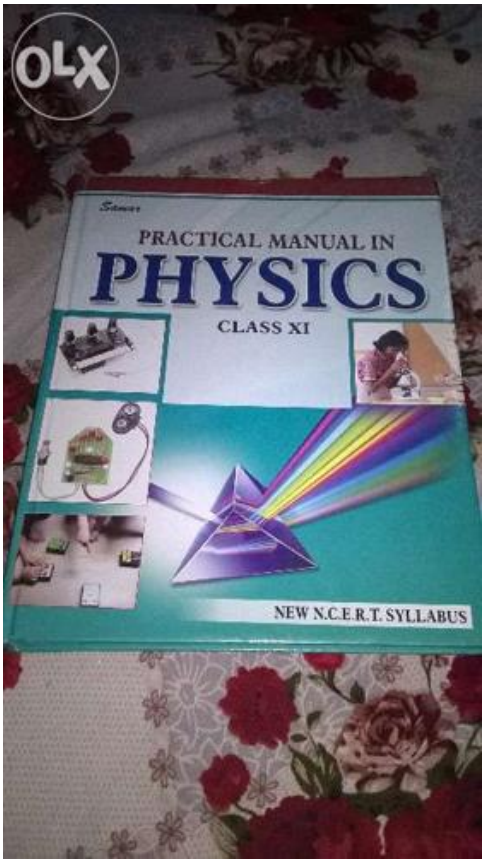
Physics Practical Book For Class 11 Download



The problem (42) is given in the paper. Experiment 1: Shock-wave radiation experiment ========== **Problem 1:** A constant voltage source of 1 volt is connected across a capacitor of $200 \mu F$ which is discharged by a $1.5 A$ current until it is fully discharged. After a while, the capacitor is connected to a resistance of $100k \Omega$. What is the time taken for the capacitor to charge to 0.9 volts? (2.5 seconds) **Solution:** Let V_1 be the initial voltage of the capacitor, V_2 be the final voltage of the capacitor. Thus,

we can write $$\begin{aligned} V_1 &= 1 \cdot 200 \mu F = 200 \mu V \\ V_2 &= 0.9 \cdot 200 \mu F = 180 \mu V\end{aligned}$$ The final voltage of the capacitor is greater than the initial voltage, because the capacitor was discharged and recharged again. Hence, $$\begin{aligned} V_2-V_1 &= 180-200 \mu V = -80 \mu V \quad (80 \mu V \leq V_2-V_1 \leq 0) \\ t &= \frac{V_2-V_1}{I} = \frac{180-200 \mu V}{1.5 A} = 12.75 seconds\end{aligned}$$ Experiment 2: Current through a resistor experiment ========== **Problem 2:** A $150W$ bulb of resistance 1.5Ω is connected to a $200 \mu F$ capacitor, a $1.5A$ current is passed through the bulb and a 4.5-V battery is connected to the circuit. How long will the bulb light? (8 seconds) **Solution:** First, let us look at the equivalent circuit. The resistor and the capacitor are in parallel and in series. Thus, $$\begin{aligned} V_0 = R \cdot I \Rightarrow V_0 &= 1.5 \cdot 1.5 = 2.25 V \\ V_R = \frac{V_0}{1-R} = 1.5 \cdot \frac{2.25 82157476af