

UNIT TEST-8
11th Standard

Date : 05-Feb-19

Physics

Reg.No. :

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Total Marks : 50

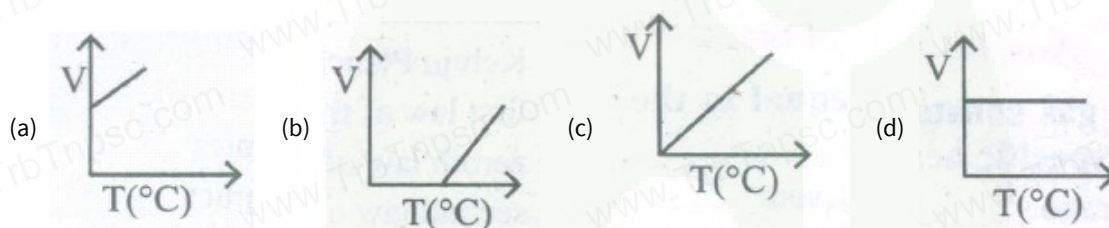
10 x 1 = 10

Time : 01:30:00 Hrs

Part-I

Choose and write the correct answer

- 1) An ideal gas passes from one equilibrium state (P_1, V_1, T_1, N) to another equilibrium state ($2P_1, 3V_1, T_2, N$). Then
(a) $T_1 = T_2$ (b) $T_1 = \frac{T_2}{6}$ (c) $T_1 = 6T_2$ (d) $T_1 = 3T_2$
- 2) In an isochoric process, we have
(a) $W = 0$ (b) $Q = 0$ (c) $\Delta U = 0$ (d) $\Delta T = 0$
- 3) C_p & C_v denote the molar specific heat capacities of a gas at constant volume and constant pressure then
(a) $C_p - C_v$ is larger for a diatomic ideal gas than for a monoatomic ideal gas
(b) $C_p + C_v$ is larger for a diatomic ideal gas than for a monoatomic ideal gas
(c) C_p / C_v is larger for a diatomic ideal gas than for a monoatomic ideal gas
(d) $C_p \times C_v$ is lesser for a diatomic ideal gas than for a monoatomic ideal gas
- 4) Volume - temperature graph at atmospheric pressure for a mono atomic gas (V in m^3 , T in $^\circ C$) is



- 5) First law of thermodynamics corresponds to
(a) conservation of energy (b) heat flow from hotter to cooler body (c) law of conservation of angular momentum
(d) Newton's law of cooling
- 6) Which one is correct?
(a) In an isobaric, $\Delta p = 0$ (b) In an isochoric process, $\Delta W = 0$ (c) In an isothermal, $\Delta T = 0$
(d) In an isothermal process, $\Delta Q = 0$
- 7) In an adiabatic process, the state of a gas is changed from P_1, V_1, T_1 to P_2, V_2, T_2 . Which of the following relations is correct?
(a) $T_1 V_1^{\gamma-1} = T_2 V_2^{\gamma-1}$ (b) $P_1 V_1^{\gamma-1} = P_2 V_2^{\gamma-1}$ (c) $T_1 P_1^{\gamma-1} = T_2 P_2^{\gamma}$ (d) $T_1 V_1^{\gamma-1} = T_2 V_2^{\gamma}$
- 8) Calculate the work done if temperature is changed from $0^\circ C$ to $200^\circ C$ at one atm. [$R = 2 \text{ cal K}^{-1}$]
(a) 100 cal (b) 200 cal (c) 100 cal (d) 800 cal
- 9) An adiabatic process is one in which
(a) the change in internal energy is equal to the mechanical work done (b) the temperature of the gas change
(c) no heat enters or leaves the gas (d) all of the above
- 10) The gas constant (R) is equal to the _____ of two specific heats
(a) ratio (b) Sum (c) produce (d) difference

Part-II

4 x 2 = 8

Answer any 4 questions

Q.No. 14 is compulsory.

- 11) There are two Carnot engines A and B operating in two different temperature regions. For Engine A the temperatures of the two reservoirs are $150^\circ C$ and $100^\circ C$. For engine B the temperatures of the reservoirs are $350^\circ C$ and $300^\circ C$. Which engine has lesser efficiency?
- 12) What is a thermal expansion?

- 13) State the first law of thermodynamics.
- 14) Give the sign convention for Q and W.
- 15) Is it possible that there is a change in temperature of a body without giving/taking heat to from it?
- 16) Calorimeters are made of metals not glass. Why?

Part-III

4 x 3 = 12

Answer any 4 questions**Q.No. 18 is compulsory.**

- 17) Jogging every day is good for health. Assume that when you jog a work of 500 kJ is done and 230 kJ of heat is given off. What is the change in internal energy of your body?
- 18) A 0.5 mole of gas at temperature 300 K expands isothermally from an initial volume of 2 L to 6 L
 - (a) What is the work done by the gas?
 - (b) Estimate the heat added to the gas?
 - (c) What is the final pressure of the gas?
 (The value of gas constant, $R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$)
- 19) Write the main features of the prevost theory
- 20) Define cyclic processes
- 21) Write the conditions for reversible process.
- 22) Describe the two ways of changing the internal energy of a system.

Part-IV

4 x 5 = 20

Answer all the questions.

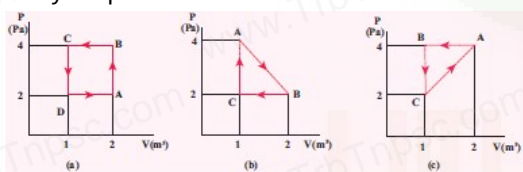
- 23) a) Derive the work done in an adiabatic process

(OR)

- b) a) 'A lake has more rain'.
b) 'A hot cup of coffee has more heat'. What is wrong in these two statements?
- b) A gas expands from volume 1m^3 to 2m^3 at constant atmospheric pressure.
 - (a) Calculate the work done by the gas.
 - (b) Represent the work done in PV diagram
- 24) a) Explain Calorimetry and derive an expression for final temperature when two thermodynamic systems are mixed.

(OR)

- b) The PV diagrams for a thermodynamical system is given in the figure below. Calculate the total work done in each of the cyclic processes shown.



- 25) a) Discuss the
 - a. thermal equilibrium
 - b. mechanical equilibrium
 - c. Chemical equilibrium
 - d. thermodynamic equilibrium.

(OR)

- b) Explain in detail the working of a refrigerator.
- 26) a) Derive Mayer's relation for an ideal gas.

(OR)

- b) Explain in detail Carnot heat engine.
