

Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name: Thermal Physics and Statistical Mechanics

Subject Code: 4SC03TPS1

Branch: B.Sc. (Chemistry, Physics)

Semester: 3

Date: 20/03/2019

Time: 2:30 To 5:30

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 Macroscopic State.
- b) Define Entropy.
- c) What are bosons?
- d) Define Mean free path.
- e) Give the statement of Equipartition theorem.
- f) What is a Carnot cycle?
- g) Define Compressibility.
- h) State the Second law of thermodynamics based on Entropy.
- i) Which Statistics is followed by Fermions?
- j) Name the two types of quantum statistics.
- k) What do you mean by Temperature?
- l) Define Microscopic state.
- m) State the Zeroth law of thermodynamics.
- n) What is Phase space?

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

Q-2 Attempt all questions (14)

- a) Write a note on the applications of First law of thermodynamics. (05)
- b) Draw the Temperature-Entropy diagram and explain the same. (05)
- c) Explain in detail the third law of thermodynamics. (04)

Q-3 Attempt all questions (14)

- a) State and explain the Carnot Theorem in detail. (07)
- b) Compare Reversible and Irreversible process. (04)
- c) Define C_p and C_v . State the relation between them. (03)

Q-4 Attempt all questions (14)

- a) Derive the Maxwell- Boltzmann distribution law. (07)
- b) Derive the Maxwell's relation for thermodynamics. (07)

Q-5 Attempt all questions (14)

- a) Derive the Fermi-Dirac distribution law. (07)
- b) Write a note on Work-done during an adiabatic process. (04)



- c) Compare the three different statistics. (03)
- Q-6** **Attempt all questions** (14)
- a) Differentiate between macroscopic and microscopic states. (05)
- b) Derive the Tds equation. (05)
- c) Explain the law of Equipartition of energy. (04)
- Q-7** **Attempt all questions** (14)
- a) Explain transport phenomena in detail. (06)
- b) Write a note on Work-done during an isothermal process. (04)
- c) Elaborate Phase space in detail. (04)
- Q-8** **Attempt all questions** (14)
- a) Derive Maxwell's law of distribution of velocity and give its experimental verification. (07)
- b) Write short note on Clausius- Clapeyron relation. (04)
- c) Explain briefly Gibb's Enthalpy in detail. (03)

