M 7335

Reg. No. : .....

Name : .....

V Semester B.Sc. Degree (CCSS – Reg./Supple./Imp.)
Examination, November 2014
(2012 Admission)
CORE COURSE IN PHYSICS
5B07 PHY : Thermal Physics

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 first law of thermodynamics in conservation of
   a) Momentum
   b) Energy
   c) Both a) and b)
   d) None of these

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

4. In a refrigerator the heat exhausted to outer the outer atmosphere is
   a) Has than that absorbed from the contents of the refrigerator
   b) Same as that absorbed from the contents
   c) More than that absorbed form the contents
   d) None of these

5. In a cyclic process.
   a) Work done in 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. In a ratio of two specific heats of a diatomic gas is
   a) 1.66 b) 1.33
   c) 1.4 d) 1.52

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

8. On suffering adiabatic expansion the internal energy of a gas.
   a) Increases b) Decreases
   c) Remains unchanged d) May increase or decrease **(2×1=2)**

SECTION – B

Answer **any six** questions. **Each** question carries **1** weightage.

9. Explain the basis of measurement of temperature of a body.
10. Give the principle of Caratheodory.
11. State the zeroth law of thermodynamics. What is its significance ?
12. What is meant by thermodynamic state and thermodynamic coordinates ?
13. What is meant by thermodynamic equilibrium and quasi static processes ?
14. Explain why a gas has two specific heats.
15. State Kirchhoff's law of thermal radiation.
16. Explain Stefan Boltzmann law.
17. State and explain the significance of the second law of thermodynamics.
18. Define entropy. What is its physical significance ? **(6×1=6)**

SECTION – C

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

19. Define a) Ensemble b) Microscopic and macroscopic states.
20. Explain the concept of thermodynamic scale of temperature.
21. Give the Maxwellian relations.
22. Explain what is meant by equipartition of energy.
23. One gram molecule of a gas at 127°C expands isothermally until its volume is doubled. Find the work done.
24. A Carnot's engine whose low temperature reservoir is at 27°C has a efficiency of 40%. What should be the temperature of high temperature reservoir. What should be the temperature if the efficiency is changed to 60% ?
25. Calculate the change in temperature of the boiling point of water due to a change of pressure of 1 cm of mercury. (L = 540 calories, volume of 1 gm of saturated steam at 100°C = 1600cc and Volume of 1gm of water at 100°C=1cc).
26. Derive an expression for the change of entropy of a gram molecule of a gas during an isothermal expansion.
27. Explain the principle and working of a refrigerator.
28. Calculate the change of 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 $J = 4.2\times10^7$ erg/cal.
29. Determine the rate of change of saturation pressure with temperature for water at 100°C given latent heat of water at 100°C = 540 Cal, $J = 4.2\times10^7$ erg/cal and volume of steam formed = 1670 cc.
30. Explain adiabatic demagnetization. **(9×2=18)**

SECTION – D

Answer **any one** question.

31. Explain Joule-Kelvin cooling effect. Derive the necessary theory.
32. Describe the construction and working of a petrol engine. **(1×4=4)**

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