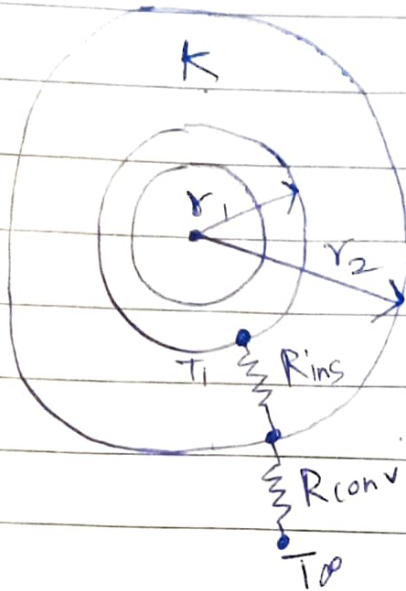Prince Yadav (230792)

Applied Heat Transfer

| Assignment - 2 |

To Plot Q v/s r

$$Q = \frac{\Delta T}{R_{eq}}$$

let the length of cylinder be L

For R_{eq}

$$R_{eq} = \frac{\ln(r_2/r_1)}{2\pi k L} + \frac{1}{2\pi r_2 L \cdot h}$$

$$\Rightarrow R_{eq} = \frac{1}{2\pi L}\left[\frac{\ln(r_2/r_1)}{k} + \frac{1}{r_2 h}\right]$$

$$\therefore Q = (T_i - T_\infty) 2\pi L \left[\frac{\ln(r_2/r_1)}{k} + \frac{1}{r_2 h}\right]^{-1}$$

$$R_T = \frac{1}{2\pi L}\left[\frac{\ln(r_2/r_1)}{k} + \frac{1}{r_2 h}\right]$$

$$\frac{dR_T}{dr_2} = \frac{1}{2\pi L}\left[\frac{1}{r_2 k} - \frac{1}{r_2^2 h}\right] = 0$$

$$\Rightarrow \quad \frac{1}{r_2 k} = \frac{1}{r_2^2 h}$$

$$\boxed{r_2 = \frac{k}{h}}$$

↳ point of maxima in Q v/s r_2