



## SECTION - D

Answer **any one** questions :

29. Describe the construction and working of a petrol engine.
30. What is an adiabatic process ? Prove that  $PV^\gamma$  is a constant for an adiabatic process. (W 1x4=4)



Reg. No. : .....

Name : .....

V Semester B.Sc. Degree (CCSS - Reg./Supple./Imp.)

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CORE COURSE IN PHYSICS

5B07 PHY : Thermal Physics

(2012 Admn. Onwards)



Time : 3 Hours

Max. Weightage : 30

## SECTION - A

Each bunch of four questions carries a weight of 1 :

- The change in the internal energy of the gas is directly proportional to
  - Change in temperature
  - Change in pressure
  - Change in volume
  - None of these
- The device that converts heat into mechanical work is
  - Heat engine
  - Motor
  - Generator
  - Energy converter
- A reversible heat engine can have 100% efficiency if the temperature of the sink is
  - Higher than that of source
  - Equal to that of source
  - 0
  - Lower than that of source
- Change in entropy depends
  - Only on the transfer of heat
  - Only on the change of temperature
  - On transfer of mass
  - On the thermodynamics state





5. In a cyclic process
- Work done is zero
  - W.D. by the system is equal to the quantity of heat given to the system
  - W.D. does not depend on the quantity of heat given to the system
  - The internal energy of the system increases
6. Entropy remains constant in
- Isothermal Process
  - Adiabatic Process
  - Cyclic Process
  - Isobaric Process
7. The enthalpy of unit mass for any system is
- $H = U + PV + S$
  - $H = U + PV - S$
  - $H = U + PV$
  - $H = U - PV - S$
8. For a thermodynamic system work done in a process depends upon
- The path
  - State of the system
  - External Pressure
  - Nature of the system
- (W 2×1= 2)**

## SECTION – B

Answer **any six** questions. **Each** question carries **1** a weight of :

- Explain the basis of measurement of temperature of a body.
- What is Phase transition ?
- State the first law of thermodynamics and explain its importance.
- What is meant by thermodynamic equilibrium and quasi static processes ?
- How does temperature fall with height ?
- State Kirchoff's law of thermal radiation.
- State and explain the significance of the second law of thermodynamics.
- Distinguish between reversible and irreversible process. **(W 6×1=6)**



## SECTION – C

Answer **any nine** questions. **Each** question carries **2** Weight :

- Define :
  - Ensemble
  - Microscopic and macroscopic states. Give examples.
- Explain Enthalpy. Obtain an equation for Enthalpy.
- Give the Maxwellian relations.
- What is the change in internal energy when 1gm of ice at normal pressure is changed to 1gm of water at  $0^{\circ}\text{C}$  ?
- One gram molecule of a gas at  $127^{\circ}\text{C}$  expands isothermally until its volume is doubled. Find the work done.
- Calculate the efficiency of refrigerator working between  $0^{\circ}\text{C}$  and  $17^{\circ}\text{C}$ . Calculate the energy required to freeze 1kg of water at  $0^{\circ}\text{C}$ .
- Calculate the change in temperature of the boiling point of water due to a change of pressure of 1cm of mercury. ( $L = 540$  calories, volume of 1gm of saturated steam  $100^{\circ}\text{C} = 1600\text{cc}$  and volume of 1gm of water at  $100^{\circ}\text{C} = 1\text{cc}$ ).
- Derive an expression for the efficiency of a diesel engine.
- Explain the principle and working of a refrigerator.
- Calculate the change in enthalpy when one gram molecule of a gas is isothermally compressed from one atmosphere to 20 atmospheres.  $\mu = 1.08$ ,  $C_p = 8.6$  and  $J = 4.2 \times 10^7$  erg/cal.
- Distinguish between thermal and chemical irreversibility.
- A Gas occupying 1 litre at 80 cm of mercury pressure is expanded adiabatically to 1190 cc. If the pressure falls to 60cm of mercury in this process, deduce the value of  $r$ . **(W 9×2=18)**