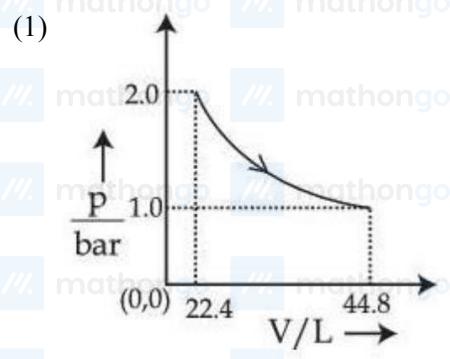


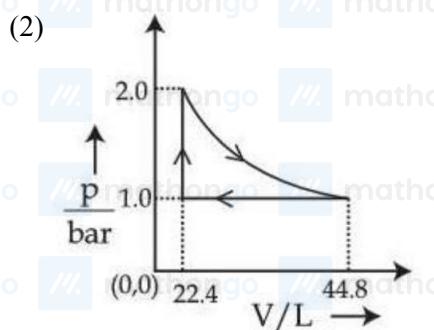
Q1. 21 January Shift 1

Which of the following graphs between pressure ' p ' versus volume ' V ' represents the maximum work done?

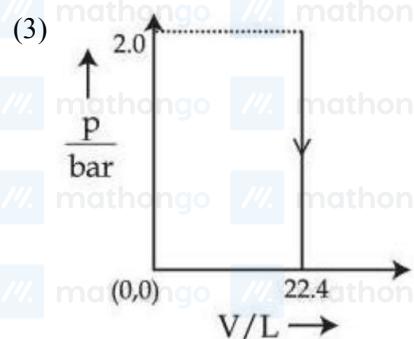
(1)



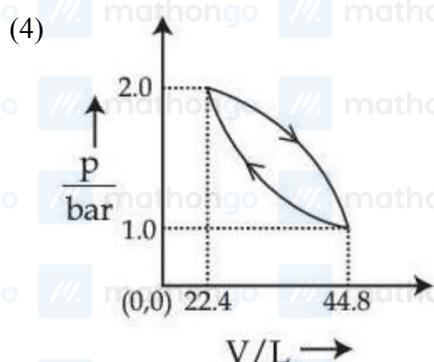
(2)



(3)



(4)

**Q2. 21 January Shift 1**

Use the following data :

Substance	$\Delta_f H^\ominus(500\text{ K})$ kJmol $^{-1}$	$S^\ominus(500\text{ K})$ JK $^{-1}$ mol $^{-1}$
AB(g)	32	222
A ₂ (g)	6	146
B ₂ (g)	x	280

One mole each of A₂(g) and B₂(g) are taken in a 1 L closed flask and allowed to establish the equilibrium at 500

K. A₂(g) + B₂(g) ⇌ 2AB(g) The value of x (in kJmol $^{-1}$) is _____. (Nearest integer) (Given :

$$\log K = 2.2 \quad R = 8.3 \text{ J K}^{-1} \text{ mol}^{-1}$$

Q3. 21 January Shift 2

Consider the following data:

$$\Delta_f H^\ominus(\text{methane, g}) = -X \text{ kJmol}^{-1}$$

$$\text{Enthalpy of sublimation of graphite} = Y \text{ kJmol}^{-1}$$

$$\text{Dissociation enthalpy of H}_2 = Z \text{ kJmol}^{-1}$$

The bond enthalpy of C – H bond is given by :

$$(1) \frac{-X+Y+Z}{4}$$

$$(2) \frac{X+Y+4Z}{2}$$

$$(3) \frac{X+Y+2Z}{4}$$

$$(4) X + Y + Z$$

Q4. 22 January Shift 1

Match the LIST-I with LIST-II

	List-I (Thermodynamic Process)		List-II (Magnitude in kJ)
A.	Work done in reversible, isothermal expansion of 2 mol ideal gas from 2 dm^3 to 20 dm^3 at 300 K	I.	4
B.	Work done in irreversible isothermal expansion of 1 mol ideal gas from 1 m^3 to 3 m^3 at 300 K against constant pressure 3 kPa	II.	11.5
C.	Change in internal energy for adiabatic expansion of 1 mol ideal gas, $\Delta T = 320 \text{ K}$, $\bar{C}_V = \frac{3}{2}R$	III.	6
D.	Change in enthalpy at constant pressure of 1 mol ideal gas, $\Delta T = 337 \text{ K}$, $\bar{C}_p = \frac{5}{2}R$	IV.	7

Choose the correct answer from the options given below:

- (1) A-II, B-III, C-I, D-IV (2) A-III, B-II, C-IV, D-I
 (3) A-II, B-I, C-III, D-IV (4) A-I, B-II, C-III, D-IV

Q5. 22 January Shift 2

If the enthalpy of sublimation of Li is 155 kJ mol^{-1} , enthalpy of dissociation of F_2 is 150 kJ mol^{-1} , ionization enthalpy of Li is 520 kJ mol^{-1} , electron gain enthalpy of F is -313 kJ mol^{-1} , standard enthalpy of formation of LiF is -594 kJ mol^{-1} . The magnitude of lattice enthalpy of LiF is ____ kJ mol^{-1} . (Nearest Integer)

Q6. 23 January Shift 1

A cup of water at 5°C (system) is placed in a microwave oven and the oven is turned on for one minute during which the water begins to boil. Which of the following option is true ?

- (1) $q = +\text{ve}$, $w = 0$, $\Delta U = -\text{ve}$ (2) $q = +\text{ve}$, $w = -\text{ve}$, $\Delta U = -\text{ve}$
 (3) $q = -\text{ve}$, $w = -\text{ve}$, $\Delta U = -\text{ve}$ (4) $q = +\text{ve}$, $w = -\text{ve}$, $\Delta U = +\text{ve}$

Q7. 24 January Shift 1

Match the LIST-I with LIST-II

List-I	Isothermal process for ideal gas system	List-II	Work done ($V_f > V_i$)
A.	Reversible expansion	I.	$w = 0$
B.	Free expansion	II.	$w = -nRT \ln \frac{V_f}{V_i}$
C.	Irreversible expansion	III.	$w = -p_{\text{ex}}(V_f - V_i)$
D.	Irreversible compression	IV.	$w = -p_{\text{ex}}(V_i - V_f)$

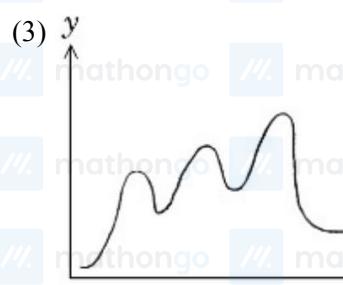
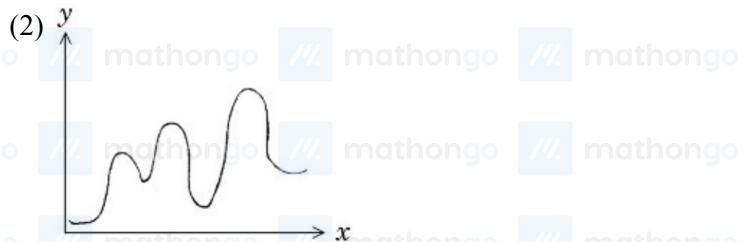
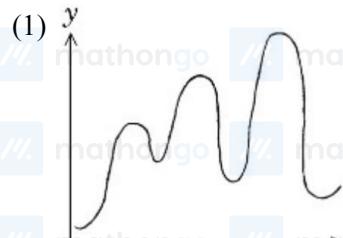
Choose the correct answer from the options given below:

- (1) A-I, B-III, C-II, D-IV
 (2) A-II, B-I, C-III, D-IV
 (3) A-IV, B-I, C-III, D-II
 (4) A-IV, B-II, C-III, D-I

Q8. 24 January Shift 1

 $A \rightarrow D$ is an endothermic reaction occurring in three steps (elementary).

- (i) $A \rightarrow B \Delta H_i = +ve$
 (ii) $B \rightarrow C \Delta H_{ii} = -ve$
 (iii) $C \rightarrow D \Delta H_{iii} = -ve$

Which of the following graphs between potential energy (y-axis) vs reaction coordinate (x-axis) correctly represents the reaction profile of $A \rightarrow D$?

[4]

Q9. 24 January Shift 2

The heat of atomisation of methane and ethane are ' x ' kJmol^{-1} and ' y ' kJmol^{-1} respectively. The longest wavelength (λ) of light capable of breaking the C – C bond can be expressed in SI unit as:

- (1) $\frac{N_A hc}{250(4y-6x)}$
 (2) $\frac{hc}{1000} \left(\frac{y-6x}{4} \right)^{-1}$
 (3) $\frac{N_A hc}{250(y-6x)}$
 (4) $N_A hc \left(y - \frac{6x}{4} \right)^{-1}$

Q10. 28 January Shift 1

20.0dm³ of an ideal gas 'X' at 600 K and 0.5 MPa undergoes isothermal reversible expansion until pressure of the gas is 0.2 MPa. Which of the following option is correct? (Given: log 2 = 0.3010 and log 5 = 0.6989)

- (1) $w = -9.1 \text{ kJ}$, $\Delta U = 0$, $\Delta H = 0$, $q = 9.1 \text{ kJ}$
- (2) $w = +4.1 \text{ kJ}$, $\Delta U = 0$, $\Delta H = 0$; $q = -4.1 \text{ kJ}$
- (3) $w = 9.1 \text{ J}$, $\Delta U = 9.1 \text{ J}$, $\Delta H = 0$; $q = 0$
- (4) $w = -3.9 \text{ kJ}$, $\Delta U = 0$, $\Delta H = 0$; $q = 3.9 \text{ kJ}$

Q11. 28 January Shift 2

The plot of $\log_{10} K$ vs $\frac{1}{T}$ gives a straight line. The intercept and slope respectively are (where K is equilibrium constant).

- (1) $\frac{\Delta S^\circ}{2.303R}, -\frac{\Delta H^\circ}{2.303R}$
- (2) $-\frac{\Delta S^\circ R}{2.303}, \frac{\Delta H^\circ R}{2.303}$
- (3) $\frac{2.303R}{\Delta H^\circ}, \frac{2.303R}{\Delta S^\circ}$
- (4) $-\frac{\Delta H^\circ}{2.303R}, \frac{\Delta S^\circ}{2.303R}$

ANSWER KEYS

- | | | | | | | | |
|--------|---------|---------|--------|---------|--------|--------|--------|
| 1. (1) | 2. 70 | 3. (3) | 4. (1) | 5. 1031 | 6. (4) | 7. (2) | 8. (1) |
| 9. (1) | 10. (1) | 11. (1) | | | | | |