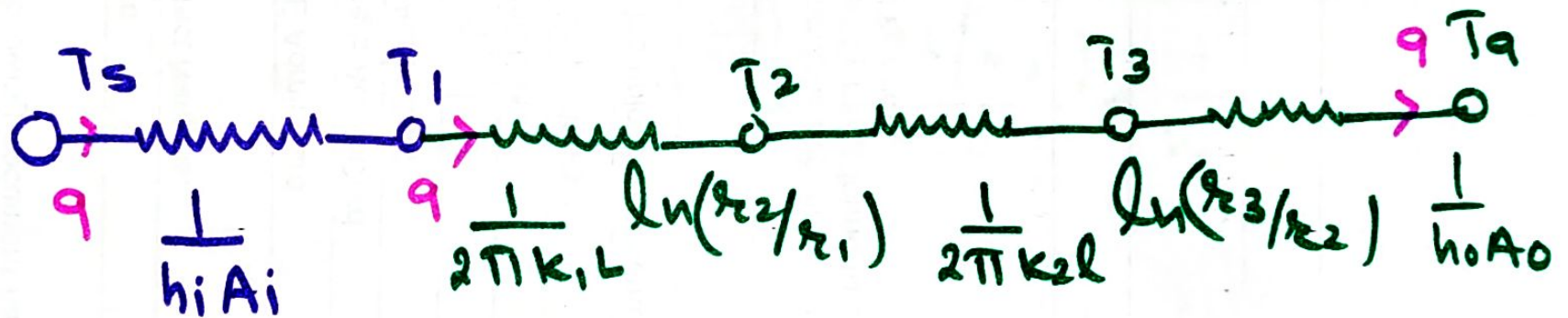
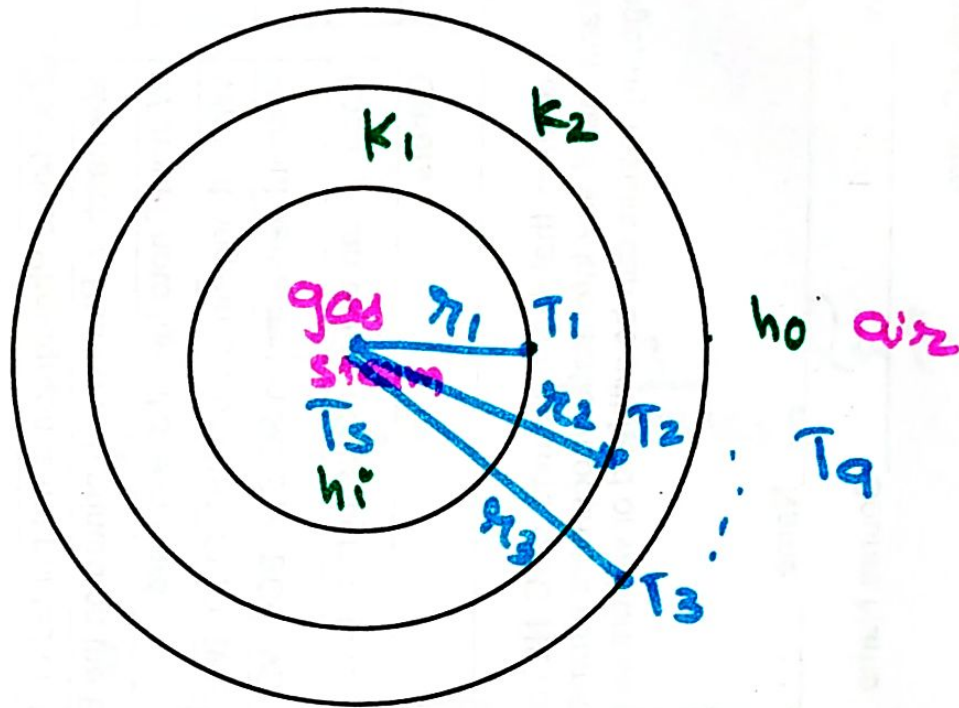


Case-III

Heat Transfer Through Composite Cylinder

- Refractory
line Refractory
- Pipe Steam.

T_s - Steam Temp.
 T_a - air Temp.



$$R_{total} = R_1 + R_2 + R_3 + R_4$$

$$q = \frac{\bar{T}_s - \bar{T}_9}{R_{total}}$$

$$R_{total} = R_1 + R_2 + R_3 + R_4$$

$$= \frac{1}{h_i A_i} + \frac{1}{2\pi k_1 l} \ln\left(\frac{r_2}{r_1}\right) + \frac{1}{2\pi k_2 l} \ln\left(\frac{r_3}{r_2}\right) + \frac{1}{h_o A_o}$$

$$q = \frac{\bar{T}_s - T_o}{\frac{1}{h_i A_i} + \frac{\ln(r_2/r_1)}{2\pi k_1 l} + \frac{\ln(r_3/r_2)}{2\pi k_2 l} + \frac{1}{h_o A_o}}$$