B.Sc. I (Hons) Paper I A

First law of thermodynamics

First law of thermodynamics states as.

Energy can neither be created nor destroyed although it may be converted from one form to other forms.

OR

The Total energy of Universe is constant.

OR

It is impossible to construct a perpetual motion machine i.e machine which would produce work continously without consuming energy.

Mathematically it is stated as.

$$q = \Delta E + W \quad \text{---} (1)$$

Where q = heat supplied to the system.

ΔE = increase in internal energy.

W = is the work done by the system.

This state that if certain amount of heat is given to the system, some work is done by the system and some heat is used to increase the internal energy of the system.

Equation (i) can be written as

$$\Delta E = Q - W \quad \text{---(ii)}$$

In differential form it can be written as

$$dE = \delta Q - dW \quad \text{---(iii)}$$

If work done is of type of expansion only and volume increased by small amount dV against the pressure P

Then the above eqn can be written as.

$$\boxed{dE = \delta Q - P dV}$$

This is the mathematical formulation of first law of thermodynamics.