| Roll No. | | | | | | | | | | | | |
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# PRESIDENCY UNIVERSITY

**BENGALURU**

## Mid - Term Examinations – October 2025

**Date:** 09-10-2025 **Time:** 11.45am to 01.15pm

| **School:** SOE | **Program:** B. Tech. in ECE | |
|---|---|---|
| **Course Code:** ECE2508 | **Course Name:** Signal Processing | |
| **Semester**: III | **Max Marks**: 50 | **Weightage**: 25% |

| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
|---|---|---|---|---|---|
| **Marks** | **26** | **24** | | | |

**Instructions:**

*(i) Read all questions carefully and answer accordingly.*

*(ii) Do not write anything on the question paper other than roll number.*

## Part A

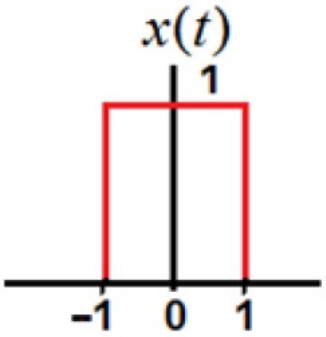
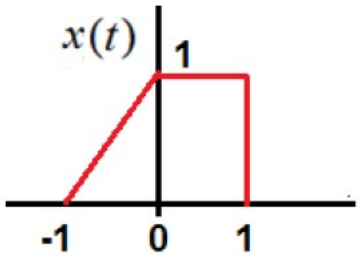
**Answer ALL the Questions. Each question carries 2marks.** **5Q x 2M=10M**

| | | | | |
|---|---|---|---|---|
| **1** | Differentiate among causal, anti-causal, and non-causal signals, providing an example of each. | **2 Marks** | **L3** | **CO2** |
| **2** | Describe each term involved in the equation $A\sin(\Omega ot+\Phi)$ for a sinusoidal signal. | **2 Marks** | **L3** | **CO2** |
| **3** | Explain the difference between deterministic and random signals, and give an example of each. | **2 Marks** | **L2** | **CO1** |
| **4** | Differentiate between discrete time and digital signals with neat examples of some signal diagrams. | **2 Marks** | **L2** | **CO1** |
| **5** | Differentiate between continuous time and discrete time signals with neat examples of some signal diagrams. | **2 Marks** | **L2** | **CO1** |

## Part B

**Answer the Questions.** **Total Marks 40M**

| | | | | | |
|---|---|---|---|---|---|
| **6.** | **a.** | Apply time shifting, time scaling, and amplitude scaling operations to the rectangular pulse $x(t)$ as depicted in the figure below to obtain $y(t)=2x(2t+3)$, and sketch the resulting signal. | **10 Marks** | **L3** | **CO 2** |

| | | | | | |
|---|---|---|---|---|---|
| | |  | | | |
| | **b.** | Apply time shifting and amplitude scaling operations to the signal $x(t)$ as depicted in the figure below to obtain $y(t)=2x(t-2)$ and $y(t)=2x(t+2)$. Also, sketch the resulting signals.<br>  | **10 Marks** | **L3** | **CO 2** |
| | | **Or** | | | |
| **7.** | **a.** | Determine whether the following systems are linear or nonlinear:<br>(i) $y(t) = x(2t)$<br>(ii) $y(t) = 2x(t) + 3$ | **10 Marks** | **L3** | **CO 2** |
| | **b.** | Determine whether the following systems are time-invariant or time-variant:<br>(i) $y(t) = x(-t)$<br>(ii) $y(t) = x(t)\sin 3t$ | **10 Marks** | **L3** | **CO 2** |

| | | | | | |
|---|---|---|---|---|---|
| **8.** | **a.** | Describe whether the signal is periodic or not. If it is periodic, compute its fundamental period.<br>$x(t) = 3\sin\left(200\pi t - \frac{\pi}{4}\right)$ | **10 Marks** | **L2** | **CO 1** |
| | **b.** | Describe whether the following signals are periodic or not. If it is periodic, compute its fundamental period.<br>(i) $x(t) = e^{\cos(2t)}$<br>(ii) $x(t) = t \cdot e^{\cos(2t)}$ | **10 Marks** | **L2** | **CO 1** |
| | | **Or** | | | |
| **9.** | **a.** | Describe whether the signal $x(t)=A\sin(t)$ is an energy signal or a power signal, and compute its power. | **10 Marks** | **L2** | **CO 1** |
| | **b.** | Describe whether the signal $x(t)=A\cos(t)$ is an energy signal or a power signal, and compute its power. | **10 Marks** | **L2** | **CO 1** |