4 **(a)** Define the electric potential at a point in an electric field.

....

....

....

.... [2]

(b) Fig. 4.1 shows part of the region between two charges of the same magnitude but opposite sign.

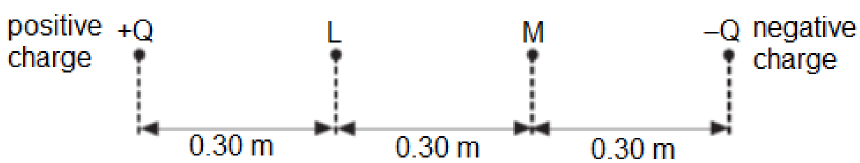

Fig. 4.1

(i) The electric potential at point **L** due to the positive charge **only** is +3.0 V.

Calculate the magnitude Q of the positive charge.

Q = ... nC [1]

(ii) Hence or otherwise, calculate the **net** electric potential at point **L**.

net electric potential = ... V [2]

(iii) Calculate the **resultant** electric field strength at point **M**.

electric field strength at **M** = ………………………….. V m^{-1} [2]

(c) R and S are two charged parallel plates, 0.60 m apart, as shown in Fig. 4.2. They are at potentials of + 3.0 V and + 1.0 V respectively.

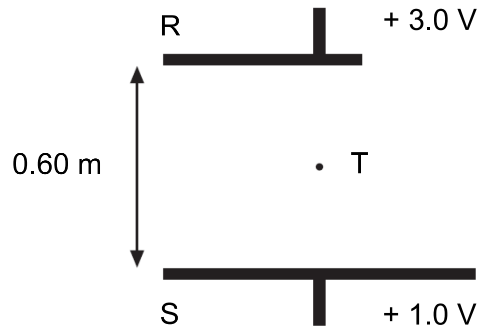

Fig. 4.2

(i) On Fig. 4.2, sketch the electric field between R and S, showing its direction. [1]

(ii) Point **T** is mid-way between R and S.

Calculate the electric field strength at **T**.

electric field strength at **T** = …………………………. V m^{-1} [2]

(iii) A charged oil drop is suspended at point T.
State the sign of the charge and sketch an arrow on Fig. 4.2 showing the direction of the electric force.

sign of charge = ……………………………... [1]