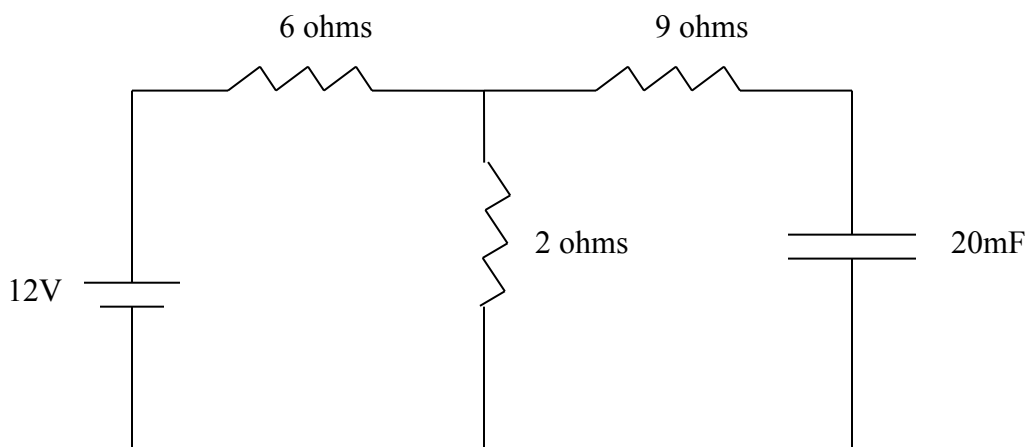**TOPIC**
Electricity and Magnetism – Section XI – Question 1

QUESTION
Shown below is a circuit connected to a voltage source of 12V. At steady state, the voltage across the capacitor most nearly is
   (A) 3V
   (B) 12V
   (C) 1.5V
   (D) 11.57V

HINT
The circuit at steady state will behave as if the capacitor is an open circuit. This is because the capacitor has been charged and hence no more current can flow through it.

SOLUTION

The 6Ω and 2Ω resistor are in the closed circuit.
$$Re_q = R_1 + R_2$$
$$= 6 + 2$$
$$= 8\Omega$$
The current in the circuit will be
$$i = \frac{V}{Re_q}$$
$$= \frac{12}{8}$$
$$= 1.5A$$
The voltage across the capacitor is same as that across the $2\ \Omega$ resistor as no current is flowing through the $9\ \Omega$ resistor. Hence
$$V = 1.5 \times 2$$

$$= 3V.$$

ANSWER

(A)

CONTRIBUTOR

Autar Kaw