

Master of Science (Physics)
Second Semester Main Examination, June-2021
Quantum Mechanics-II [MSP201T]

Time: 3:00 Hrs

Max Marks 85

Note: Attempt all questions. Question no.1 to question no.4 has two parts.
Part A is 10 Marks and Parts B is 7 Marks.

- Q.1** (a) Describe the Schrodinger Perturbation of non-degenerate and degenerate levels.
(b) Explain application to perturbation of an Oscillator .

OR

- (a) Explain Variation method and its application to ground state helium.
(b) Write application to theory of alpha decay.

- Q.2** (a) Describe methods of variation constants and transition probability.
(b) Explain wave equation for a system of change particles.

OR

- (a) Explain absorption and induced emission.
(b) Explain Einstein's A&B coefficients and transition probability.

- Q.3** (a) Explain theory of scattering.
(b) Explain born approximation & partial waves.

OR

- (a) What do you understand by perfectly rigid sphere.
(b) Explain Pauli's spin matrix.

- Q.4** (a) Explain Klein Gordon equation.
(b) Explain electromagnetic field hydrogen atom.

OR

- (a) Describe negative energy states.
(b) Explain hyperfine splitting.

- Q.5** (a) Describe WKB approximation method.
(b) Explain external electromagnetic field

OR

- (a) Describe scattering by spherically symmetrical potential.
(b) Explain Dirac relative equation in electromagnetic field

Master of Science (Physics)
Second Semester Main Examination, June-2021
Statistical Mechanics [MSP202T]

Time: 3:00 Hrs

Max Marks 85

Note: Attempt all questions are compulsory. All questions carry equal marks.

- Q.1** (a) Describe specification of states of a system.
(b) Explain classical ideal gas in ropy of mixing & Gibbs paradox.

OR

- (a) Explain Micro conical ensemble.
(b) What do understand partition function.

- Q.2** (a) Describe Maxwell Boltzmann theory.
(b) Explain Fermi Dirac & Bose-Einstein statistics.

OR

- (a) Bose-Einstein condensation.
(b) Write properties of ideal Fermi gas.

- Q.3** (a) Explain the cluster expansion for a classical gas.
(b) Explain Virial equation of state.

OR

- (c) Mean field theory of using model in 3 dimension.
(d) Explain exact solution in one dimension.

- Q.4** (a) Describe expansion of a classical gas.
(b) Explain Brownian motion.

OR

- (a) Describe thermodynamics fluctuation.
(b) Explain Langevin theory.

- Q.5** (a) Describe energy and density fluctuation.
(b) Write Boltzmann transport equation.

OR

- (a) Write Onsager reciprouity relation.
(d) Describe Fokker Pauk equation.

Master of Science (Physics)
Second Semester Main Examination, June-2021
Electrodynamics and Plasma Physics [MSP203T]

Time: 3:00 Hrs

Max Marks 85

Note: Attempt all questions. Each Question has 2 parts. Part A is 10 marks and part B is 7 marks.

- Q.1 (a) Write basic of electrostatics and Magnetostatics.
(b) Describe Biot Sawart law .
- OR
- (a) Explain Maxwell's equations.
(b) Discuss Lorentz gauge.
- Q.2 (a) Explain review of four vector and Lorentz transformation in 4 dimensional Spaces.
(b) Describe realistic transformation properties, of E & H fields.
- OR
- (a) Describe electromagnetic fields tensor in in 4 dimensional Maxwell Equation.
(b) Explain Covariance of Electrodynamics.
- Q.3 (a) Explain Elementary concept of occurrence of plasma.
(b) Write Production of gaseous and solid state plasma.
- OR
- (a) Describe plasma parameters.
(b) Explain Electrical neutrality in a plasma.
- Q.4 (a) Describe by magnetic hydro-static Pressure hydrodynamic waves.
(b) Explain magneto sonic and Alfven waves.
- OR
- (a) Describe orbits and drift motion in plasma.
(b) Explain experimental study of plasma.
- Q.5 (a) Describe field of charged particle at law velocity and high velocity.
(b) Describe plasma Oscillations.
- OR
- (a) Explain Transverse Oscillators & Longitudinal Oscillators.
(b) Explain Coulomb Gauge.

Master of Science (Physics)
Second Semester Main Examination, June-2021
Atomic & Molecular Physics [MSP204T]

Time: 3:00 Hrs

Max Marks 85

Note: Attempt all questions. All Questions carry equal marks.

- Q.1** (a) What are equivalent and non equivalent electron.
(b) What are the spectral terms and equivalent electrons example.

OR

- (a) Write the Thomas Fermi model.
(b) What are Hartree orbitals and hartree fock accurate.

- Q.2** (a) Difference between hartree and hartree fock method.
(b) Why is hyperfine splitting smaller than fine splitting.

OR

- (a) What is Classical Mechanics symmetric top.
(b) What is difference between rigid and non rigid rotator.

- Q.3** (a) Which type of diatomic molecules gives Vibration Spectra.
(b) How do you Calculate Vibration energy.

OR

- (e) What is Spectroscopy qualitative or quantitative.
(f) What is IR Spectroscopy used to determine.

- Q.4** (a) What is Ultraviolet and their used for.
(b) What is difference between rotational and Vibration Spectroscopy.

OR

- (a) What is instrumentation techniques in a lab & instrumentation is important.
(b) What is the Principle of Photoelectron Spectroscopy.

- Q.5** (a) Write the types of Photoelectron Spectroscopy & their application.
(b) Definition of PQ & R branches in vibrational rotation spectra.

OR

- (a) What is Vibration energy level.
(d) What is isomer shift in Mossbauer Spectroscopy & their uses.