LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2019**

16/17/18UPH3AL01 – PHYSICS FOR CHEMISTRY - I

Date: 06-11-2019   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

PART A

ANSWER **ALL** QUESTIONS: **(10 x 2 = 20 Marks)**

1. Draw and explain velocity time graph.

2. What is rigidity modulus?

3. Define Poisson's ratio.

4. Find the energy stored in a wire of 5m length and 10^{-3} m in diameter when it is stretched by 3 x 10^{-3} m due to load. Young's modulus of material is 2×10^{11} Nm^{-2}.

5. State Boyle's law.

6. Write Ideal gas equation and explain its significance.

7. What is Unit Cell of crystal lattice?

8. The lattice constant for a unit cell of aluminium is 4.049 Å. Calculate the spacing of (2 2 0) plane?

9. State the postulates of special theory of relativity.

10. According to Einstein's theory of relativity when a mass moving to the speed of light will possess infinite mass, but photons does not exhibit the phenomenon. Why?

PART B

ANSWER ANY **FOUR** QUESTIONS: **(4 x 7.5 = 30 Marks)**

11. Determine the time period of oscillation of a liquid in a U-tube.

12. a) Derive the expression for energy stored in a wire.   **(5)**

    b) Calculate the elastic energy store up in a wire originally 5 metre long and 10^{-3}m in diameter which has been stretched by 3×10^{-4}m due to load of 10 kg   **(2.5)**

13. a) Derive an expression for work done by gas in adiabatic expansion.   **(5)**

    b) A gas has a volume of 0.02 m^3 at a pressure of 2x10^5 Pa and temperature of 27 C.

    It is heated at constant pressure until its volume increases to 0.03m^3. Calculate the external work done.

                                (2.5)

14. State and derive Bragg's law of X-ray diffraction.

15. a) The length of a moving rod is measured to be exactly half its proper length. What is the speed of the rod, relative to the observer at rest?   **(2.5)**

b) Derive Einstein's mass energy equation. **(5)**

16. Derive the expression to determine the angle of contact using Quinke's tube experiment.

PART C

ANSWER ANY **FOUR** QUESTIONS: **(4 x 12.5 = 50 Marks)**

17. Derive the expression for time period of oscillations in simple pendulum.

18. Derive Poiseuille's formula for the rate of flow of liquid through a capillary tube.

19. a) State Avogadro's Hypothesis and hence derive the general gas equation. **(8)**

    b) One litre of an ideal gas at a pressure of 6 atm undergoes an adiabatic expansion until its pressure drops to one atmosphere and volume increases to 2 litre. Find the work done during the process. [γ=1.4]

    (4.5 Marks)

20. a) The lattice constant of a metal with cubic lattice is 2.88 Å. The density of metal is 7200 kg/m^3. Calculate the number of unit cells present in 1 kg of the metal. **(4.5)**

    b) Explain the rotating crystal method to determine the interplanar spacing of a crystal. **(8 Marks)**

21. a) Describe Michelson- Morley experiment and discuss its negative results. **(10)**

    b) How fast would a rocket have to go relative to an observer for its length to be contracted to 99% of its length at rest? **(2.5 Marks)**

22. Obtain the Lorentz transformation equations in relativity.

@@@@@@