STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.

(For candidates admitted during the academic year 2004-05 & thereafter)

SUBJECT CODE : **PH/MC/TS24**

B.Sc. DEGREE EXAMINATION APRIL 2007

BRANCH III - PHYSICS

SECOND SEMESTER

REG. No._____

COURSE : **MAJOR – CORE**

PAPER : **THERMAL PHYSICS AND STATISTICAL MECHANICS**

TIME : **30 MINS.** MAX. MARKS : 30

SECTION - A

TO BE ANSWERED IN THE QUESTION PAPER ITSELF

ANSWER ALL QUESTIONS: (30 x 1 = 30)

I CHOOSE THE CORRECT ANSWER:

1. The change of entropy is given by

   a) $\frac{dQ}{T}$ b) $\frac{ds}{T}$ c) $\frac{du}{T}$ d) $\frac{dW}{T}$

2. In adiabatic demagnetization, the salt used is

   a) diamagnetic b) ferromagnetic c) ferrimagnetic d) paramagnetic

3. Systems which can exchange only energy with the surroundings are called

   a) open system b) closed system d) isolated system d) ideal system

4. For a perfect gas undergoing adiabatic process the relation between pressure and temperature is

   a) $T^{\gamma}P^{1-\gamma}$ = constant b) $T^{\gamma}P^{r}$ = constant

   b) $T^{1-\gamma}P^{1-\gamma}$ = constant d) $T^{1-\gamma}P^{\gamma}$ = constant

5. The mean free path `λ' is proportional to

   a) square of the absolute temperature b) square root of the absolute temperature

   c) cube of the absolute temperature d) absolute temperature

6. The relation between entropy and thermodynamic probability is

   a) S= K log w b) S=K/[log w] c) S=w log K d) S=log [KW]

7. In quantum statistics, the voltage of phase cells is

   a) h^2 b) h c) h^3 d) $1/h^3$

8. C_p of a gas is $5/2\,R$. The value of C_v would be

   a) $\frac{3}{2}R$ b) $\frac{5}{2}R$ c) $\frac{-3}{2}R$ d) $\frac{1}{2}R$

..2..

9. In B-E statistics, the particles are always
   a) distinguishable b) undistinguishable
   c) sometime indistinguishable d) sometimes distinguishable

10. The first law of thermodynamics is given by
   a) $dQ = du - dw$ b) $dQ = du + dw$
   c) $dQ = -du + dw$ d) $du = dQ + dw$

11. In F-D statistics, the particles are characterized by
   a) symmetric wave function only
   b) asymmetric wave function only
   c) skew symmetric wave function
   d) both symmetric and anti symmetric wave functions

12. In Stefan's law, the rate of emission of radiant energy by unit area of a perfectly black body is directly proportional to
   a) T b) T^3 c) T^2 d) T^4

13. The efficiency of a reversible engine
   a) depends upon the temperature of source only
   b) depends upon the temperature of sink only
   c) depends upon neither the temperature of the source nor the temperature of the sink
   d) depends upon both the temperature of source and sink only

14. The kinetic energy associated with each degree of freedom is
   a) $\frac{1}{2}T$ b) $\frac{1}{2}KT^2$ c) $\frac{1}{2}KT$ d) $\frac{3}{2}KT$

15. The transport phenomena occur
   a) only in equilibrium state of a gas
   b) only in non-equilibrium state of a gas
   c) is both equilibrium and non-equilibrium states of a gas
   d) is quasi static equilibrium of a gas.

II. STATE WHETHER TRUE OR FALSE:

16. In an adiabatic process temperature changes are bound to occur.
17. P,V,T and S are thermodynamic potentials.
18. A blackbody is radiating heat at a temperature T. If its temperature is doubled, the total energy radiated is also doubled.
19. A collection of large number of identical independent system is called an ensemble.
20. The SI unit of Boltzmann's constant are $J/^{\circ}K$

III. FILL IN THE BLANKS:

21. When a gas is suddenly compressed its temperature ……
22. Heat engines are devices which are used to convert heat energy into ……
23. Good absorbers are good ……. ..2..

24. In F.D. statistics, the particles have …… spin.
25. The statement of unattainability of absolute zero is called …… law of thermodynamics.

IV. ANSWER IN ONE OR TWO SENTENCES:

26. Define adiabatic process.

27. Define Phase space.

28. What is RMS velocity?

29. What do you mean by degrees of freedom?

30. Give an example for irreversible process.

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