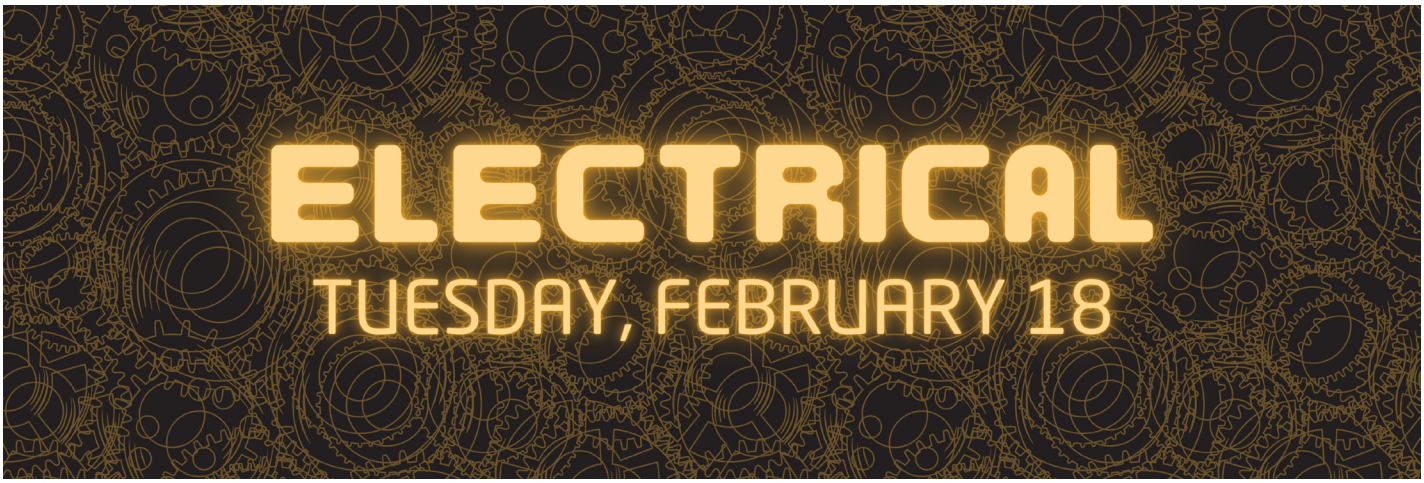
FEB. 18, 2025 ● SOLUTIONS TO ELECTRICAL ENGINEERING PROBLEM SET

1.1 In a series circuit, the total resistance is the sum of the individual resistances. Using the given resistances, we have 150 + 250 + 75 = 475 Ω. So, the total resistance of the circuit is **475** Ω.

1.2 In a parallel circuit, the total reciprocal resistance of the system is equal to the sum of the reciprocals of the individual resistances. We have $1/R_{\text{total}} = 1/150 + 1/250 + 1/75 = 5/750 + 3/750 + 10/750 = 18/750 = 0.024$. That means $R_{\text{total}} = 1/0.024 \approx$ **41.67** Ω.

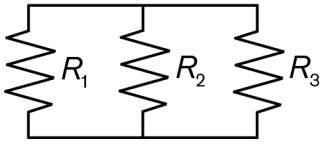
1.3 This circuit combines parallel and series configurations. We can start by calculating the resistance of the two 100 Ω resistors in parallel. We have $1/R_{\text{parallel}} = 1/100 + 1/100 = 2/100 = 1/50$, so $R_{\text{parallel}} = \underline{50\ \Omega}$. Next, we can add the parallel combination to the series resistor (200 Ω), giving us 50 + 200 = 250 Ω. So, the total resistance of this circuit is **250** Ω.



EWEEK 2025 ● ELECTRICAL ENGINEERING

Electrical engineering powers the technology we rely on every day, from smartphones to advanced medical devices. **Resistors**, a fundamental element in electrical circuits, are crucial for controlling current flow and ensuring circuits function properly, efficiently and safely.

In a **series circuit**, the total resistance is the sum of the individual resistances. In a **parallel circuit**, the total reciprocal resistance of the system is equal to the sum of the reciprocals of the individual resistances. Electrical resistance is measured in **ohms**, represented by the symbol Ω.

Series Circuit	Parallel Circuit
	
$R_{total} = R_1 + R_2 + R_3 + \ldots + R_n$	$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots + \frac{1}{R_n}$

1.1 Riya, an electrical engineering student, is designing a prototype for a smartphone charger. To control the flow of current, Riya connects three resistors in series. The first resistor has a resistance of 150 Ω, the second has a resistance of 250 Ω and the third has a resistance of 75 Ω. What is the total resistance of the circuit, in ohms?

1.2 Riya decides to test a different configuration to see if it will improve the efficiency of the charging circuit. She replaces the series setup with a parallel connection using the same three resistors (150 Ω, 250 Ω and 75 Ω). What is the total resistance of the circuit in this new parallel configuration, in ohms? Express your answer as a decimal to the nearest hundredth.

1.3 Riya's classmate, Emma, suggests a new design to optimize charging. The design involves two 100 Ω resistors connected in parallel, which are then connected in series with a 200 Ω resistor. This configuration will power a smartphone charging dock. What is the total resistance of this circuit, in ohms?