LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – NOVEMBER 2012

# PH 1101 - PHYSICS FOR MATHEMATICS - I

Date : 03/11/2012 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**PART – A**

Answer **ALL** questions: (10x2=20)

1. Draw distance – time and velocity – time graph for a particle moving with constant velocity.
2. What are generalized co-ordinates in Lagrangian formulation?
3. State Newton’s law of gravitation.
4. Calculate the mass of the earth from the following data. Radius of the earth = 6371 km   
   G=6.66 x 10-11 Nm2/kg2
5. State Hooke’s law of elasticity.
6. Define surface tension. Give its unit.
7. Draw a circuit diagram for the given function : F(A,B,C) = AB +
8. State two postulates of special theory of relativity.
9. What is meant by CMRR in op-amp?
10. The mean life of π meson is 2 x 10-8 s. Calculate the mean life of a meson moving with the velocity of 0.8c.

**PART – B**

Answer any **FOUR** questions: (4x7.5=30)

1. Define centripetal force. Derive an expression for it.
2. Define escape velocity. Show that the escape velocity from the surface of the earth is 11km/s.
3. Derive Poiseuille’s formula for determining the coefficient of viscosity of a liquid.
4. With a neat circuit diagram and truth table, explain the working of a full adder.
5. Derive the Lorentz space-time transformation formulae.

**PART – C**

Answer any **FOUR** questions: (4x12.5=50)

1. Obtain the relation between the three moduli of elasticity.
2. Setup and solve Lagrange’s equation for i) Simple Pendulum ii) Atwood’s machine
3. a) State the postulates of general theory of relativity. ***(4)***b) Show that the effect of gravitation is to introduce a curvature in space-time manifold. ***(8.5)***
4. a) With a neat circuit diagram, explain the working of an op-amp inverting amplifier. ***(8.5)***  
   b) Simplify using K-map : Y = F (A,B,C) = ∑ ( 1,2,3,5,7) ***(4)***
5. Describe the Michelson –Morley experiment and explain the physical significance of negative results.