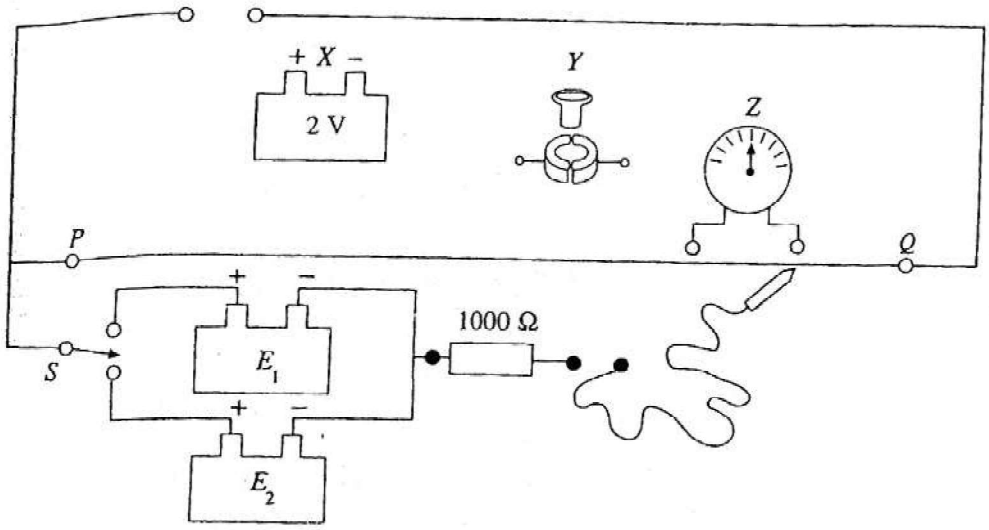
(e) The error Δl of the resonance length l has two components; i.e. the reading error (Δl_1) of the instrument used to measure l, and the error due to the uncertainty in obtaining the resonance state (Δl_2). How would you experimentally determine Δl_2?

.....

.....

.....



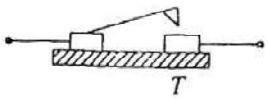
shows an incomplete diagram of an experimental set-up of a potentiometer arrangement used to the e.m.f. E_1 and E_2 of two cells. PQ is a wire of length 1 m and resistance of 20 Ω. Z represent a 2 V accumulator, a switch, and a centre zero galvanometer respectively. S is ay key.

mplete the arrangement by connecting the items X, Y and Z to the circuit with lines.

In order to perform this experiment the magnitudes of E_1 and E_2 must satisfy a certain requirement with e.m.f. of X. What is it?

.....

you suggest a tap-key (T) shown in the figure to the accumulator t? (Yes / No). State the reason.



.....

.....

reason as to why a much thicker wire of the same material should **not** be used as the meter wire.

.....

(e) List the essential steps that you would perform when obtaining a balanced length.

.....

.....

.....

.....

(f) Write down an expression relating E_1, E_2 and their corresponding balanced lengths l_1 and l_2.

.....

.....

(g) If you want to determine the value for the ratio $\frac{E_1}{E_2}$ by plotting a suitable graph, state what modification you would propose to the circuit.

.....

(h) When a student began to perform the experiment as mentioned in (g) above, he found that the lowest pair of values that he could obtain for l_1 and l_2 were closer to 100 cm. As a result he was unable to obtain a good set of measurements to plot a graph. How would you overcome this problem experimentally?

.....