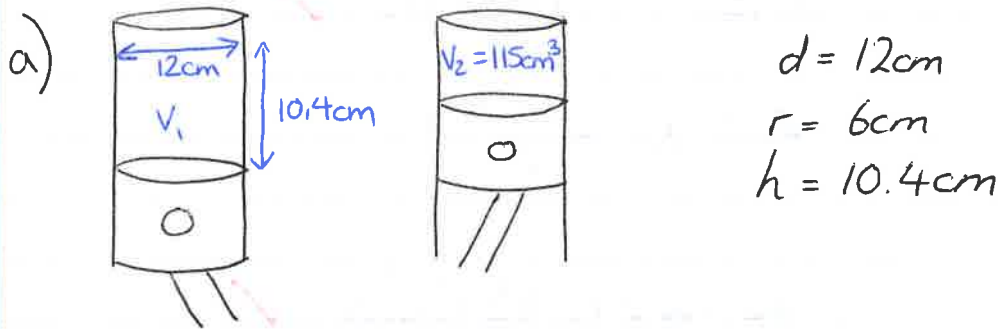


Question



$$\begin{aligned}
 V_1 &= \pi r^2 h + \text{clearance volume} \\
 &= (\pi \times 6^2 \times 10.4) + 115 \\
 &= 1176.21 + 115 \\
 V_1 &= 1291.21 \text{ cm}^3
 \end{aligned}$$

$$\text{Compression ratio} = \frac{V_1}{V_2} = \frac{1291.21}{115} = \frac{11.23}{1}$$

Compression ratio is 11.23 : 1

7 marks

b)

$$\begin{aligned}
 V_1 &= 11.23 & V_2 &= 1 \\
 p_1 &= 95 \text{ kN/m}^2 & p_2 &= ? \\
 T_1 &= 30^\circ\text{C} + 273 = 303\text{K} & T_2 &= 450^\circ\text{C} + 273 = 723\text{K}
 \end{aligned}$$

$$\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2}$$

$$\frac{p_1 V_1 T_2}{T_1} = p_2 V_2 \quad \times T_2$$

$$\frac{p_1 V_1 T_2}{T_1 V_2} = p_2 \quad \div V_2$$

$$p_2 = \frac{p_1 V_1 T_2}{T_1 V_2} = \frac{(95 \times 11.23 \times 723)}{(303 \times 1)} \checkmark$$

$$p_2 = \frac{771332.55}{303}$$

$$p_2 = 2545.65 \text{ kN/m}^2 \checkmark$$

6 marks

done ✓