TIME : 3 Hrs   **MAX. MARKS: 75**

Class: I M .Sc Physics   Semester-II   Sub. Code: P8PYE201

Subject Name: ADVANCED SPECTROSCOPY

PART - A (5 X6 = 30 MARKS)

Answer ALL Questions

1. (a) How many normal modes would you expect to be observed in the infrared absorption spectra of H_2O and CO_2? Diagram the Normal modes.

(Or)

(b) Draw the block diagram of IR spectrophotometer Instrumentation and explain.

2. (a)Explain the Quantum theory of Raman Scattering.

(Or)

(b) Explain the structure determination using IR and Raman spectroscopy.

3. (a) Explain chemical shift in CH_3CHO and CH_3CH_2OH.

(Or)

(b) The ^{14}N resonance of a compound showed 3 lines at 5.997, 3.501 &2.496 MHz. Calculate the quadrapole coupling constant e^2qQ/h and η.

4. (a)Discuss in detail about anisotropic g-factors system.

(OR)

(b) What is triplet state? Write a note on $\Delta m_s = \pm 2$ transition

5. (a)Draw the block diagram of the experimental setup used for observation of CARS and explain its working.

(OR)

(b)Explain the experimental technique and discuss why multichannel is preferred to single channel in Hyper Raman effect.

PART - B (3 X 15 = 45 MARKS)

Answer any THREE Questions

6. Explain the effect of anharmonicity on the vibrations of diatomic and polyatomicmolecules of IR. Explain its example.

7. Explain with block diagram the functioning of Raman Spectrometer and explain the Resonance Raman Scattering.

8. Derive Bloch Equation and explain the variation of susceptibility with an energy level diagram.

9. With a block diagram explain a Mossbauer spectrometer and explain the isomer chemical shift.

10.Explain the working of LMR with neat diagram.

[Mr. AAB&GSF]   (02-Copies)

TIME : 3 Hrs   **MAX. MARKS: 75**

Class: IM.Sc Physics   **Semester-II**   **Sub. Code: P8PY2003**

Subject Name: QUANTUM MECHANICS II

PART –A(5 X 6 = 30 MARKS)

Answer ALL Questions

1. (a) Discuss scattering cross section and amplitude.

(Or)

 (b) Write general expression of phase shift of lth partial wave.

2.(a) Obtain Fermi golden rule from the time dependent perturbation theory.

(Or)

 (b) Write short notes on sudden approximation

3. (a) Find out the Dirac matrix $\alpha_x, \alpha_y, \alpha_z$ and β.

(Or)

 (b) Write the magnetic moment of an electron due to spin as obtained by

   Dirac's equation.

4. (a) Describe the Covariant form of Dirac equation

(Or)

 (b) Write the properties of γ- matrices

5. (a) Derive the Klein-Gordon equation and mention the difficulties of the

equation in second quantization.

(Or)

 (b) Discuss creation and annihilation operators.

PART - B (3 X 15 = 45 MARKS)

Answer any THREEQuestions

6.Relate the laboratory and centre of mass coordinates systems for a
 scattering process.

7. Develop the semi classical radiation theory and use it to determine
 the conditions for allowed transitions

8. Obtain plane wave equations of the Dirac equation for a free particle.
 Explain the negative energy state

9. Discuss the Feynman`s theory of positron.

10. Discuss the second quantization of Schrodinger field.

[Mr. GSF]   (02-Copies)

Time: 3 Hrs   **Max. Marks: 75**

Class: I M.Sc Physics   **Semester II**   **Sub. Code: P8PY2001**

STATISTICAL MECHANICS

SECTION-A (5 X 6 = 30 Marks)
Answer ALL the Questions

1. (a)Discuss First law, Second law and third law of thermodynamics. Explain its entropy.

(OR)

(b)Discuss Gibb's phase rule. Mention some of its applications.

2. (a)What do you mean by the term phase space, ensemble, microstates and macro states?

(OR)

(b)Give the theory of Gibb's paradox.

3. (a) Show that Black body radiation phenomena are explained on the basis of ideal Bose gas

(OR)

(b)Derive the Richardson-Dushmann equation for thermionic emission.

4. (a)Calculate the electronic heat capacity of a metal using Fermi-Dirac statistics.

(OR)

(b)Obtain the F-D distribution and discuss thermodynamic properties of Fermi gas.

5. (a).Explain Brownian motionand derive the ILangevian theory

(OR)

(b).Derive the Fokker –plank equation.

SECTION-B (3 X 15 = 45 Marks)
Answer any THREE the Questions

6. Discuss in detail Landau's theory of phase transition.

7. From thermodynamic consideration Obtain expression for Entropy, free energy, chemical potential and thermodynamic potential.

8. Explain Bose- Einstein condensation. Difference between liquid helium I and liquid helium II.

9. Discuss in detail Pauli`s theory of Para magnetism with suitable relation.

10. What is Ising model? Use a suitable approximation method to obtain expressions for entropy and free energy under this model.

————————————

[Mr.PM]   (02 Copies)

TIME : 3 Hrs   MAX. MARKS: 75

Class:I M.Sc Physics   Semester- II   Sub. Code: P8PY2002

Subject Name: ELECTRO MAGNETIC THEORY
PART - A (5 X 6 = 30 MARKS)
Answer ALL Questions

1. (a)Define dielectric polarization. Derive Clausius-Mosotti
      relation for non –polar molecules.

                              (Or)

    (b) Write down the Laplace's equation in Cartesian coordinates
        and obtain its solution.

2. (a) Explain Magnetic scalar and vector potential of alocalized
      current distribution

                              (Or)

    (b) Obtain the vector and scalar potential of a magnetic field.

3. (a) Derive the Maxwell`s fourth equation and explain the concept of
      displacement current.

                              (OR)

      (b)What are Gauge transformations? Obtain an expression for
        Coulomb gauge.

4.   (a) Explain Poynting vector and radiated power.

                              (OR)

    (b) Explain the terms radiation pressure and electromagnetic momentum.

5.   (a) ExplainTEM waves in coaxial cables.

                              (OR)

    (b) Derive an expression for circular wave guide.

PART - B (3 X 15 = 45 MARKS)

Answer any THREE Questions

6. Define polarization and displacement vectors. Derive an expression for
    the energy of the electrostatic field in the presence of dielectric.

7. Derive an expression for magnetic field intensity at an external point for
    a uniformly magnetised sphere in an external magnetic field.

8. Derive Poynting's theorem and obtain the equation of continuity.

9. Find the power radiated by an oscillating electric dipole and describe its
    angular distribution.

10. Describe the theory of propagation of electromagnetic waves in a
    rectangular wave guide.

[Mr. PM]   (2Copies)

ISLAMIAH COLLEGE [AUTONOMOUS], VANIYAMBADI
CIA TEST II – MARCH 2020

Time: 3 Hrs.   **Max. Marks: 75**
Class: **Sem: II**   **Sub. Code: P8HR2001**

HUMAN RIGHTS
PART – A (5×6 = 30 Marks)
Answer ALL questions

1. (a) Discuss about the important definitions of Human Rights.
      (Or)
   (b) Highlight on the important theories of Human Rights.

2. (a) Write about the Civil and Political Rights enshrined in the
        International Covenant.
                 (Or)
   (b)Describe about the Economic, Social and Cultural Rights
        in the International Covenant.

3. (a) Write about the powers and Functions of the United
        Nations High Commission for Refugees.
                 (Or)
   (b) Discuss about the role of U.N.O. in Safeguarding Human
        Rights.

4. (a) Write about the Helsinki Process.
                 (Or)
   (b)Discuss about the monitoring of Human Rights in Europe.

5. (a) Write a note on the Directive Principles of State policy in
        Indian Constitution.
                 (Or)
   (b) What are the powers and Functions of National Human
        Rights Commission.

PART – B (3×15 = 45 MARKS)
Answer any THREE of the following

6. Trace the historical development of Human Rights.

7. Highlight on the significance of Universal Declaration of
   Human Rights.

8. Discuss about the Powers, Functions and Duties of United
   Nations High Commission for Human Rights.

9. Discuss about the role of Amnesty International in
   Safeguarding Human Rights.

10. Describe in detail regarding the Fundamental Rights
    enshrined in the Indian Constitution.

SB   **07 Copies**