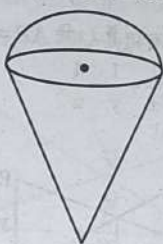29. (a) A room is in the form of cylinder surmounted by a hemi-spherical dome. The base radius of hemisphere is one-half the height of cylindrical part. Find total height of the room if it contains $\left(\dfrac{1408}{21}\right)$ m³ of air. $\left(\text{Take } \pi = \dfrac{22}{7}\right)$

OR

(b) An empty cone is of radius 3 cm and height 12 cm. Ice-cream is filled in it so that lower part of the cone which is $\left(\dfrac{1}{6}\right)^{th}$ of the volume of the cone is unfilled but hemisphere is formed on the top. Find volume of the ice-cream. (Take $\pi = 3.14$)

30. Prove that $\sqrt{5}$ is an irrational number.

31. Prove that $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \dfrac{1}{\cot A + \tan A}$.

SECTION – D

(This section comprises of Long Answer (LA) type questions of 5 marks each.)

32. A ladder set against a wall at an angle 45° to the ground. If the foot of the ladder is pulled away from the wall through a distance of 4 m, its top slides a distance of 3 m down the wall making an angle 30° with the ground. Find the final height of the top of the ladder from the ground and length of the ladder.