



UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)

उत्तराखण्ड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल)

M.Sc. Physics (MSCPHY12)

First Year Assignment

Last Date of Submission: 15 May 2013

Course Title: Statistical Mechanics and  
Quantum mechanics

Course Code: PHY-502

Year: 2012-13

Maximum Marks: 40

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.

### Section A

- 1- Define three types of ensemble.
- 2- State and prove Liouville's theorem.
- 3- What is partition function? Express thermodynamic quantities through partition function.
- 4- State and prove Boltzmann equipartition theorem.
- 5- Define wave function and operators.
- 6- Find the solution of wave equation for a particle moving in one dimensional potential step.
- 7- Explain WKB method and application of WKB method in  $\alpha$  decay.
- 8- Explain Fermi Golden rule and time dependent perturbation theory.

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

### Section B

1. Define B-E statistics and arrive at the distribution function.
2. Deduce Schrodinger time dependent and independent wave equations.
3. Solve the Schrödinger equation of H atom and derive the eigen values and eigen function.
4. Explain briefly the principle of time independent perturbation theory and Stark effect in hydrogen atom.