Circuit Symbols Questions – OCR A Level Physics

Praneel Physics

1. Draw the circuit symbol for a voltmeter. **(P)**

Working and Answer:

A circle with a "V" inside.

2. Draw the symbol for a thermistor. **(P)**

Working and Answer:

A rectangle with a diagonal line and a small horizontal bar across it.

3. What is the purpose of a fuse in a circuit? **(P)**

Working and Answer:

To protect the circuit by breaking the connection if current exceeds a safe value.

4. State the function of a variable resistor. **(P)**

Working and Answer:

To alter the resistance in a circuit and control current.

5. Sketch and label the circuit symbol for a diode and explain its function. **(PP)**

Working and Answer:

A triangle pointing to a line. It allows current to flow in one direction only.

6. Identify and describe the symbol for a light-dependent resistor (LDR). **(PP)**

Working and Answer:

A rectangle with two arrows pointing toward it. Resistance decreases with increasing light intensity.

7. What is the purpose of a capacitor in a circuit? **(PP)**

Working and Answer:

To store electrical energy and release it when needed.

8. What does the symbol for a switch look like and what is its role? **(PP)**

Working and Answer:

An open or closed break in a line. Used to start or stop current flow.

9. Draw a circuit that includes a power supply, a resistor, an ammeter, and a voltmeter measuring the resistor's voltage. **(PPP)**

Working and Answer:

The voltmeter is connected in parallel with the resistor; ammeter in series.

10. A student connects a battery, resistor, and LED in series. Explain the choice and orientation of the LED. **(PPP)**

Working and Answer:

The LED must face the correct way (anode to positive). The resistor limits current to prevent damage.

11. What would happen if an LDR was placed in series with a lamp and the room became darker? **(PPP)**

Working and Answer:

The resistance of the LDR increases, reducing current, and the lamp becomes dimmer.

12. Calculate the total resistance of two resistors in parallel: $6\,\Omega$ and $3\,\Omega$. **(PPP)**

Working and Answer:

$$\frac{1}{R} = \frac{1}{6} + \frac{1}{3} = \frac{1}{2} \Rightarrow R = 2\,\Omega$$

13. Explain the role of a capacitor in a flash circuit in a camera. **(PPPP)**

Working and Answer:

It stores charge over time and releases it rapidly to produce a high-power flash.

14. Draw a labelled circuit that would allow you to investigate the IV characteristic of a diode. **(PPPP)**

Working and Answer:

Include variable resistor, diode, voltmeter across diode, and ammeter in series.

15. Describe how a thermistor could be used in a temperature-sensing circuit. **(PPPP)**

Working and Answer:

Place it in a potential divider; output voltage changes with temperature due to resistance change.

16. A capacitor is charged with a 12 V battery and stores $24\,\mu C$ of charge. Calculate its capacitance. **(PPPP)**

Working and Answer:

$$C = \frac{Q}{V} = \frac{24 \times 10^{-6}}{12} = 2\,\mu F$$

17. Design a circuit using a potential divider and an LDR to switch on an LED in the dark. **(PPPPP)**

Working and Answer:

Place LDR and fixed resistor in series. Connect LED and transistor to output across fixed resistor. As light drops, voltage across fixed resistor increases and turns on LED.

18. Calculate the output voltage of a potential divider made of a $4\,k\Omega$ resistor and a $2\,k\Omega$ resistor connected to 9 V. Output taken across the $2\,k\Omega$. **(PPPPP)**

Working and Answer:

$$V_{out} = 9 \times \frac{2}{4+2} = 3\,\text{V}$$

19. Explain why a diode must be connected the correct way around in a DC circuit. **(PPPPP)**

Working and Answer:

It only allows current in the forward direction; in reverse, it blocks current and may be damaged if voltage exceeds breakdown.

20. A thermistor has resistance $2\,k\Omega$ at 25°C and $500\,\Omega$ at 50°C. Explain the relationship between resistance and temperature. **(PPPPP)**

Working and Answer:

It is a negative temperature coefficient (NTC) thermistor; resistance decreases as temperature increases.