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

CMRENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Supply) - December- 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)	Sketch the signal $x(t) = u(t+1) + u(t-1) - u(t-2) - u(t-4)$	[2M]
b)	Formulate Unit Step and Unit Impulse Functions.	[2M]
c)	State the Dirichlet's conditions for existence of Fourier Series.	[2M]
d)	Find the Fourier transform of δ[n].	[2M]
e)	Name the ideal filters.	[2M]
f)	Formulate the relation between bandwidth and rise time.	[2M]
g)	Mention the properties of ROC for Laplace transform.	[2M]
h)	Find the Z -Transform of x[n]=δ[n-1]-δ[n+3]	[2M]
i)	How can you prevent aliasing?	[2M]
j)	Determine the Nyquist sampling rate of the signal sinc(100πt).	[2M]

PART-B **(50 Marks)**

2.	Examine the orthogonality of the signals sin mw_0t, cos nw_0t over the interval $(t_0, t_0 + T)$.	[10M]
	OR	
3.a)	Define the signal and discuss its classification with neat diagrams.	[5M]
b)	Derive the expression for evaluating mean square error.	[5M]
4.	State and prove any five properties of Fourier transform.	[10M]
	OR	
5.a)	Derive the expression for trigonometric Fourier series coefficients.	[5M]
b)	Find the Fourier transform of cosω$_0$t and sinω$_0$t.	[5M]
6.	For an LTI system described by a differential equation. $\frac{d^2}{dt^2}y(t) + 4\frac{d}{dt}y(t) + 3y(t) = \frac{d}{dt}x(t) + 2x(t)$, The input is $x(t) = e^{-t}u(t)$. Determine its transfer function, impulse response.	[10M]
	OR	
7.a)	Analyze the expression for transfer function of an LTI system.	[5M]
b)	With neat sketches explain the filter characteristics of a linear system.	[5M]
8.	Determine the Laplace transform of the following signals. Also specify ROC. $i)\quad x(t) = 3e^{-t}\mathrm{u(t)} - 2\mathrm{e}^{-\mathrm{t}}\mathrm{u(t)}$ $ii) x(t) = e^{-t}\mathrm{u(t)} + \mathrm{e}^{-\mathrm{t}}\cos(3\mathrm{t})\mathrm{u(t)}$	[10M]
	OR	
9.	State and prove any five properties of Laplace transform.	[10M]

10.	With the help of neat sketches explain various sampling methods.	[10M]

OR

11.a)	Find the cross correlation of the functions sin ωt and cos ωt.	[5M]
b)	Derive the relation between convolution and correlation.	[5M]

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