

$$dW = p \cdot dV \quad \text{--- (4)}$$

Total work done by the system for change in volume from V_i to V_f

$$W = dW_1 + dW_2 + dW_3 + \dots$$

$$W = \int_{V=V_i}^{V=V_f} dW$$

$$W = \int_{V_i}^{V_f} p \cdot dV \quad \text{--- (5)}$$

Note : (I) when $W = +ve$, work is done by the system. and expansion takes place ($V_f > V_i$)

(II) when compression takes place, $V_f < V_i$