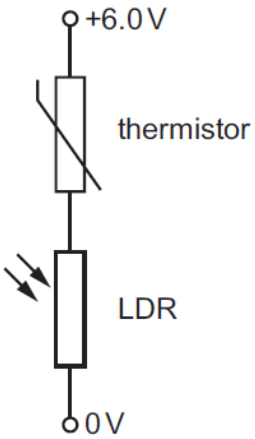
1. Nov/2020/Paper_11/No.38

A thermistor and a light-dependent resistor (LDR) are connected in series. A potential difference (p.d.) of 6.0 V is applied across them as shown.



The thermistor has a resistance of 6000 Ω in a cold room and 1000 Ω in a warm room. The LDR has a resistance of 2000 Ω in dim light and 500 Ω in bright light.

When is the p.d. across the LDR equal to 2.0 V?

A in a cold room with bright light

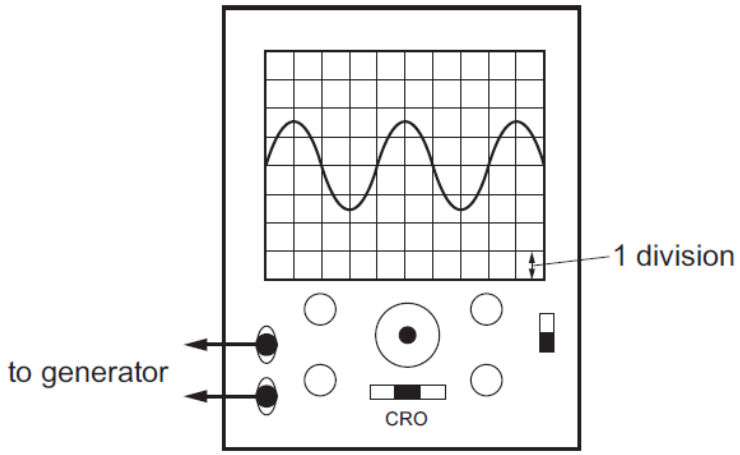
B in a cold room with dim light

C in a warm room with bright light

D in a warm room with dim light

2. Nov/2020/Paper_12/No.37

A cathode-ray oscilloscope with the Y-gain set at 2 V / division is connected to a generator.



Which row describes the signal from the generator and its amplitude?

	signal	amplitude / V
A	a.c.	3
B	a.c.	6
C	d.c.	3
D	d.c.	6

3. June/2020/Paper_22/No.10a,10b,10d

An oscilloscope is a device used to display waveforms.

(a) Inside the oscilloscope, a beam of electrons is emitted from a metal filament by thermionic emission.

The emitted electrons are accelerated away from the filament by a potential difference of 2000 V.

(i) State what must happen to the metal filament for thermionic emission to occur.

.....

..... [1]

(ii) Explain why the electrons accelerate away from the filament.

.....

.....

..... [1]

(iii) The charge on one electron is 1.6×10^{-19} C.

Calculate the maximum kinetic energy of one electron after it has been accelerated through 2000 V.

kinetic energy = ... [2]

(b) Fig. 10.1 is the trace on the screen of the oscilloscope.

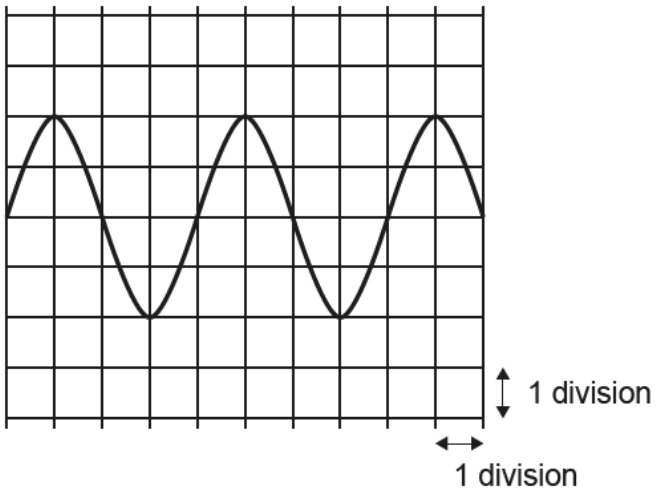


Fig. 10.1

The settings on the oscilloscope are 10 ms / division for the *x*-axis and 3.0 V / division for the *y*-axis.

(i) Calculate the amplitude of the trace shown in Fig. 10.1.

amplitude = ... [2]

(ii) Calculate the time for one oscillation (complete wavelength) of the trace shown in Fig. 10.1.

time = ... [1]

(d) A student investigates what happens when a diode is connected between the microphone and the oscilloscope.

Fig. 10.2 shows the circuit that he uses.

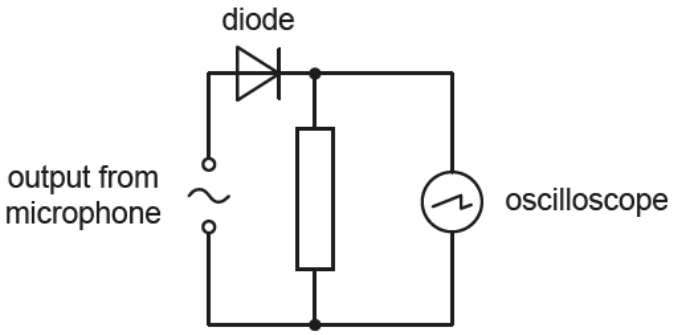


Fig. 10.2

Without the diode, the output from the microphone is an alternating current and the trace is as shown in Fig. 10.1 on page 18.

(i) Describe the action of the diode on the current from the microphone.

.....

..... [1]

(ii) On the grid in Fig. 10.3, sketch the trace seen on the screen when the diode is used.

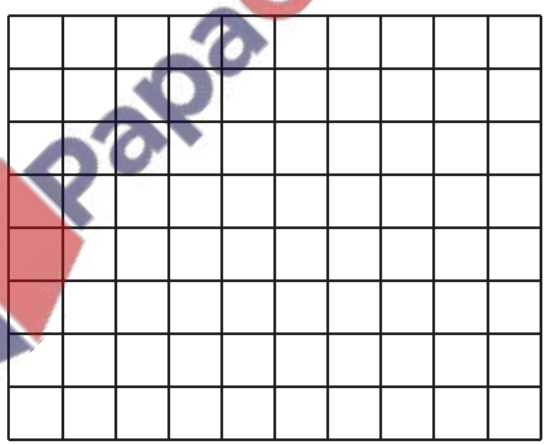


Fig. 10.3

[2]