LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **MATHEMATICS**

FIRST SEMESTER – **APRIL 2016**

PH 1101 - PHYSICS FOR MATHEMATICS - I

Date: 05-05-2016   Dept. No.   Max. : 100 Marks

Time: 01:00-04:00

PART A

Answer all questions: **(10×2=20marks)**

1. Define angular velocity and give the relation between linear and angular velocity.
2. What are Generalised coordinates?
3. Define Gravitational potential.
4. State Newton's law of gravitation.
5. State Hooke's law
6. A soap bubble 50 mm in diameter contains a pressure $2 \times 10^5 \, N/m^2$. Find the surface tension in the soap film.
7. Simplify $X + \bar{Y}X$.
8. What is a flip flop?
9. Write the postulates of special theory of relativity.
10. What are frames of reference?

Part B

Answer any FOUR questions: **(4×7.5 = 30marks)**

11. (a)Define velocity and acceleration and give their unit.   **(3 marks)**

    (b)Sketch the distance-time graph and velocity – time graph of uniformly accelerated motion.
                                                           (4.5 marks)
12. Define escape velocity. Show that the escape velocity from the surface of the earth is 11 km/s.
13. Derive Poiseuille's formula for the rate of flow of liquid through a capillary tube.
14. With a neat circuit diagram, explain the working of a full binary adder.
15. Derive Lorentz transformation equations.
16. Explain the working of an op amp as a non – inverting amplifier.

Part C

Answer any FOUR questions: **(4×12.5 = 50marks)**

17. (a)What is a projectile? Derive expressions for range, time of flight and maximum height reached.
                                                           (8 marks)

    (b)What are constraints? Explain its classification with an example.   **(4.5 marks)**
18. Explain in detail the Cavendish method of determining the gravitational constant G
19. (a)Derive an expression for couple per unit twist in a torsion wire.   **(7.5 marks)**

    (b)Explain the static torsion method of determining the rigidity modulus of the material of a rod.
                                                           (5 marks)
20. Deduce the formula for relativistic variation of mass with velocity.
21. Explain in detail the working of J-K flip flop with a neat circuit diagram.
22. Obtain the relation connecting three moduli of elasticity.

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