

Name of the Student: _____

Max. Marks : 23 Marks

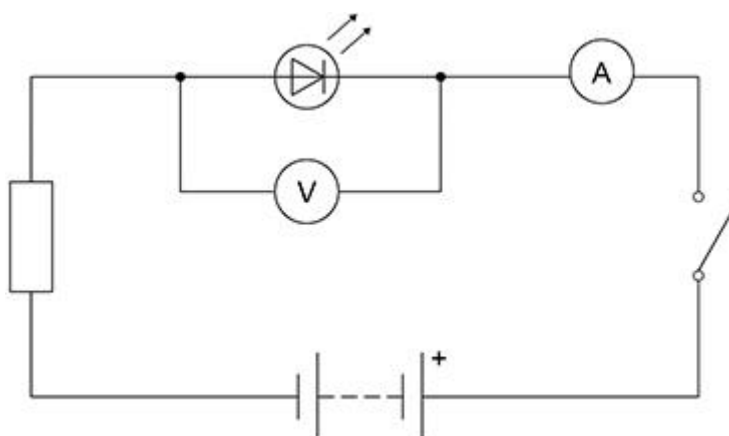
Time : 23 Minutes

Q1.

The camera in a mobile phone uses an LED to provide light when taking a photograph.

A student investigated how the potential difference across an LED varies with the current in it.

Figure 1 shows the circuit used.

Figure 1

- (a) The student closed the switch. The voltmeter gave a reading of 5.0 V

The ammeter gave a reading of 0 mA

The LED did not emit any light.

Explain how the student should have changed the circuit to make the LED emit light.

(2)

- (b) The student changed the circuit so that the LED emitted light.

The current in the circuit was 290 mA

The power of the LED was 0.98 W

Calculate the potential difference across the LED.

Use the Physics Equations Sheet.

Give your answer to 2 significant figures.

Potential difference (2 significant figures) = _____ V

(5)

A traditional camera uses a flash unit to provide light.

Figure 2 shows a flash unit on a traditional camera.

Figure 2



- (c) The flash unit emits light from xenon gas in a fluorescent tube.

What happens when a xenon atom emits light?

Tick (✓) **one** box.

Electrons in the atom fall to a lower energy level.

☐

Electrons in the atom move to a higher energy level.

☐

Electrons leave the atom, causing ionisation.

☐

Electrons transfer to the atom from the electrical circuit.

☐

(1)

- (d) When the flash unit is used there is a mean potential difference of 200 V across the fluorescent tube.

The flash of light lasts for 2.8×10^{-4} s

1.4 J of energy is transferred.

Calculate the mean current.

Use the Physics Equations Sheet.

Mean current = _____ A

(6)

(Total 14 marks)

Q2.

A hybrid car has an electric motor and a petrol engine.

- (a) Petrol is a non-renewable energy resource.

What is meant by a non-renewable energy resource?

(1)

- (b) The electric motor in the car is powered by a battery.

To charge the battery, the car is plugged into the mains supply at 230 V

The power used to charge the battery is 6.9 kW

Calculate the current used to charge the battery.

Current = _____ A

(4)

- (c) Mains electricity is an ac supply.

Explain the difference between direct and alternating potential difference.

(2)

- (d) The cable used to connect the car to the mains electricity supply has a low resistance.

Explain why it is better to use a cable with a low resistance than to use a cable with a high resistance.

(2)

(Total 9 marks)