# Model Paper for Pre-Target-1

| VFSTR - VADLAMUDI | Regd. No. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Year | Semester | | Branch | | Section | | | | | |
| Staff Name: | I | 1 | | AI/ML | | 28, 34 | | | | | |
| Faculty Dept.: Physics | Course: EP | | Code: 25PY101 | | | Set-1 | | | | | |
| Program Name: B. Tech. | Date: 10.10.25 | | Time: 11.00 to 12.30 AM (Each Course 30 Minutes) | | | Pre – T1 | | | | | |

**Instructions:**

1. Total marks: 10

**1. Classical Electron Theory (CET)**

I. What is the symbol used for electrical conductivity? [1]

II. What is the free electron approximation postulate? [1]

III. Derive the microscopic version of Ohm's law in a conducting wire with resistance R, cross-sectional area A, and length l. [3]

**2. Electrical conductivity**

A meteorite has fallen from outer space near Vignan University. ISRO scientist has assigned you to find the type of material. It is difficult to make a wire out of it. So, you cut a cube out of the material and perform electrical conductivity measurements with the following observations.

Side length of cube = 10 cm

Opposite faces are connected across a DC source. When a voltage of V=100 V is applied, an electric current of I=1 nA (n for nano) is observed.

What is the conductivity of the material? Which type of material it is? [5]