

Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 3_ElectricCircuits

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

A constant potential difference is maintained across a negative temperature coefficient thermistor. The thermistor is heated and its resistance decreases.

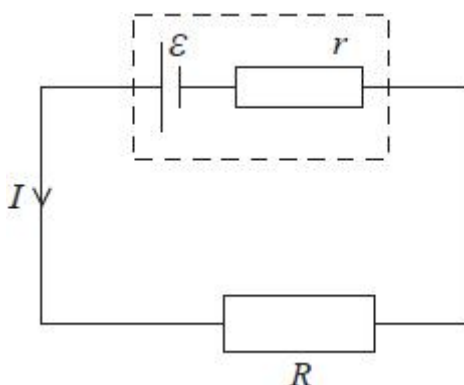
Which of the following explains this decrease in resistance?

- ☐ **A** the collision rate of conduction electrons with lattice ions increases
- ☐ **B** the drift velocity of the conduction electrons decreases
- ☐ **C** the kinetic energy of the lattice ions decreases
- ☐ **D** the number density of the conduction electrons increases

(Total for question = 1 mark)

Q2.

A cell of e.m.f. $\mathcal{E}$ and internal resistance r is connected across an external resistor of resistance R .



Which is the correct expression for the terminal potential difference V of the cell?

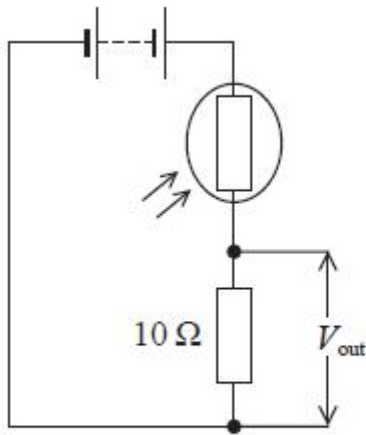
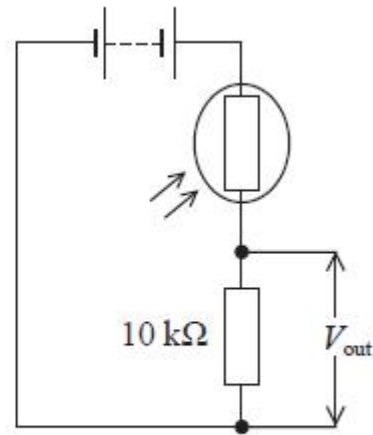
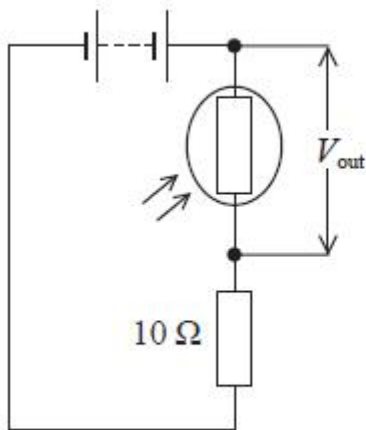
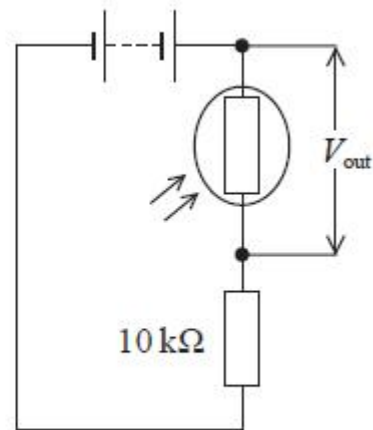
- ☐ **A** $V = \mathcal{E} + Ir$
- ☐ **B** $V = \mathcal{E} - Ir$
- ☐ **C** $V = \mathcal{E} + IR$
- ☐ **D** $V = \mathcal{E} - IR$

Q3.

When a light dependent resistor is illuminated, its resistance falls from $1000\text{ k}\Omega$ to $0.1\text{ k}\Omega$.

The light dependent resistor is connected in series with a fixed resistor.

Which of the circuits shown would produce the greatest output potential difference V_{out} when illuminated?


☐ A

☐ B

☐ C

☐ D

(Total for question = 1 mark)

Q4.

Two copper wires are joined in series in a circuit. Wire A has twice the radius of wire B.

The drift velocity of the electrons in wire A is v_A and the drift velocity of the electrons in wire B is v_B .

The ratio $v_A : v_B$ is

- ☐ A 1 : 2
- ☐ B 1 : 4
- ☐ C 2 : 1
- ☐ D 4 : 1

(Total for question = 1 mark)

Q5.

Answer the question with a cross in the box you think is correct (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

Which of the following increases as the temperature of a metallic conductor increases?

- ☐ A amplitude of the vibrations of the lattice ions
- ☐ B distance travelled by the charge carriers between collisions
- ☐ C drift velocity of the conduction electrons
- ☐ D number of conduction electrons per unit volume

(Total for question = 1 mark)

Q6.

Which of the following statements about the forces in a Newton's Third Law pair is **not** correct?

The forces

- ☐ A act along the same line.
- ☐ B act on the same body.
- ☐ C are equal in magnitude.
- ☐ D are of the same type.

(Total for question = 1 mark)

Q7.

An electric torch uses two 1.5 V cells. The torch bulb is marked 2.4 V, 270 mA.

What is the resistance of the torch bulb?

- ☐ **A** 0.81Ω
- ☐ **B** 0.65Ω
- ☐ **C** 8.9Ω
- ☐ **D** 11Ω

(Total for question = 1 mark)

Q8.

A series circuit consists of two resistors with resistances R_1 and R_2 and a battery of potential difference V .

Which of the following gives the potential difference across the resistor with resistance R_2 ?

(1)

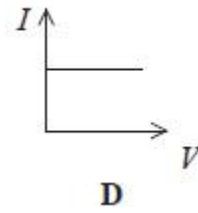
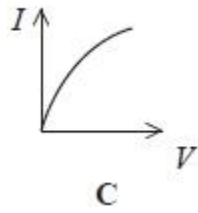
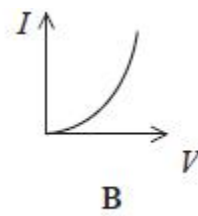
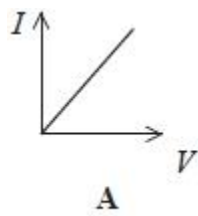
- ☐ **A** $\frac{R_1}{R_2} V$
- ☐ **B** $\frac{R_2}{R_1} V$
- ☐ **C** $\frac{R_1}{R_1 + R_2} V$
- ☐ **D** $\frac{R_2}{R_1 + R_2} V$

(Total for question = 1 mark)

Q9.

Answer the question with a cross in the box you think is correct (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

Which of the following graphs shows how the current varies with potential difference for a filament lamp?

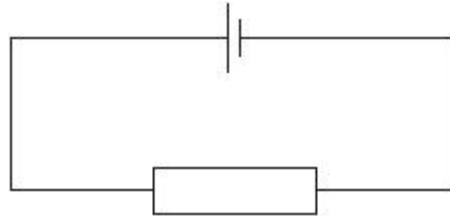


- ☐ **A**
- ☐ **B**
- ☐ **C**
- ☐ **D**

(Total for question = 1 mark)

Q10.

A cell of e.m.f. 1.5 V is connected to a $5.0\ \Omega$ resistor. The terminal potential difference across the cell is 1.0 V.



Which of the following is the current in the circuit?

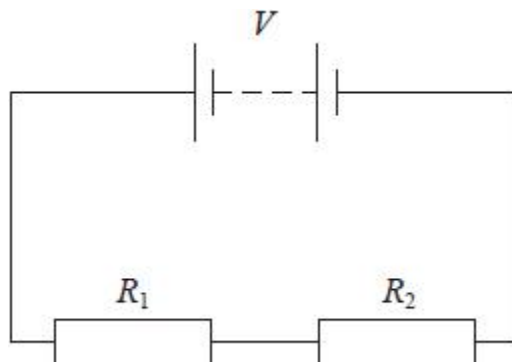
- ☐ **A** 0.1 A
- ☐ **B** 0.2 A
- ☐ **C** 0.3 A
- ☐ **D** 0.5 A

(Total for question = 1 mark)

Q11.

Answer the question with a cross in the box you think is correct ☐. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☐.

Two resistors of resistance R_1 and R_2 are connected to a battery as shown.
The terminal potential difference of the battery is V .



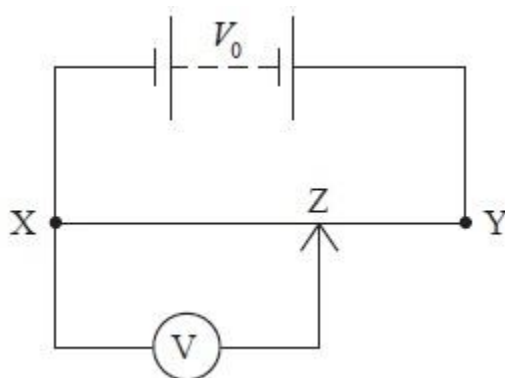
Which of the following gives the potential difference across the resistor of resistance R_1 ?

- ☐ A $\frac{R_1}{R_2} \times V$
- ☐ B $\frac{R_1}{R_1 + R_2} \times V$
- ☐ C $\frac{R_2}{R_1} \times V$
- ☐ D $\frac{R_2}{R_1 + R_2} \times V$

(Total for question = 1 mark)

Q12.

The diagram shows a uniform wire XY across which a potential difference V_0 is applied.



Which of the following correctly shows the output potential difference across XZ?

☐ A $V = \frac{XY}{XZ}V_0$

☐ B $V = \frac{XZ}{XY}V_0$

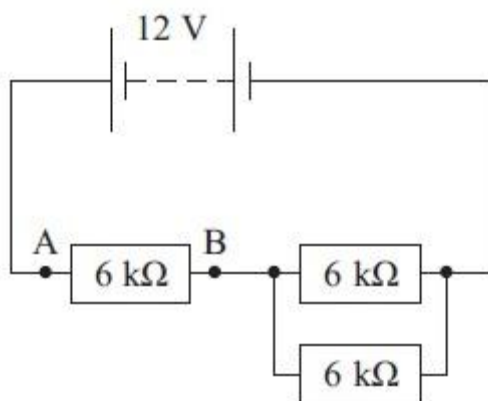
☐ C $V = \frac{XZ}{ZY}V_0$

☐ D $V = \frac{ZY}{XY}V_0$

(Total for Question = 1 mark)

Q13.

A combination of resistors is connected to a 12 V supply of negligible internal resistance.



The potential difference between points A and B is

- ☐ A 4 V
☐ B 6 V
☐ C 8 V
☐ D 12 V

(Total for question = 1 marks)

Q14.

A current of 0.2 A flows through a lamp for 3 hours.

The total charge passing through the lamp in this time is

- ☐ A 2160 C
☐ B 600 C
☐ C 36 C
☐ D 0.6 C

(Total for Question = 1 mark)

Q15.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

A torch is switched on for 5 minutes. The current in the torch bulb is 6 mA.

Which of the following gives the charge, in coulombs, that flows in this time?

☐ **A** $6 \times 10^{-3} \times 5$

☐ **B** $\frac{6 \times 10^{-3}}{5}$

☐ **C** $\frac{6}{300}$

☐ **D** $6 \times 10^{-3} \times 300$

(Total for question = 1 mark)

Q16.

A potential difference V is applied across the ends of a conductor. The drift velocity of the charge carriers in the conductor is v .

Which of the following expressions gives the relationship between drift velocity and potential difference?

☐ **A** $v \propto \frac{1}{V}$

☐ **B** $v \propto \frac{1}{V^2}$

☐ **C** $v \propto V$

☐ **D** $v \propto V^2$

(Total for question = 1 mark)

Q17.

A potential difference is applied to a wire.

The current in the wire

☐ **A** depends only on the potential difference applied.

☐ **B** depends only on the resistance of the wire.

- ☐ C depends on both the potential difference and the resistance of the wire.
- ☐ D does not depend on the potential difference or the resistance of the wire.

(Total for question = 1 mark)

Q18.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

A conductor has a resistance R . A constant potential difference is applied across the conductor. The drift velocity of the charge carriers in the conductor is v .

Which of the following is the relationship between R and v ?

- ☐ A $v \propto R$
- ☐ B $v \propto \sqrt{R}$
- ☐ C $v \propto \frac{1}{R}$
- ☐ D $v \propto \frac{1}{\sqrt{R}}$

(Total for question = 1 mark)

Q19.

All electrical components have resistance.

In which of the following situations would the resistance of the stated component **not** increase?

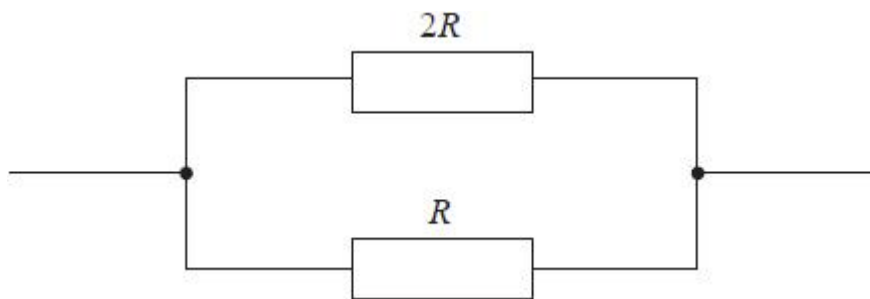
- ☐ A Increasing the current through a filament lamp.
- ☐ B Increasing the temperature of a metal wire.
- ☐ C Increasing the temperature of a negative temperature coefficient thermistor.
- ☐ D Reversing the direction of a diode in forward bias in a circuit.

(Total for question = 1 mark)

Q20.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Part of an electric circuit consists of two resistors. One resistor has a resistance $2R$ and the other resistor has a resistance R as shown.



Which of the following is the equivalent resistance of this combination?

- ☐ A $\frac{R}{3}$
- ☐ B $\frac{2R}{3}$
- ☐ C $\frac{3R}{2}$
- ☐ D $3R$

(Total for question = 1 mark)