Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name : Quantum Mechanic-II and Statistical Mechanics

Subject Code :5SC02PHC4 Branch : M.Sc. (Physics)

Semester : 2 Date : 11/05/2016 Time : 10:30 To 01:30 Marks :70

Instructions:

(1) Use of Programmable calculator and 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.

SECTION – I

Q-1 **Attempt the Following questions** **(07)**

a. Define: phase shift. **02**
b. Give the name of identical particles in Bose and Fermi systems. **02**
c. Write formula of the scattering amplitude. **01**
d. Write unit of scattering crosssection. **01**
e. Write formula of the total scattering cross section (σ). **01**

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

a. Discuss scattering amplitude in terms of phase shift. **05**
b. Explain optical theorem. **05**
c. Discuss screened Coulomb potential. **04**

OR

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

a. Describe wave mechanical picture of scattering and obtain the formula of the scattering amplitude. **05**
b. Explain validity of Born approximation. **05**
c. Describe Born series. **04**

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

a. Define: Green's function. Derive formal expression for scattering amplitude. **07**
b. Describe in detail EIKONAL approximation. **07**

OR

Q-3 **a.** Discuss in brief Born approximation. **07**
b. How phase shift and potential are correlated with each other? Derive the expression for the phase shift. **07**

SECTION – II

Q-4		**Attempt the Following questions**	**(07)**
	a.	Define: most probable average values.	**02**
	b.	Define: entropy.	**02**
	c.	Define: Grand partition function of N-particles.	**02**
	d.	Which model is useful to study the structure of the ferromagnetic substance?	**01**
Q-5		**Attempt all questions**	**(14)**
	a.	Discuss postulate of classical-statistical mechanics.	**05**
	b.	Describe in brief microcanonical ensembles.	**05**
	c.	Explain derivation of thermodynamic quasistatic system.	**04**
		OR	
Q-5		**Attempt all questions**	**(14)**
	a.	Explain Gibbs paradox.	**05**
	b.	Discuss postulate of quantum-statistical mechanics.	**05**
	c.	Describe canonical ensembles.	**04**
Q-6		**Attempt all questions**	**(14)**
	a.	How equivalence of the Ising model used for study of the liquid gas and binary alloys? Discuss in brief.	**07**
	b.	Why helium does not solidify? Discuss Tizza's two fluid model.	**07**
		OR	
Q-6		**Attempt all Questions**	**(14)**
	a.	Discuss in brief microcanonical ensembles for ideal gases.	**07**
	b.	Describe in brief energy fluctuations in the canonical ensemble.	**07**