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Reg. No. :

D 1088

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

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 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 × 20 = 100)

1. (a) Obtain the equation of motion in Poisson Bracket.
(b) Describe the Hamilton's characteristic equation.
2. (a) Outline the generalized coordinates for rigid body.
(b) Obtain Euler's equation.

3. (a) Explain the theory of small oscillation of two coupled oscillators.
 (b) Explain the linear triatomic molecule.
4. (a) Solve the Bessel's differential equation.
 (b) Deduce the Rodriguez formula.
5. (a) Derive the Cauchy's Riemann equation.
 (b) Evaluate $\int_C \frac{Z^2+1}{Z^2-1} dZ$ if C is circle of unit radius with centre.

6. (a) Expand $\frac{1}{Z}$ by Taylor series about $Z=1$.
 (b) State and prove Cauchy's Integral theorem.
7. (a) State and prove Schwarz inequality.
 (b) Explain Schmidt orthogonalization process.

8. (a) Obtain the Fourier series for the function.

$$F(x) = \begin{cases} 2x & 0 \leq x \leq \pi \\ x - \pi & \pi \leq x \leq 2\pi \end{cases}$$

- (b) Explain Inverse Laplace Transform and properties.

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First Year

Physics

QUANTUM MECHANICS

Time : Three hours

Maximum : 100 marks

Answer any FIVE questions.

(5 × 20 = 100)

1. (a) Obtain the schroedinger equation by matrix form.
(b) Derive the equation of motion in Heisenberg picture.
2. (a) What is degeneracy? Explain the stark effect in ground state of hydrogen atom.
(b) Derive the expression for adiabatic approximation.

3. (a) Obtain the eigen function of L^2 and L_z .
(b) Derive the dirac equation in electromagnetic field.
 4. (a) Deduce the expression for Born approximation.
(b) Derive the expression for Hartree's self consistent.
 5. (a) Describe the ionization of hydrogen atom.
(b) Explain SP^3 hybridisation.
 6. (a) Explain the emission and absorption Radiation.
(b) Obtain classical Hamiltonian equation.
 7. (a) Discuss the equation of motion in schrodinger picture.
(b) Explain the Dirac equation in central field.
 8. (a) Explain WKB approximation.
(b) Explain Fermi golden rule.
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Reg. No. :

D 1090

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

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M.Sc. DEGREE EXAMINATION, DECEMBER 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) Define electric potential? Find out electric potential at a point due to electric dipole
(b) Deduce Langevin Debye Formula for polar molecules.
2. (a) Explain Biot –Savart Law.
(b) Explain magnetic vector potential.
3. (a) Derive the equation of Lorentz Gauge.
(b) Explain the Brewster's law in a waveguide.

4. (a) Explain Thomson scattering by a free electron.
(b) Explain the working of Fabry Perot interferometer.
 5. (a) Explain Faraday rotation in solids.
(b) Describe the propagation of light in crystals.
 6. (a) Explain acceptance angle and numerical aperture in optical fibre.
(b) Explain fibre losses and dispersion.
 7. (a) Discuss about population inversion.
(b) Explain construction and working of CO_2 laser.
 8. (a) Discuss the characteristics of laser? And Explain laser action.
(b) Explain semiconductor laser.
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D 1091

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

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M.Sc. DEGREE EXAMINATION, DECEMBER 2013.

First Year

Physics

NUCLEAR PHYSICS AND SPECTROSCOPY

Time : Three hours

Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

(5 × 20 = 100)

1. (a) Explain the theories of Nuclear composition.
(b) In a mass spectrometer, charged +ve ion accelerated p.d 1000v which B = 1000 gauss deflected circular path 18.2 cm radius. What is speed, mass of ion?
2. (a) Explain Radioactive decay detail.
(b) Explain the Internal conversion.
3. (a) Explain the Bohr – wheeler theory of fission.
(b) Outline the explanation of Magic numbers.

4. (a) Describe the surface reaction.
(b) Explain the Quark model.
 5. (a) Explain the anomalous zeeman effect.
(b) Explain vibrational rotational spectra of diatomic molecule.
 6. (a) Explain FTIR spectrometer with a diagram.
(b) Explain the working of Laser Raman spectrometer.
 7. (a) Describe the chemical shift in NMR.
(b) Discuss the NQR frequencies.
 8. (a) Describe the working of ESR spectrometer.
(b) Explain the Mossbauer spectrometer.
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