VITHALBHAI PATEL & RAJRATNA P.T.PATEL SCIENCE COLLEGE
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T.Y.B.Sc (Sem-5)

Physics: USO5CPHY04

Date: 04/10/2013, **03:30pm to 5:00 pm**

Day: Friday **Total marks: 30**

Q-1. Multiple choice question **06**

(1) Helmholtz function is given by
(a) H=U+W (b) G = h - TS
(c) h = U + PV (d) F = U -TS

(2) In second order phase trasition process
(a) Change in heat, entropy and volume.
(b) No change in heat, entropy and volume.
(c) Change in heat but not change in entropy and volume.
(d) No change in heat but change in entropy and volume.

(3) The stirling formula is $\ell n\, N\, !$=.....
(a) $N\, \ell n(\frac{\ell}{N})$ (b) N $\ell nN - N$
(c) N $\ell n\, n$ (d) e $\ell n\, (\frac{N}{e})$

(4) For a system of a large number of identical particles, the concept of ensemble average was introduced by
(c) Plank (b) Kelvin
(c) Hamilton (d) Gibbs

(5) In micro canonical ensemble
(a) Neither exchange energy nor particle.
(b) Exchange of energy but not particle.
(c) Exchange of both particle and energy.
(d) Exchange particle but not energy.

(6) Mean kinetic energy of a particle per degree of freedom is.....
(a) $<E> = \frac{3}{2}kT$ (b) $<E> = \frac{3}{2}kT$
(c) $<E> = \frac{1}{2}kT$ (d) none of above

Q-2. Short Question [Attempt any three] **06**

(1) State first law of thermodynamics.
(2) State Nernst's heat theorem.
(3) Explain equal a priori probability.
(4) Explain phase space.
(5) Explain canonical ensemble.
(6) Write canonical partition function for quantum and classical statistics.

Q-3 Derive Ehrenfest's equation in cases of second order phase transition. **06**

OR

Derive clausius clapeyron's latent heat equation **06**

$$\frac{dp}{dT} = \frac{L}{T\,(v_2 - v_1)}$$

Q-4 What is Gibbs paradox in microcanonical. ensemble ? How it is removed. **06**

OR

State and prove Liouville's theorem. **06**

Q-5 Derive an expression for grand canonical distribution of asystem in quantum and classical statistics. **06**

OR

Derive an expression for Maxwell distribution of velocities of a particles. **06**