Seat No. _____ **Enrollment No._____**

C. U. SHAH UNIVERSITY

M. Sc. Semester-II (Regular/ Remedial)

Examination may-2015

Subject Name: Quantum Mechanics-II and Statistical Mechanics

Subject Code: 5SC02PHC4 **Maximum Marks: 70**

Instructions:
1. Attempt all questions.
2. Make suitable assumption wherever necessary.
3. Figures to the right indicate full marks.
4. Draw figure / Diagram wherever necessary.

Section – I Marks

Q-1 Do as Directed.(All Questions are compulsory) (07)

a) Define phase shift? (02)
b) Give definition of Partial wave. (02)
c) Gives the formula of the scattering amplitude. (01)
d) Give the unit of scattering cross-section? (01)
e) Gives the formula of the total scattering cross section (σ). (01)

Q-2 Answer the following in detail.

a) Discuss in details scattering amplitude in terms of phase shift. (05)
b) Explain wave mechanical picture of scattering and obtain the formula of the scattering amplitude. (05)
c) Explain in details screened coulomb potential. (04)

OR

Q-2 Answer the following in detail.

a) Write a short note on optical theorem. (05)
b) Explain validity of Born Approximation. (05)
c) Explain kinematics of scattering process. (04)

Q-3 Answer the following in detail.

a) What is Green's function? Derive formal expression for scattering amplitude. (07)
b) Explain in details EIKONAL approximation. (07)

OR

Q-3 Answer the following in detail.

a) Explain in details Born approximation. (07)
b) Give the relation between phase shift and potential. Derive the expression for the phase shift. (07)

Section – II

Marks

Q-4 Do as Directed.(All Questions are compulsory) (07)

a) Which substance is remains a liquid at absolute zero? (01)
b) Define Grand partition function of N-particles. (01)
c) Gives statement of Nernst theorem. (02)
d) What is super fluid? Give any example of it. (02)
e) Give the name of identical particles in Bose and Fermi systems. (01)

Q-5 Answer the following in detail.

a) Discuss in details the postulate of Quantum-statistical mechanics. (05)
b) Gives derivation of thermodynamics Quasistatic system in detail. (05)
c) Why liquid Helium does not solidify? (04)

OR

Q-5 Answer the following in detail.

a) Discuss in details the postulate of Classical-statistical mechanics. (05)
b) Explain Gibb's paradox in details. (05)
c) Explain Third law of thermodynamics. (04)

Q-6 Answer the following in detail.

a) Explain Canonical Ensemble in details. (07)
b) Explain Ising model in details. (07)

OR

Q-6 Answer the following in detail.

a) Explain in details theory of classical Ideal gas. (07)
b) Explain Equipartition theorem in details. (07)
