidth and signal bandwidth.	[2M]
f)	Mention the characteristics of distortion less transmission system.	[2M]
g)	State initial and final value theorem of Laplace transform.	[2M]
h)	Express the relation between Laplace Transform & Fourier Transform.	[2M]
i)	Define aliasing. How it can be avoided?	[2M]
j)	Write the expression for auto correlation.	[2M]

PART-B **(50 Marks)**

2.a)	Discuss the concept of impulse function. Explain how signum function is expressed in terms of unit step function.	[5M]
b)	Explain orthogonality property between two complex functions $f_1(t)$ and $f_2(t)$ for a real variable t.	[5M]
	OR	
3.	Perform the following operations on signals with suitable example: (i) Amplitude scaling (ii) Addition (iii) Multiplication of signals (iv) Time reversal	[10M]
4.a)	State the Dirchlet conditions for convergence of Fourier Series.	[5M]
b)	Solve the Fourier transform of the signal given $x(t) = \cos w_0 t$	[5M]
	OR	
5.	Express the Fourier transform for the signal $x(t) = e^{-at}, 0 \leq t \leq \infty$ and also plot the magnitude and phase spectrum.	[10M]
6.	Explain the causality and physical reliability of a system and hence give poly-wiener criterion.	[10M]
	OR	
7.a)	What is an LTI system? Derive an expression for the transfer function of an LTI system.	[5M]
b)	Solve the Laplace transform of the signal $x(t) = e^{-2t}u(t) + e^{-3t}u(t)$	[5M]

8. State and prove any five properties of Z-Transform. [10M]

OR

9.a) Write the properties of ROC in laplace transform. [5M]

b) Solve the Z-Transform of [5M]

$$x[n] = \left(\frac{1}{2}\right)^n u[n] + \left(\frac{1}{3}\right)^n u[-n-1]$$

10. Explain the process of sampling. [10M]

OR

11.a) Give introduction to band pass sampling. [5M]

b) Explain about Auto-correlation function with their properties. [5M]

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