

- 1) In a certain cathode-ray tube, the electrons are accelerated under a difference of potential of 5 kilovolts. After being accelerated, they travel horizontally over a distance of 200 millimeters. Calculate the downward deflection over this distance caused by the gravitational force. An electron carries charge  $-1.6 \times 10^{-19}$  coulomb and mass  $9.1 \times 10^{-31}$  kilogram.
- 2) The figure shows a cylindrical electrostatic analyzer or velocity selector. It consists of a pair of cylindrical conductors separated by a radial distance of a few millimeters. Show that, if the radial distance between the cylindrical surfaces of average radius  $R$  is  $a$ , and if the voltage between them is  $V$ , then the particles collected at  $I$  have a velocity of

$$v = \left( \frac{Q V R}{m a} \right)^{1/2}$$

