

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – APRIL 2010

PH 2100 - PHYSICS FOR CHEMISTRY

Date & Time: 22/04/2010 / 1:00 - 4:00

Dept. No.

Max. : 100 Marks

PART - A

Answer ALL questions.

(10 x 2 = 20 marks)

1. Draw the graphs of kinetic and potential energy of a particle executing simple harmonic motion.
2. Define moment of inertia of a body about a given axis.
3. State Kepler's laws.
4. Define gravitational field strength.
5. Define Poisson's ratio.
6. A spherical soap bubble of radius 1 cm is blown in air. How much energy will be needed to increase the radius to 3 cm? (surface tension of soap solution is 0.03 N/m.)
7. What is normalization of a wave function?
8. What is the significance of the wave function?
9. On sounding two tuning forks A and B together, 9 beats per second are produced. The frequency of B is 512 Hz. If the prong of A is slightly tapped, the beat frequency decreases. Find the frequency of A.
10. What are nodes and antinodes?

PART - B

Answer any FOUR questions.

(4 x 7.5 = 30 marks)

11. Show that oscillations of a liquid in a U tube are simple harmonic.
12. Explain any two experimental tests of general theory of relativity.
13. Obtain a general expression for excess pressure over curved surface of a liquid.
14. Apply Heisenberg's uncertainty principle to prove the non-existence of electron in the nucleus.
15. (a) Explain Doppler red shift. (3.5)
(b) A source emitting sound of frequency 60 Hz is moving towards a stationary observer with a velocity of 100 m/s. Calculate the apparent frequency of the sound as heard by the observer. (velocity of sound = 330 m/s) (4)

PART - C

Answer any FOUR questions.

(4 x 12.5 = 50 marks)

16. (a) Obtain an expression for the acceleration of a sphere rolling down an inclined plane. (10)
(b) Calculate the angular momentum of an object of mass 3 kg, moving in a circle of radius 6m, with an angular velocity of 4 rad/s. (2.5)
17. (a) With a neat diagram describe Boy's experiment to determine the universal gravitational constant. (9)
(b) When a planet moves in a circular orbit of radius R about the Sun, the centripetal force is provided by the gravitational attraction. Use this to show that the period T of such a planet is given by $T^2 = 4\pi^2 R^3 / GM$. (3.5)
18. Define the three moduli of elasticity q, n, k and obtain the relation connecting these quantities.
19. (a) What are matter waves? (3)
(b) With a neat diagram, describe Davisson and Germer experiment for the study of electron diffraction. (9.5)
20. Explain in detail the method of verifying the laws of transverse vibrations in strings.

