SCHOOL: Your school name

SENIOR FOUR PHYSICS · UNIT 5 QUIZ

Direct Current Circuits · FREE SAMPLE

Academic year: 20..... – 20..... **Date:** ...../...../20.....

Name: ..... Class: .....

Duration: 1 hour 30 minutes **Total marks:** 22

INSTRUCTIONS

1. A full unit quiz has three sections and 50 marks: A (10 marks), B (20 marks), C (20 marks).
2. This free sample is a short extract of each section.
3. Calculators may be used.

SECTION A: OBJECTIVE QUESTIONS

Answer ALL questions. The marks are shown for each question.

1. Two identical lamps are connected to the same battery, first in series and then in parallel. Ignoring internal resistance, which statement is correct? (1 mark)

A. Each lamp is brighter in parallel, because each gets the full battery voltage
B. Each lamp is brighter in series, because the same current flows through both
C. Brightness is unchanged, because the lamps and the battery are the same
D. Each lamp is brighter in series, because the total resistance is then larger

2. What is the main advantage of connecting several identical cells in parallel rather than using a single cell? (1 mark)

A. It raises the total e.m.f. above that of one cell, so a larger current flows
B. It raises the total internal resistance, so the cells last much longer
C. It lowers the total internal resistance, so a larger current can be drawn
D. It lowers the terminal voltage, so less power is wasted in the external circuit

3. A car battery has an e.m.f. of 12.6 V. While the starter motor draws 150 A, the p.d. across the battery terminals falls to 9.6 V. What is the internal resistance of the battery? (1 mark)

A. 0.064 Ω
B. 0.084 Ω
C. 0.020 Ω
D. 50 Ω

4. When a Wheatstone bridge is balanced, no current flows through its galvanometer. *(True / False)* (1 mark)

5. For resistors connected in _____, the same current flows through each resistor, but the voltage divides between them. (1 mark)

6. The resistance that opposes current flow inside a battery or cell itself is called its _____ resistance. (1 mark)

7. Matching. Match each item in column A with the correct answer in column B. Write the letter in the answer column. (4 marks)

Column A	Answer	Column B
1. In a parallel circuit, which quantity is the same across every branch?		**a.** Potential difference
2. If the external (load) resistance of a circuit is reduced to zero (a short circuit), what determines the maximum current that flows?		**b.** 4 Ω
3. A 15 Ω resistor is connected in parallel with an unknown resistor, and the combination has a resistance of 10 Ω. What is the unknown resistance?		**c.** 30 Ω
4. A 2 Ω resistor is connected in series with a parallel combination of two 4 Ω resistors. What is the total resistance of the network?		**d.** The e.m.f. and the internal resistance, $I = \varepsilon/r$

8. Fill in the blanks. Use the words in the box to complete the sentences. One word in the box is not needed. (3 marks)

very low resistance, connected in parallel · **$V = \varepsilon - Ir$** · **high resistance, connected in parallel** · **6**

(i) The terminal voltage V of a cell with e.m.f. ε, internal resistance r, delivering current I, is given by ..... .

(ii) A voltmeter used to measure potential difference across a component is designed to have ..... .

(iii) A cell of e.m.f. 3.0 V and internal resistance 0.5 Ω is short-circuited by a thick wire of negligible resistance. The current that flows is ..... A.

SECTION B: SHORT ANSWER QUESTIONS

Answer ALL questions.

9. A single-loop circuit has a cell of e.m.f. 9 V, internal resistance 1 Ω, connected to an external resistor of 2 Ω. What current flows in the circuit? (2 marks)

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10. What is the formula for the equivalent resistance of two resistors R_1 and R_2 connected in parallel? (2 marks)

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11. State whether this statement is true or false, and give a reason: "An ideal voltmeter has infinite resistance, so it takes no current from the circuit it is connected to." (2 marks)

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SECTION C: STRUCTURED QUESTIONS

Answer ALL questions. Show your working.

12. Direct Current Circuits **(10 marks)**

(a) A source of e.m.f. 12 V supplies a current of 2 A to a circuit. What total power is delivered by the source? (3 marks)

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(b) In a metre bridge, an unknown resistor X is in the left gap and a 6.0 Ω standard resistor is in the right gap. The balance point is 40.0 cm from the left end of the wire. What is X? (3 marks)

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(c) Three resistors of 2 Ω, 3 Ω, and 5 Ω are connected in series. What is the total resistance? (4 marks)

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END