Ref

Reg. No. : .....

D 2100 **Q.P. Code : [D 07 PPH 01]**

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, MAY 2013.

First Year

Physics

CLASSICAL MECHANICS AND MATHEMATICAL PHYSICS

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

$(5 \times 20 = 100)$

1. (a) Derive the Lagrangian equations for the particle moving under the influence of a central force.

   (b) Obtain the equation of motion using Poisson brackets.

7. (a) State and Prove schwarts Inequality.

(b) Find the laplace transform of cos at and cosh at.

8. (a) Give the theory of small Oscillations for a two coupled harmonic oscillator.

(b) Find the moment of Inertia of a rod of length 2a and mass M abent a perpendicular line through one end.

Reg. No. : .....

D 2101 Q.P. Code : [D 07 PPH 02]

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, MAY 2013.

First Year

Physics

QUANTUM MECHANICS

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

(5 × 20 = 100)

1. (a) Explain first order stark effect in Hydrogen using the stationary state.

   (b) Explain the WKB approximation.

2. (a) Applying Born's approximation, evaluate the scattering amplitude and hence the differential cross section.

   (b) Explain harmonic perturbation and Fermi Golden Rule.

3. (a) Obtain the Energy values of one dimensional Linear Harmonic Oscillator.

   (b) Obtain the Equation of motion in schrodinger picture.

4. (a) Obtain the Eigen values of total angular momentum J^2 and J_z.

   (b) Derive the Dirac Relativistic Equation for a free particle.

5. (a) Deduce the expression for scattering amplitude in terms of Green's function.

   (b) Explain the Hartree's self consistent field method.

6. (a) Explain the semiclassical theory on radiation. Obtain expression for spontaneous and Induced Emission.

   (b) Discuss the field Quantisation of Non- Relativistic schrodinger Equation.

7. (a) What is hybridisation? Explain SP^3 hybridisation.

   (b) Explain scattering by coloumb and Yukawa potentials.

8. (a) Find out the clebsch Gordon coefficients for

$$J_1 = \frac{1}{2}, J_z = 1.$$

   (b) Obtain the Dirac Relativistic Equation for a free particle.

Reg. No. : .....

D 2102 **Q.P. Code : [D 07 PPH 03]**

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, MAY 2013.

First Year

Physics

ELECTROMAGNETIC THEORY AND OPTICAL PHYSICS

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

(5 × 20 = 100)

1. (a) Derive Clausius – Mosotti Relation.

   (b) Derive the expression for Magnetic Vector Potential.

2. (a) Derive the equation of continuity.

   (b) Derive Maxwell's equation in terms of EM potentials.

3. (a) Explain the Anomalous Dispersion in Liquids and Solids.

   (b) Describe Hanbury Brown Twiss Intensity Interferometer and its working.

4. (a) Explain the propagation of light in crystals.

   (b) Derive the wave equations in step index fibres.

5. (a) Explain the characteristics of a Laser Light. Discuss about Population Inversion.

   (b) Describe the working of Helium – Neon Laser with a neat diagram.

6. (a) Define Electric Potential. Find out the electric potential at a point due to electric dipole.

   (b) Compare between electrostatics and magento statics.

7. (a) Explain the chemical vapour deposition for fibre fabrication.

   (b) Describe the working of Fabry – Perot Interferometer with a neat diagram.

8. (a) Explain the working of Linear Half Wave Antenna.

   (b) Derive Langevin Debye formula for polar molecules.

Reg. No. : .....

D 2103 Q.P. Code : [D 07 PPH 04]

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, MAY 2013.

First Year

Physics

NUCLEAR PHYSICS AND SPECTROSCOPY

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

Answer questions carry equal marks.

(5 × 20 = 100)

1. (a) Describe the working of Bainbridge Mass spectrometer with a neat diagram.

   (b) Explain the pauli's Exclusion Principle and the concept of Hidden variable.

2. (a) Explain Gamow's Theory of Alpha Decay.

   (b) Discuss about Fermic and Gamow Teller transitions.

3. (a) What are schmidt curves? How are they plotted and how far they explain the measured magnetic moments of odd nucler?

(b) Derive the seaborg's expression for Activation energy.

4. (a) Derive Breit Wigner Dispersion Formula.

(b) Explain the Quark structure of Hadnoms.

5. (a) Explain the working of Microwave spectrometer.

(b) Outline the ideas of Rotation vibration Raman spectra of Diatomic molecule.

6. (a) Explain the quantum theory of normal zeeman effect.

(b) Discuss the Hyperfine structure of Spectral Lines.

7. (a) Explain the principle and working of High Resolution NMR Spectrometer.

(b) Outline the general principle of NQR spectroscopy.

8. (a) Describe the working of ESR spectrometer.

(b) Explain the Magnetic Hyperfine and electric quadropole interaction.
