

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – MATHEMATICS

FIRST SEMESTER – NOVEMBER 2019

PH 1101 – PHYSICS FOR MATHEMATICS - I

Date: 05-11-2019

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

PART- A

Answer ALL Questions:

(10×2=20 Marks)

1. What are generalized coordinates?
2. Draw the velocity – time graph for a particle moving with constant velocity.
3. State Newton's law of gravitation.
4. Define escape velocity?
5. What are the forces of cohesion and adhesion?
6. State Hooke's law.
7. Draw the circuit of an inverting operational amplifier.
8. A rod of 1m long is moving along its length with a velocity $0.8c$. Calculate its length as it appears to an observer on earth.
9. What is meant by CMRR in op-amp?
10. State the postulates of special theory of relativity.

PART- B

Answer any FOUR questions:

(4×7.5 = 30 Marks)

11. What are constraints? Explain its classification with an example.
12. Calculate the density of the earth and mass of the sun.
13. Derive Poiseuille's formula for the rate of flow of a liquid through a capillary tube.
14. Derive the expression for length contraction and time dilation.
15. With a neat diagram and truth table, explain the working of a full adder.
16. Deduce Einstein's mass - energy equation.

PART- C

Answer any four questions:

(4×12.5 = 50 Marks)

17. Set up the Lagrangian and derive equations of motion for a simple pendulum and Atwood's machine.
18. Describe the experimental method of determining the value of the gravitational constant (G)
19. Derive the relations connecting three moduli of elasticity and Poisson's ratio.
20. With a neat diagram, and truth table, explain the working of an op amp as an integrator and differentiator.
21. Deduce an expression for the excess of pressure inside a curved liquid surface.
(7.5 Marks)
(b) Explain the molecular theory of surface tension. (5 Marks)
22. Describe the Michelson- Morley experiment with a neat diagram and explain the physical significance of negative results.

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