

CMENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS

II-B.TECH-I-Semester End Examinations (Supply) - August- 2023
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 $x(t) = u(t + 1) + u(t - 1)$ [2M]
- b) Define Unit Step and Unit Impulse Functions? [2M]
- c) State the Dirchelet-s condition for existence of Fourier Series. [2M]
- d) Find the Fourier transform of $\delta[n]$? [2M]
- e) Draw the ideal filter characteristics. [2M]
- f) Analyze the expression for transfer function of an LTI system. [2M]
- g) Mention the properties of ROC for z -Transform . [2M]
- h) Find the Z -Transform of $x[n]=\delta[n-1]-\delta[n+3]$? [2M]
- i) How can you prevent aliasing? [2M]
- j) Determine the Nyquist sampling rate of the signal $\text{sinc}(100\pi t)$? [2M]

PART-B**(50 Marks)**

2. Examine the orthogonality of the signals $\sin(\omega t) \cos(2\omega t)$ 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 two properties of Fourier transform? [10M]
OR
5. a. Derive the expression for trigonometric Fourier series coefficients? [5M]
- b. Find the Fourier transform of $\cos(\omega_0 t)$ and $\sin(\omega_0 t)$? [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. Give the relation between bandwidth and rise time? [10M]
OR
8. Determine the Laplace transform of the following signals. Also specify ROC. [10M]
 $x(t) = 3e^{-t}u(t) - 2e^{-t}u(t)$
OR
9. a. State and prove any two properties of Laplace transform? [5M]
- b. Find the Z transform and ROC of the following sequences [5M]
i) $2^n u[n]$ ii) $u[n] - u[n - 3]$

10. With the help of neat sketches prove sampling theorem.

[10M]

OR

11. a. Find the cross correlation of the functions $\sin(\omega t)$ and $\cos(\omega t)$?
b. Derive the relation between convolution and correlation?

[5M]

[5M]
