$$W = \mu R T_1 \log_e \frac{V_2}{V_1} + \cancel{\frac{\mu R}{(\gamma-1)}(T_1 - T_2)} + \left\{ -\mu R T_2 \log_e \frac{V_3}{V_4} \right\}$$
$$+ \left\{ -\cancel{\frac{\mu R}{(\gamma-1)}(T_1 - T_2)} \right\}$$

$$W = \mu R \left\{ T_1 \log_e \left(\frac{V_2}{V_1}\right) - T_2 \log_e \left(\frac{V_3}{V_4}\right) \right\} \quad -(5)$$

For Adiabatic process $B \to C$

$$\because \; TV^{\gamma-1} = K \;\Rightarrow\; T_1 V_2^{\gamma-1} = T_2 V_3^{\gamma-1} \quad -(6)$$

For Adiabatic process $D \to A$

$$T_1 V_1^{\gamma-1} = T_2 V_4^{\gamma-1} \quad -(7)$$

by (6)/(7)

$$\left(\frac{V_2}{V_1}\right)^{\gamma-1} = \left(\frac{V_3}{V_4}\right)^{\gamma-1}$$

$$\frac{V_2}{V_1} = \frac{V_3}{V_4} \quad -(8)$$

by Eq (5) and Eq (8)

$$W = \mu R \left\{ T_1 \log_e \left(\frac{V_2}{V_1}\right) - T_2 \log_e \left(\frac{V_2}{V_1}\right) \right\}$$

$$W = \mu R \log_e \left(\frac{V_2}{V_1}\right)(T_1 - T_2) \quad -(9)$$