Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name : Introduction to Statistical Mechanics and Plasma Physics

Subject Code :4SC06SMC1 Branch :B.Sc. (Physics)

Semester : 6 Date :11/05/2016 Time :02:30 To 05:30 Marks :70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) What is main aim of statistical mechanics? 01
b) Define: ensemble. 01
c) What is macroscopic state? 01
d) Define: microscopic state. 01
e) What is phase space? 01
f) Write equation of ensemble average. 01
g) Define: microcanonical ensemble. 01
h) Define: grandcanonical ensemble. 01
i) Write equation of microcanonical average. 01
j) Write Sackur-Tetrode formula for entropy of a perfect gas. 01
k) What is plasma? 01
l) What is recombination for plasma? 01
m) How many types of collision of particles? Write their names. 01
n) What is photo-ionization? 01

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a) Derive the expression of grand canonical partition function. 04
b) Explain Gibbs paradox. 05
c) Write short note on equal a priory probability. 05

Q-3 **Attempt all questions** **(14)**

a) Explain in detail Liouville's theorem. 07
b) Explain in detail entropy of a perfect gas in a microcanmopnical ensemble. 07

Q-4 **Attempt all questions** **(14)**

a) Describe canonical distribution in detail and obtain formula of the canonical partition function of the system. 07

b) Discuss condition for applicability of Maxwell-Boltzmann distribution. 07

Q-5 **Attempt all questions** **(14)**

a) Explain Maxwell-Boltzmann velocity distribution law. 07

b) Distinguish Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein systems. 07

Q-6 **Attempt all questions** **(14)**

a) Explain applications of plasma. 07

b) Discuss in detail production mechanism of plasma. 07

Q-7 **Attempt all questions** **(14)**

a) Discuss excitation and dissociation of atoms and molecules. 05

b) Explain plasma oscillations. 05

c) Discuss electrical conductivity of plasma. 04

Q-8 **Attempt all questions** **(14)**

a) Discuss dielectric properties of plasma. 05

b) Describe Nernst's heat theorem. 05

c) Write short note on cyclotron radiation of plasma. 04