C. U. SHAH UNIVERSITY
Summer Examination-2022

Subject Name: Statistical Mechanics and Plasma Physics

Subject Code: 4SC06SMP1   **Branch: B.Sc. (Physics)**

Semester: 6   **Date: 06/05/2022**   **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)	Define Phase space.	01
b)	Define Plasma.	01
c)	Define Ensemble.	01
d)	What do you mean by thermodynamic probability?	01
e)	What do you understand by microscopic state?	01
f)	What is coordinate system?	01
g)	What is entropy?	01
h)	What is recombination phenomenon?	01
i)	What are the types of statistical mechanics?	01
j)	What is the volume of phase space cell?	01
k)	What is non equilibrium condition?	01
l)	Give distribution of two distinguishable particle in 2 identical boxes.	01
m)	How to produce external filed for ionization of gases.	01
n)	Define Radiation.	01

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

Q-2	**Attempt all questions**	**(14)**
a)	Explain briefly, Macroscopic and Microscopic states in statistical mechanics	**06**
b)	Explain Maxwell Boltzmann energy distribution law.	**08**

Q-3	**Attempt all questions**	**(14)**
a)	Explain Stirling approximation.	**07**
b)	Explain micro canonical ensembles.	**07**

Q-4	**Attempt all questions**	**(14)**
a)	Write down all postulates of statistical mechanics.	**07**
b)	Explain: Size of phase space cell and volume in phase space.	**07**

Q-5   **Attempt all questions**   **(14)**
     a) What is Liovilles theorem? Explain.   **07**
     b) What is Gibbs Paradox? Explain.   **07**

Q-6   **Attempt all questions**   **(14)**
     a) State and explain the methods for production of plasma.   **07**
     b) What is Fermi Dirac distribution law? Explain in details.   **07**

Q-7   **Attempt all questions**   **(14)**
     a) What is Nernst's heat theorem, Explain?   **07**
     b) Explain the additive property of Entropy.   **07**

Q-8   **Attempt all questions**   **(14)**
     a) Discuss applications of Plasma.   **07**
     b) Explain Maxwell Boltzman distribution of speed.   **07**