M 9819

Reg. No. : .....

Name : .....

V Semester B.Sc. Degree (CCSS – Reg./Supple./Imp.) Examination, November 2015
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** :

1. The change in the internal energy of the gas is directly proportional to
   a) Change in temperature
   b) Change in pressure
   c) Change in volume
   d) None of these

2. The device that converts heat into mechanical work is
   a) Heat engine
   b) Motor
   c) Generator
   d) Energy converter

3. A reversible heat engine can have 100% efficiency if the temperature of the sink is
   a) Higher than that of source
   b) Equal to that of source
   c) 0
   d) Lower than that of source

4. Change in entropy depends
   a) Only on the transfer of heat
   b) Only on the change of temperature
   c) On transfer of mass
   d) On the thermodynamics state

P.T.O.

5. In a cyclic process
   a) Work done is zero
   b) W.D. by the system is equal to the quantity of heat given to the system
   c) W.D. does not depend on the quantity of heat given to the system
   d) The internal energy of the system increases

6. Entropy remains constant in
   a) Isothermal Process
   b) Adiabatic Process
   c) Cyclic Process
   d) Isobaric Process

7. The enthalpy of unit mass for any system is
   a) $H = U + PV + S$
   b) $H = U + PV - S$
   c) $H = U + PV$
   d) $H = U - PV - S$

8. For a thermodynamic system work done in a process depends upon
   a) The path
   b) State of the system
   c) External Pressure
   d) Nature of the system

(W 2×1= 2)

SECTION – B

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

9. Explain the basis of measurement of temperature of a body.

10. What is Phase transition ?

11. State the first law of thermodynamics and explain its importance.

12. What is meant by thermodynamic equilibrium and quasi static processes ?

13. How does temperature fall with height ?

14. State Kirchhoff's law of thermal radiation.

15. State and explain the significance of the second law of thermodynamics.

16. Distinguish between reversible and irreversible process.

(W 6×1=6)

SECTION – C

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

17. Define :
    a) Ensemble
    b) Microscopic and macroscopic states. Give examples.
18. Explain Enthalpy. Obtain an equation for Enthalpy.
19. Give the Maxwellian relations.
20. What is the change in internal energy when 1gm of ice at normal pressure is changed to 1gm of water at 0°C ?
21. One gram molecule of a gas at 127°C expands isothermally until its volume is doubled. Find the work done.
22. Calculate the efficiency of refrigerator working between 0°C and 17°C. Calculate the energy required to freeze 1kg of water at 0°C.
23. 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°C = 1600cc and volume of 1gm of water at 100°C = 1cc).
24. Derive an expression for the efficiency of a diesel engine.
25. Explain the principle and working of a refrigerator.
26. 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.
27. Distinguish between thermal and chemical irreversibility.
28. 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)

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^r is a constant for an adiabatic process.

(W 1×4=4)