

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI –600 034.
B.Sc., DEGREE EXAMINATION – CHEMISTRY
III SEMESTER – NOVEMBER 2001
PHY 101 PHYSICS FOR CHEMISTRY

10.11.2001
9.00 – 12.00

Max:100 marks

PART – A

Answer All questions.

(10 x 2 = 20 marks)

01. Sketch the graphs of kinetic and Potential energies versus displacement of SHM.
02. Obtain an expression for moment of Inertia of a sphere about its tangent using parallel axis theorem.
03. State Kepler's laws of planetary motion.
04. Explain the principle of equivalence of general theory of relativity.
05. State Hooke's law of elasticity.
06. Explain the molecular theory of surface tension.
07. Calculate the de Broglie wavelength of an electron of energy 2 MeV.
08. Mention the name of any two experiments which establishes matter like nature of waves.
09. Give any two applications of Doppler effect in Sound.
10. Write the overtones of open and closed pipe.

PART – B

Answer any four.

(4 x 7.5 = 30 marks)

11. a) Uniform circular disc of mass 20kg and radius 0.15m is mounted on a horizontal cylindrical axle of radius 0.015m and negligible mass. Neglecting frictional losses in bearings (a) Calculate angular velocity acquired from rest by the application for 12 seconds of a force of 25N tangential to the axle.
b) Calculate the kinetic energy of the disc at the end of the period. (4.5+3)
12. Account for the gravitational redshift by the general theory of relativity.
13. Derive an expression for excess pressure over a curved surface of a liquid. Deduce an expression for the same in the case of a soap bubble.
14. Using Heisenberg's uncertainty principle, explain the stability of hydrogen atom.
15. Obtain an expression for velocity of sound in strings.

PART – C

Answer any four.

(4 x 12.5 = 50 marks)

16. a) Show that Oscillations of a liquid in a U tube is simple harmonic. (4)
b) Obtain an expression for acceleration of a sphere rolling down an inclined plane. You are given solid and Hollow sphere of same mass and radius. Which reaches bottom first? (8.5)
17. a) Describe an experiment for determining the universal gravitational constant 'G' (10)
b) Obtain the value of the escape velocity for an atmospheric particle 1000km above the surface of moon. Given mass of moon = 7.34×10^{22} kg, Radius of the moon = 1.74×10^3 km
 $G = 6.67 \times 10^{-11} \text{ NM}^2/\text{kg}^2$. (2.5)
18. Derive the relation connecting the three moduli of elasticity.
19. Obtain an expression for Co-efficient of viscosity of a liquid by Poiseuille's flow.
20. a) Solve the Schroedinger equation for a particle in a potential well and obtain the eigenvalues and the normalised eigen functions. (9 ½ marks)
b) What do you understand by box normalisation? (3)

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