M. Sc. II Year		MPH-C301			Semester-II
		STATISTICAL MECHANICS			
Total Lectures	Time Allotted for End Semester Examination	Marks Allotted for Continuous Assessment	Marks Allotted for End Semester Examination (ESE)	Maximum Marks (MM)	Total Credits
60	**3 Hrs**	**30**	**70**	**100**	**04**

NOTE: The question paper shall consist of three sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of 6 marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllbus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT-I

BASIC PRINCIPLES OF STATISTICAL MECHANICS

Thermodyanamic potentials, Thermodynamic equilibria, Nernst's heat theorem, Chemical potential, Phase space, Ensembles, Density distribution of phase space, Liouville's theorem, Microstate and macrostates, Thermodynamical probability, Most probable distribution, Maxwell-Boltzmann disitribution law, Law of equipartition of energy. **(12 Lectures)**

UNIT-II

METHODS OF ENSEMBLES

Microcanonical ensemble- Perfect gas in microcanonical ensemble, Entropy, Gibbs Paradox, Partition function and its correlation with thermodynamic quantities, Canonical Ensemble- Thermodynamic function and partition functions, Grand canonical ensemble- Thermodynamic function and partition functions, Theory of imperfect gases, Equation of state and virial co-efficients. **(12 Lectures)**

UNIT-III

THEORY OF IDEAL GAS

The ideal quantum gas, Bose-Einstein statistics, Fermi-Dirac statistics and Maxwell-Boltzmann statistics, Evaluation of constants α and β and their thermodynamic interpretation, Black body radiation and Planck's radiation, Grand canonical ensemble and the quantum statistics. **(12 Lectures)**

UNIT-IV

IDEAL B/E GAS

Energy and pressure of a gas, Gas degeneracy, Bose-Einstein condensation, Thermal properties of B/E gas, Liquid He, Landau's theory of liquid He-II, Feyman's theory of liquid He-II. **(12 Lectures)**

UNIT-V

IDEAL FERMI GAS

Energy and pressure of a gas, Weakly degenerate and strongly degenerate, Thermodynamic functions of degenerate F/D gas, Electron gas, Pauli theory of paramagnetism and Landau diamagnetism, White Dwarfs , Neutron stars. **(12 Lectures)**

Text Books / Reference Books

1. Statistical Mechanics – R. K. Pathria
2. Statistical Mechanics – K. Huang
3. Statistical Physics - E.S. R. Gopal
4. Theoretical Chemistry - Glasstone
5. Statistical Mechanics - S.K. Sinha
6. Statistical and Thermal Physics- F. Reif
7. Statistical Mechanics - Landau & Lifshitz
8. Introduction to Statistical Physics – Pointon