4 A resistor of resistance of 8.2 kΩ and a LDR (light dependent resistor) are connected in series, as shown in **Fig 4.1**. The resistance of the LDR when light is shone on it is 420 Ω and when dark is 134 kΩ.

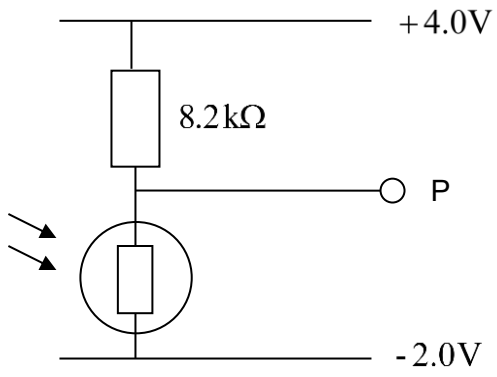

Fig. 4.1

(a) Calculate the potential at point P when

(i) light is shone on the LDR,

Potential = …… V [2]

(ii) no light is shone on the LDR (dark).

Potential = …… V [1]

An alarm is now connected in parallel with the LDR in **Fig. 4.1** and a laser beam is directed at the LDR in a simple burglar alarm system. When a burglar blocks the laser that is shining continuously on the LDR, the alarm is triggered. Assume that the resistance of the alarm is very large.

(iii) Explain clearly how the LDR is used to turn on/off the alarm in such a system.

……

……

.....

..... [2]

(b) A circuit is set up as shown in **Fig. 4.2** below. The potentiometer wire has a resistance of 1.5 Ω and is 1.00 m long. The movable contact J can be connected to any point along wire XY.

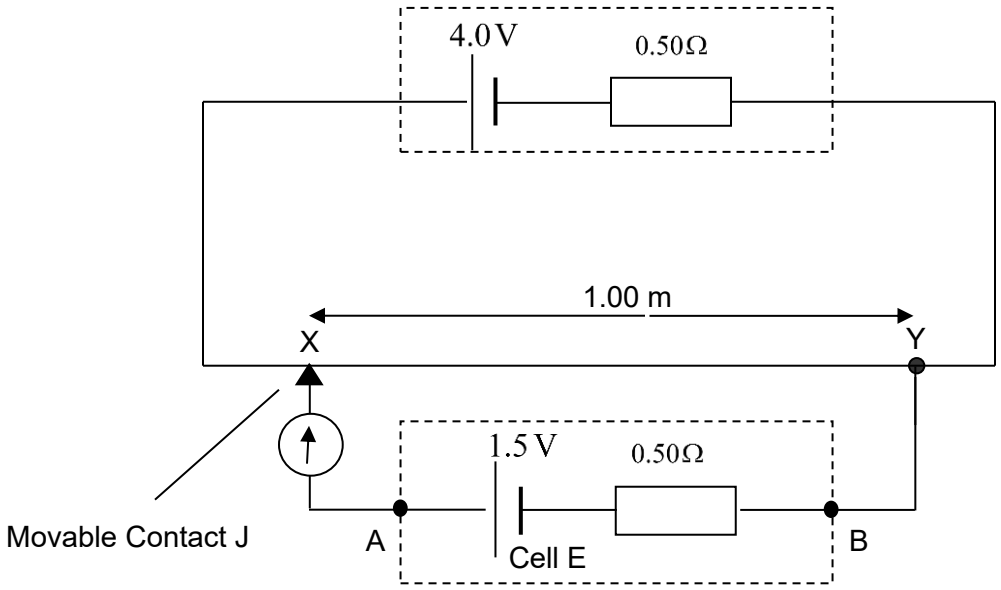

Fig. 4.2

(i) Determine the distance of the contact J from X, such that there is no deflection in the galvanometer.

Distance = …… m [2]

(ii) A 1.50 Ω resistor is connected across points A and B (in parallel with cell E). Determine the new distance of the contact J from X, such that there is no deflection in the galvanometer.

Distance = …….. m [3]