

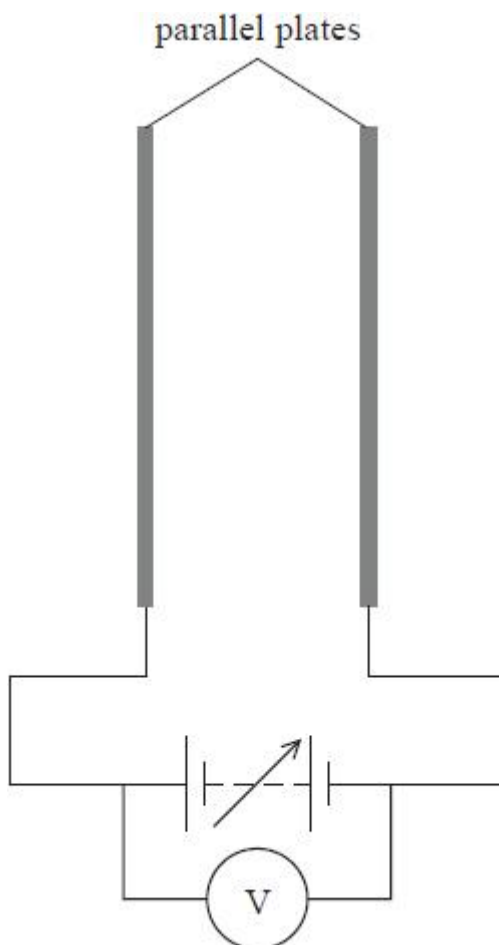
Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

A teacher demonstrates the electric field produced between two parallel metal plates. The plates are connected to a variable power supply, as shown. The power supply has a very large internal resistance and includes a voltmeter that indicates its output.



The power supply output is increased until sparks are heard and are seen in the gap between the plates. Sparks form in air when the electric field strength exceeds $3.0 \times 10^6 \text{ V m}^{-1}$ and the air becomes conducting for a short time.

(i) Calculate the minimum potential difference across the plates for sparks to be created.

distance between parallel plates = 2.0 mm

(2)

.....
.....
.....

Minimum potential difference =

(ii) Explain why the voltmeter reading decreases significantly whenever sparks are produced.

(3)

.....

.....

.....

.....

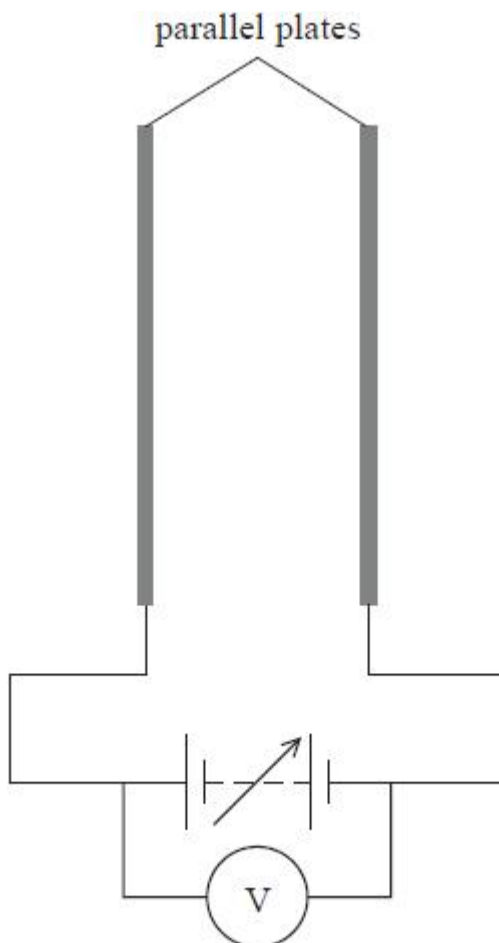
.....

.....

(Total for question = 5 marks)

Q2.

A teacher demonstrates the electric field produced between two parallel metal plates. The plates are connected to a variable power supply, as shown. The power supply has a very large internal resistance and includes a voltmeter that indicates its output.



(i) Add to the diagram to show the electric field between the two plates.

(3)

(ii) Explain why the reading on the voltmeter indicates the e.m.f. of the power supply.

(2)

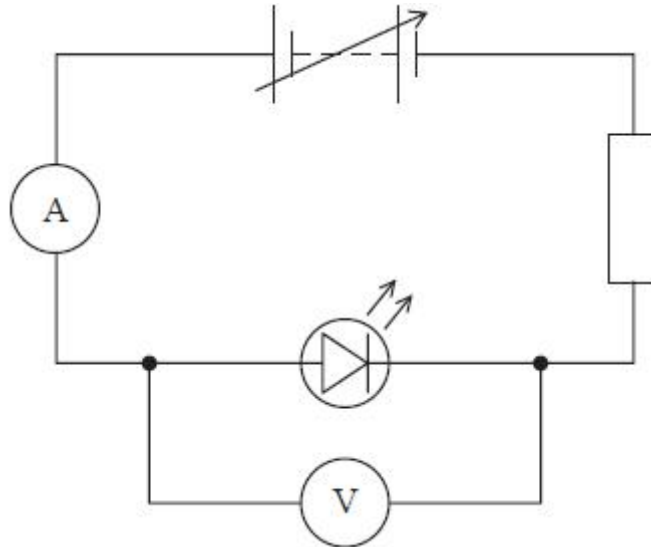
.....

.....
.....
.....

(Total for question = 5 marks)

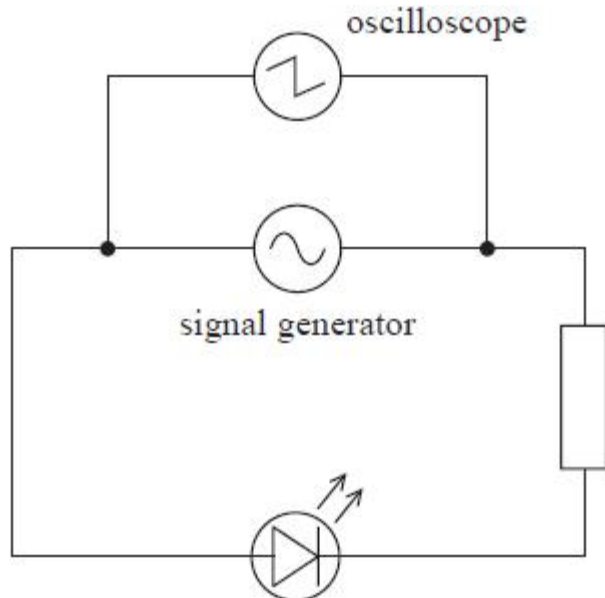
Q3.

A light emitting diode (LED) is placed in a circuit with a fixed resistor and a variable power supply. An ammeter and a high resistance voltmeter are also connected, as shown.

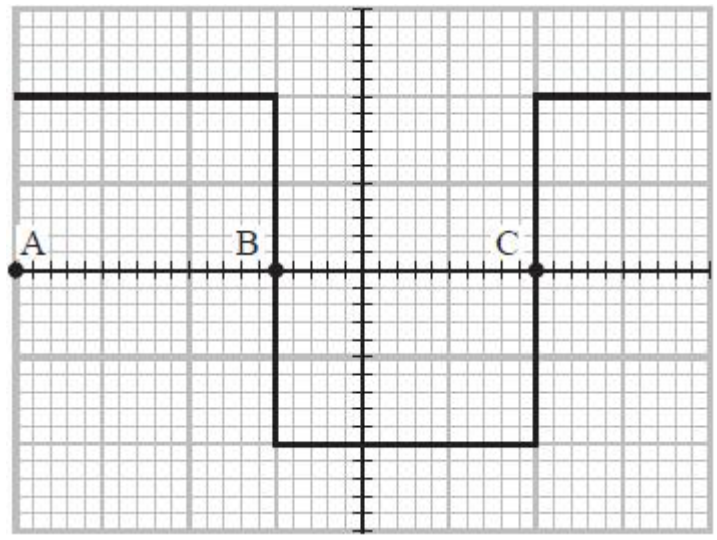


* The ammeter and voltmeter were removed from the circuit.

The variable power supply was replaced by a signal generator and an oscilloscope, as shown.



The output from the signal generator is shown on the oscilloscope screen below.
The output varies between +6 V and -6 V.
Points A, B and C represent instants of time.



Explain why the LED flashes. Your answer should refer to the output between times A and C.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 10 marks)