

### Question 37142

Reynolds number is  $Re = \frac{v l}{\nu}$ , where  $v$  is the mean velocity,  $l$  is the typical length scale in system and  $\nu$  is the kinematic viscosity. The kinematic viscosity is  $\nu = \frac{\eta}{\rho}$ , where  $\eta$  is the dynamical viscosity and  $\rho$  is the density of the fluid.

Let us first convert given viscosity into  $Pa \cdot s$  (in SI).  $1 P = 10^{-1} PI$  And  $1 Pa \cdot s = 10 P$ , hence  $1 Pa \cdot s = 100 PI$  so  $\eta = 10^{-5} Pa \cdot s$ . Kinematic viscosity is then  $\nu = 10^{-8} \frac{m^2}{s}$ .

Also knowing  $l = 2 cm = 2 \cdot 10^{-2} m$  and  $v = 5 \frac{cm}{s} = 5 \cdot 10^{-2} \frac{m}{s}$ , obtain  $Re = 100$ . Critical Reynolds value is 1000 hence the flow is laminar (calculated Reynolds value is lower than critical).