LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc.DEGREE EXAMINATION – MATHEMATICS

FIRSTSEMESTER – APRIL 2018

PH 1101- PHYSICS FOR MATHEMATICS - I

Date: 28-04-2018   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

Part A

Answer **ALL** the questions   (10×2 = 20)

1. An old man moves on a semicircular track of radius 50m during a morning walk. If he starts at one end of the track and reaches at the other end. Find the displacement of the person.

2. Sketch a graph for motion of an object with constant positive acceleration with zero initial velocity.

3. State Newton's law of gravitation.

4. What is gravitational red shift?

5. State Hooke's law.

6. Define surface tension. Give its unit.

7. What is CMRR in an operational amplifier?

8. State two characteristics of an ideal op-amp.

9. State Postulates of special theory of relativity.

10. What is non-inertial frame of reference?

Part B

Answer any **FOUR** questions   (4 x 7.5 = 30)

11. What are constraints? Explain its types with an example.

12. Obtain an expression for gravitational potential at a point on the earth's surface.

13. a) Show that work done in stretching a wire equals $\frac{1}{2}$ (stress × strain).

    b) The Young's modulus of a metal is 2×10^{11} Nm^{-2} and its breaking stress is 1.078×10^9 Nm^{-2}. Find the maximum amount of energy per unit volume which can be stored in the metal when stretched.   (5+2.5)

14. Deduce Poiseuille's formula for rate of flow of liquid through a capillary tube.

15. Explain the working of an operational amplifier as an inverting amplifier.

16. Obtain Einstein's mass energy relation.

Part C

Answer any **FOUR** questions   (4 x 12.5 = 50)

17. Set up Lagrangian and obtain equation of motion of a) Atwood's machine b) Simple pendulum.   (6.5+6)

18. a) Write a short note on weightlessness.

    b) Define escape velocity and derive the expression for escape velocity of an object.   (5+7.5)

19. Obtain the relation connecting the three moduli of elasticity.

20. Describe Quincke's method of determining the surface tension and angle of contact of mercury.

21. With a neat diagram, Explain the working of JK flip flop.

22. Derive Lorentz transformation equations.

$$$$$$$$$$