

Enrollment No: _____

Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2020

Subject Name: Thermal Physics and Statistical Mechanics**Subject Code: 4SC03TPS1****Branch: B.Sc. (Chemistry, Physics)****Semester : 3****Date : 05/03/2020****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) Give Max Plank's statements of second Law of Thermodynamics. 1
- b) Define Heat energy. 1
- c) System of N particles in Phase Space represented by which dimensions. 1
- d) Define Enthalpy. 1
- e) Define Degree of Freedom of a system. 1
- f) Give the Plank's Law which is bridge between Statistical Mechanics and Thermodynamics. 1
- g) What is meant by Mean free path? 1
- h) Give the first TdS Equation. 1
- i) Boson particle follows which Statistics? 1
- j) Give the total no of ways of obtaining distribution of the $n_1, n_2 \dots n_l$ particles among the states with energies $E_1, E_2, \dots E_l$ respectively according to Maxwell Boltzmann's Law. 1
- k) Define Joule- Thompson Effect. 1
- l) Define Viscosity. 1
- m) Give classification of Quantum Statistics. 1
- n) What are Fermions? 1

Attempt any four questions from Q-2 to Q-8**Q-2 Attempt all questions (14)**

- a) Explain in details application of First Law of Thermodynamics. 5
- b) Explain in details relation between Entropy and Thermodynamic probability. 5
- c) Explain in details Works-done during an adiabatic process. 4

Q-3 Attempt all questions (14)

- a) Derive Maxwell's relation for Thermodynamics. 6
- b) Give comparison of three Statistics. 4
- c) Derive relation between C_p-C_v . 4

Q-4 Attempt all questions (14)

- a) Define Carnot cycle and Explain in details Carnot Theorem with diagram. 7



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| | b) | Explain in details Bose Einstein Distribution Law. | 7 |
| Q-5 | | Attempt all questions | (14) |
| | a) | Explain in detail Fermi-Dirac Distribution Law. | 7 |
| | b) | Write a short note on Phase Space. | 4 |
| | c) | Derive relation of C_p/C_v using TdS equations. | 3 |
| Q-6 | | Attempt all questions | (14) |
| | a) | Explain in details Reversible and Irreversible process of Thermodynamics. | 5 |
| | b) | Explain in details Temperature-Entropy diagram. | 5 |
| | c) | Explain Transport Phenomena in short. | 4 |
| Q-7 | | Attempt all questions | (14) |
| | a) | Derive Maxwell's Law of Distribution of Velocity and give its experimental verification. | 7 |
| | b) | Write a short note on Clausius- Clapeyron relation. | 4 |
| | c) | Explain in details Law of Equipartition of Energy. | 3 |
| Q-8 | | Attempt all questions | (14) |
| | a) | Explain Macroscopic and Microscopic states in details. | 5 |
| | b) | Explain in details work-done during Isothermal process. | 5 |
| | c) | Write a short note on Third Law of Thermodynamics. | 4 |

