

Easy

Deputy Executive Engineer (Electrician) 2026

Gujarat Public Service Selection Board / Assistant Engineer (Electrical)

A DC circuit consists of a resistor of 10 Ω connected across a 20 V supply. With reference to current and power, consider the following statements: 1. The current flowing

A

1 and 2 only

B

2 and 4 only

C

1, 2 and 3 only

Correct

D

All of the above

Correct Answer: C

Full Detailed Explanation

Correct Answer: C - 1, 2 and 3 only
Quick Concept Explanation At fixed supply voltage, doubling resistance halves current and halves power because $P = V^2 / R$. Given $V = 20$ V and $R = 10 \Omega$: $I = V/R = 2$ A and $P = VI = 40$ W. If R doubles to 20Ω at the same 20 V, $I = 1$ A and $P = 20$ W. Key relation: $I = V/R$; $P = VI = I^2 R = V^2 / R$. Exam focus: At fixed V, power varies inversely with R. Common trap: Do not assume power stays constant when resistance changes on a fixed-voltage source. Statement-wise Verification Statement 1 - Correct. The current flowing through the resistor is 2 A. Given $V = 20$ V and $R = 10 \Omega$: $I = V/R = 2$ A and $P = VI = 40$ W. Statement 2 - Correct. The power dissipated in the resistor is 40 W. Given $V = 20$ V and $R = 10 \Omega$: $I = V/R = 2$ A and $P = VI = 40$ W. Statement 3 - Correct. If resistance is doubled, current becomes 1 A. At fixed supply voltage, doubling resistance halves current and halves power because $P = V^2 / R$. Statement 4 - Incorrect. Power remains unchanged if resistance is doubled. The correct principle is: At fixed supply voltage, doubling resistance halves current and halves power because $P = V^2 / R$. Core Concept Resistive DC calculations follow Ohm's law and the power relations $P = VI = I^2 R = V^2 / R$. At fixed supply voltage, doubling resistance halves current and halves power because $P = V^2 / R$. Formula / Key Relationship $I = V/R$; $P = VI = I^2 R = V^2 / R$. Step-by-Step Check Given $V = 20$ V and $R = 10 \Omega$: $I = V/R = 2$ A and $P = VI = 40$ W. If R doubles to 20Ω at the same 20 V, $I = 1$ A and $P = 20$ W. Statement 1: Current is 2 A. Correct. Statement 2: Power is 40 W. Correct. Statement 3: If resistance is doubled, current becomes 1 A. Correct. Statement 4: Power remains unchanged. Incorrect.