

Electricity calculations assignment.

[76 marks]

Complete the questions and calculations below. To receive full marks you must show clear steps in your working and include the correct final units where appropriate.

1. Write out the following equations **in words** giving the **units** of each **quantity**:
 - a) $Q = I \times t$ [3]
 - b) $V = E / Q$ [3]
 - c) $V = I \times R$ [3]
 - d) $P = V \times I$ [3]
 - e) $P = E / t$ (or $P = W / t$) [3]
 - f) $E = V \times I \times t$ [4]

2. Explain the meaning of the following equations about electrical **units**:
 - a) $1 \text{ A} = 1 \text{ C} / \text{s}$ [2]
 - b) $1 \text{ V} = 1 \text{ J} / \text{C}$ [2]
 - c) $1 \text{ W} = 1 \text{ J} / \text{s}$ [2]

3. If the current through a torch bulb is 0.5A what charge passes through it in 2 minutes? [3]
4. What is the current flowing in a circuit if the charge passing each point is 180C in 30 seconds? [3]
5. How long would it take for 45C of charge to flow through an ammeter reading 0.3A [3]
6. A battery provides 12V. How much energy would each Coulomb of charge carry from the battery? [2]
7. Three 2 Volt cells are connected in series and used as a supply for a spot-light.
 - a) What is the total voltage (or potential difference) provided by this battery of cells? [2]
 - b) How much energy does 1C of charge gain on passing through all three cells? [2]
8. What is the power of a lamp rated at 12V and 2A? [3]
9. An electric steam iron requires a voltage of 240V and a current of 6A.
 - a) Calculate the electrical power of the iron. [3]
 - b) If the iron is used for 20 minutes how much energy is transferred in total? [3]
10. What current is needed to run a 1.2kW electric kettle from a voltage of 240V? [3]
11. How many 3 Volt cells are needed to power a 45W lap-top with a current of 3A? [3]
12. What is the resistance of a lamp when a voltage of 12V across it causes a current of 3.5A to flow? [3]
13. What is the reading on a voltmeter across a 10Ω resistor carrying a current of 1.3A? [3]
14. If the voltage across a 30Ω resistor is 8V what is the current flowing through it? [3]
15. A resistor of 20Ω is connected to a 5V battery.
 - a) What current will flow through this resistor? [3]
 - b) What is the electrical power of this resistor? [3]
 - c) How much charge would flow through this resistor in 1 minute 20s? [3]
 - d) How much energy would be transferred in this time? [3]