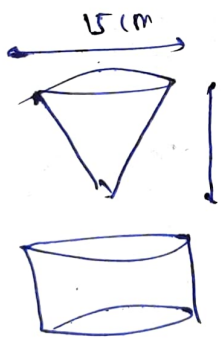
Q.(3) Coffee is draining from a conical filter, height & diameter both 15 cm into a cylindrical coffee pot diameter 15 cm. The rate at which coffee drains from the filter into the pot is 100 cu·cm/min. The rate in cm/min at which the level in the pot is rising at the instant when the coffee in the pot is 10 cm is

A- $\frac{9}{16\pi}$ B- $\frac{25}{9\pi}$ C- $\frac{5}{3\pi}$ D $\frac{16}{9\pi}$

Ans: (D) for cylindrical pot, $V = \pi r^2 h$

$$\frac{dV}{dt} = \pi\left[r^2\frac{dh}{dt} + h.2r\frac{dr}{dt}\right]. \quad \left(r \text{ constant } \therefore \frac{dr}{dt} = 0\right)$$



$$100 = \pi r^2 \frac{dh}{dt}$$

$$100 = \pi \frac{225}{4}.\frac{dh}{dt}. \quad \left(r = \frac{15}{2}\,m\right)$$

$$\frac{dh}{dt} = \frac{16}{9\pi} \text{ cm/min.}$$