2 **(a)** **(i)** State the first law of thermodynamics.

.....

.....

.....[1]

(ii) Use first law of thermodynamics to explain why the internal energy of the water in an ice cube increases when the ice melts, at atmospheric pressure, to form a liquid without any change of temperature.

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.....

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.....

.....

.....[2]

(b) An ideal gas undergoes a cycle of changes A → B → C → A as shown in Fig. 2.1.

Process A to B takes place at constant temperature of 310 K. Process B to C takes place at constant volume and during this process, 55 J of heat leaves the system. The temperature at C is 280 K. Process C to A takes place with no heat exchange.

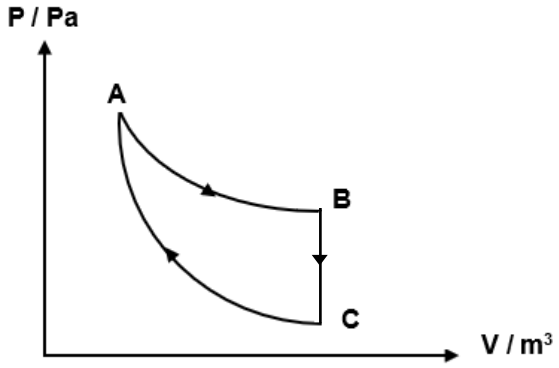

Fig. 2.1

(i) Calculate the change in internal energy of the gas during the process B to C.

change in internal energy = …… J [2]

(ii) Determine the work done by the gas during the process C to A.
Explain your working clearly.

work done by the gas = …… J [3]

[Total: 8]