PQ 3e

Q and A

Q1

There is a current of 40 mA in a lamp filament for 16 s. Calculate the quantity of charge that passes any fixed point in the circuit in this time.

$Q = It$

$Q = 40 \times 10^{-3} \times 16$

$Q = 640 \times 10^{-3}$ Charge passing $= \underline{\underline{0.64\,C}}$.

Q2

A flash of lightning lasts for 1 ms. The charge transferred between the cloud and the ground in this time is 5 C. Calculate the mean current in this flash of lightning.

$Q = \bar{I}t$

$\bar{I} = Q/t$

$\bar{I} = 5/10^{-3}$

$\bar{I} = 5 \times 10^{3}$

Current is 5×10^{3} A.

Q3

The current in a circuit is 2.5×10^{-2} A. How long does it take for 500 C of charge to pass any given point in the circuit?

$Q = It$

$t = Q/I$

$t = 500 / 2.5 \times 10^{-2}$

$t = 2 \times 10^{4}$ Time is $\underline{\underline{2 \times 10^{4}\ s}}$

Q4

A resistor of value 180 Ω has a current of 68·0 mA flowing through it. What is the p.d. across it?

$V = IR$

$V = 0.068 \times 180$

$V = 12.24$

P.d is 12·2 V (12V)

Q5

What current flows through a 4·7 kΩ when the p.d across it is 98·4 V?

$V = IR$

$I = V/R$

$I = 98.4 / 4.7 \times 10^{3}$

$I = 0.020936$

Current is 2.1×10^{-2} A (21 mA)

Q6

A p.d. of 450 V is placed across a resistor of 33·0 kΩ. Calculate the current flowing through it.

$V = IR$

$\therefore I = V/R$

$\therefore I = 450/33.0 \times 10^{3}$

$\therefore I = 0.01363636$

Current is 1.36×10^{-2} (13.6 mA)

Q7

The power dissipated by a 3·3 kΩ resistor is 250 mW. Find the p.d. across the resistor.

$P = V^2/R$

$\therefore V^2 = PR$

$\therefore V^2 = 0.250 \times 3.3 \times 10^3$

$\therefore V^2 = 825$

$\therefore V = 28.7228$ p.d is 28·7 (29 V)

Q8

A 27 Ω resistor has a current of 0·573 A flowing through it. Determine the power of the resistor.

$P = I^2R$

$P = 0.573^2 \times 27$

$P = 8.86488$ Power is 8.86 W (8.9 W)

Q9

A 60 W filament lamp is connected to the mains supply (230 V). What current flows in the filament?

$P = IV$

$\therefore I = P/V$

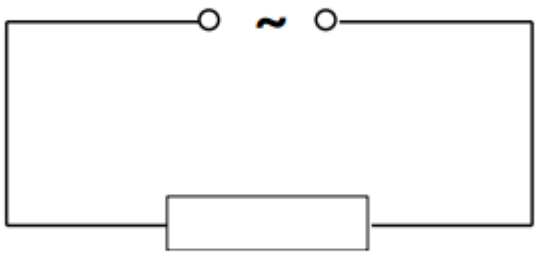
$\therefore I = 60/230$

$\therefore I = 0.2608696$ Current is $\underline{\underline{0.26\ A}}$.

Q10

Calculate the p.d. across the 50 Ω load resistor in each of the following circuits.

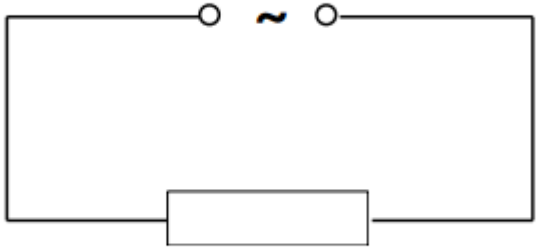
(a)



50 Ω

5 W

(b)



50 Ω

100 W

Q10 continued

(a) $P = V^2/R$

$\therefore V^2 = PR$

$\therefore V^2 = 5 \times 50$

$\therefore V^2 = 250$

$\therefore V = 15.81139$

P.d. is 16 V

(b) $P = V^2/R$

$\therefore V^2 = PR$

$\therefore V^2 = 50 \times 100$

$\therefore V^2 = 5000$

$\therefore V = 70.711$

P.d. 70.7 V (71 V)