



M 7157



Reg. No. :

Name :

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

Examination, November 2014

CORE COURSE IN PHYSICS

5B 07 PHY : Thermal Physics

(2011 and Earlier Admissions)

Time : 3 Hours

Max. Weightage : 30

PART – A

Answer all. Each bunch carries 1 weightage :

1. I) The ratio of isothermal elasticity of a gas to the adiabatic elasticity is
 - a) γ
 - b) $\frac{1}{\gamma}$
 - c) $1-\gamma$
 - d) $\frac{1}{1-\gamma}$
- II) If the system undergoes contraction of volume, then work done by the system is
 - a) Positive
 - b) Negative
 - c) Zero
 - d) Infinity
- III) At what temperature adiabatic change is equal to isothermal change
 - a) At 0°C
 - b) At 0°F
 - c) Zero Kelvin
 - d) 100°C
- IV) An ideal gas at 27°C is compressed adiabatically to $8/27$ of its original volume. If $\gamma = \frac{5}{3}$ then the rise in temperature
 - a) 450°C
 - b) 675°C
 - c) 225°C
 - d) 375°C
2. I) Entropy is a measure of
 - a) Perfect order
 - b) Available energy
 - c) Disorder
 - d) None of the above
- II) In a Carnot engine when heat is taken by a perfect gas from the hot source, then the temperature of the source is
 - a) Decrease
 - b) Increases
 - c) First decrease, then increases
 - d) Remain constant

P.T.O.



III) The value of probability of an event can not be

- a) Zero b) 1 c) $\frac{1}{2}$ d) Negative

IV) The thermodynamic probability of a system in equilibrium is

- a) Maximum b) Minimum but not 1
c) 1 d) Zero

(2×1=2)

PART – B

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

3. Define temperature of a body.
4. What do you meant by thermodynamic equilibrium ?
5. State the first law of thermodynamics.
6. State and explain adiabatic process.
7. State and explain second law of thermodynamics.
8. State and explain Carnots theorem.
9. Define entropy.
10. Define third law of thermodynamics. (6×1=6)

PART – C

Answer **any nine**. Each question carries **2** weightage :

11. At normal temperature and normal pressure when one gram of water freezes its volume increases by 0.091 cm^3 . Calculate the change in its internal energy.
12. What are isochoric and isobaric process ? Show that for an adiabatic change $PV^\gamma = \text{const.}$
13. What are the postulates of kinetic theory ?
14. Explain briefly 'reversible' and 'irreversible' process. Give two example of each.
15. What is an indicator diagram ? What is its importance ?



16. Give the statistical definition of entropy. Entropy increases during natural process. Explain.
17. Using Maxwell's relation, prove that the ratio of adiabatic to isothermal bulk modulus is equal to the ratio of specific heats.
18. Calculate the fall in temperature produced by adiabatic demagnetisation of a paramagnetic salt at an initial temperature 3K. When the magnetic field is reduced from 8400 oerstead to zero. Curie const. = 0.6 cgs and $C_4 = 0.2$ cgs. unit.
19. What is meant by thermodynamic probability ? Explain.
20. State and explain Boltzman's theorem on entropy.
21. Derive Steten's law from Plank's law.
22. Briefly explain about dying stress. (9×2=18)

PART – D

Answer **any one**. Each question carries **4** weightage :

23. Describe the working of the Carnot's reversible heat engine. Show how the work done during each operation in representing on a p-v diagram. Calculate the efficiency of this engine interms of the temperature of the source and sink. Why cannot be realised in practice ?
24. Derive Maxwell's four thermodynamic relations. (1×4=4)