SCHOOL OF SCIENCES

UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)

उत्तराखण्ड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल)

M.Sc. Physics (MSCPHY13)

First Year Assignment

Last Date of Submission: 15 May 2015

Course Title: Statistical Mechanics and Quantum mechanics — Course Code: PHY-502

Year: 2014-15 — Maximum Marks: 40

Section A

Section A contains 08 short answer type questions of 5 marks each. Students are required to answer 4 questions only. Answers of short answer type questions should be 250 words approximately.

1- Define an ensemble, its types and give the applications.
2- Explain Maxwell-Boltzmann statistics and Maxwell distribution function.
3- Define B-E statistics and derive the distribution function.
4- State and prove properties of Pauli spin matrices.
5- Derive the recursion relation for the total angular momentum operator for a system of two particles.
6- Explain the principle of time independent perturbation theory.
7- What is Stark Effect in hydrogen atom?
8- Explain how Klein Gordon equation leads to positive and negative probability density values.

Section B

Section B contains 04 long answers type question of 10 marks each and students are required to answers 02 questions only.

1. Explain various types of equilibrium. Define various thermodynamic parameters.
2. Deduce Schrödinger time independent and time dependent equation. Give the physical significance of wave function.
3. By using Schrödinger wave equation solve the hydrogen atom problem, and explain quantum mummers.
4. What is WKB approximation method? Explain α decay by WKB approximation.