3.5 Mains Electricity and Circuit Wiring Safety: 10-minute Pack

Total Marks

EDEXCEL 4PH1 · Calculator allowed · about 10 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State the nominal rms voltage supplied by the UK mains electricity supply that household appliances use.

(Total for Question 1 is 1 mark)

2 Describe two differences between direct current as supplied by a cell or battery and alternating current supplied by the UK mains, naming each type in your answer.

(Total for Question 2 is 2 marks)

3 Describe the purpose of the earth wire in a mains appliance and how it reduces the risk of electric shock to a user.

(Total for Question 3 is 3 marks)

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4 Explain how a fuse protects an appliance and a user from danger in the event of a fault that allows excessive current to flow.

(Total for Question 4 is 2 marks)

5 A hairdryer is labelled 900 W for power and is designed to be used on UK mains 230 V. Calculate the current the hairdryer draws from the mains and hence suggest a suitable fuse rating for the plug. Show your working and state the unit.

(Total for Question 5 is 2 marks)

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Mark scheme · 3.5 Mains Electricity and Circuit Wiring Safety: 10-minute Pack

Question 1

230 V (or 230 volts) cao **B1**

Answer: 230 V

Question 2

DC: current flows in one direction only (from a cell or battery) **B1**

AC: current changes direction periodically, e.g. 50 times per second for UK mains **B1**

Answer: DC flows in one direction only; AC reverses direction periodically (50 Hz in UK mains).

Question 3

provides a low resistance path to earth for fault current if the live conductor touches a metal case **B1**

this allows large fault current to flow so protective devices operate (fuse blows or circuit breaker trips) **B1**

metal case is kept at near earth potential, reducing risk of electric shock to a user who touches the case **B1**

Answer: Earth gives a low-resistance path for fault current so a fuse or breaker operates and the metal case stays near earth potential, reducing shock risk.

Question 4

wire in the fuse melts when current exceeds its rating, breaking the circuit **B1**

this stops current flowing so prevents overheating or fire and reduces risk of electric shock **B1**

Answer: If current exceeds the fuse rating its thin wire melts and breaks the circuit, stopping current flow and preventing overheating, fire or a live casing that could give a shock.

Question 5

uses I = P / V with P = 900 W and V = 230 V **M1**

I = 900 / 230 = 3.913... A, therefore suitable fuse rating 5 A cao **A1**

Answer: I = P / V = 900 / 230 = 3.91 A (about 3.9 A), so use a 5 A fuse.

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