LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

SECOND SEMESTER – **APRIL 2014**

PH 2105/2103 - PHYSICS FOR CHEMISTRY - I

Date : 07/04/2014   Dept. No.   Max. : 100 Marks
Time : 09:00-12:00

PART A

Answer **ALL** the questions $(10 \times 2 = 20)$

1. Define angular velocity and give the relation between linear and angular velocity.
2. What are generalized coordinates? What will be the degrees of freedom of two independent particles moving freely in space?
3. State Newton's law of gravitation.
4. Define Poisson's ratio. What is the maximum possible value of Poisson's ratio.
5. Find the half angular width of the central bright maximum in the Fraunhofer diffraction pattern of slit of width 12×10^{-7}m when the slit is illuminated by monochromatic light of wavelength 6000Å.
6. Plane polarized light passes through a quartz plate with its optic axis parallel to the faces. Calculate the least thickness of the plate for which the emergent beam will be plane-polarized. (Take μ_E=1.5533, μ_0 = 1.5442 and $\lambda = 5 \times 10^{-7}$m).
7. State the postulates of Einstein's special theory of relativity.
8. Define Crystal lattice
9. What are Polaroids? Give any two uses.
10. Lattice constant of copper is 0.38nm. Calculate the distance between (110) planes.

PART – B

Answer any **FOUR** questions $(4 \times 7.5 = 30)$

11. What are Constraints? Explain the types of Constraints with suitable example.
12. State Kepler's laws of planetary motion. Derive Newton's law of gravitation from Kepler's law.
13. a) Show that the work done per unit volume in stretching a wire is equal to ½(stress ×strain).
    b) Calculate the work done in stretching a uniform metal wire of area of cross-section 10^{-6} m^2 and length 1.5m through 4×10^{-3} m. (Take Young's modulus, q=2×10^{11} N/m^2).   (5+2.5)
14. What are Miller Indices? Write the procedure for finding Miller Indices of a given plane.
15. Explain with a neat diagram how Nicol prism be used as a polarizer and an analyser.

PART – C

Answer any **FOUR** questions $(4 \times 12.5 = 50)$

16. Set up the Lagrangian and solve for the equations of motion
    a) for a simple pendulum to find the time period.
    b) for the Atwood's machine.   (7.5+5)
17. Define Escape velocity. Derive an expression for the escape velocity of a body.
18. State Bragg's law. Explain the Powder diffraction experimental method of analysing structure of polycrystalline materials.   (2.5+10)
19. Discuss Fraunhofer diffraction at a narrow single slit.

20. a) Using Stoke's law deduce an expression for the terminal velocity of a spherical ball falling under gravity through a viscous liquid.

b) Define Surface energy. Derive the expression for excess pressure inside a liquid drop.   (7.5+5)