LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

 **B.Sc.** DEGREE EXAMINATION – **PHYSICS**

THIRD SEMESTER – NOVEMBER 2010

# PH 3104 / 3100 - PHYSICS FOR MATHEMATICS - I

 Date : 10-11-10 Dept. No. Max. : 100 Marks

 Time : 9:00 - 12:00

**PART A**

Answer **ALL** questions: 10 x 2 = 20

1. Distinguish between distance covered and displacement of an object in motion.
2. What are generalized co-ordinates in Lagrangian formulation?
3. State any two laws of planetary motion due to Kepler.
4. What is gravitational red shift?
5. State Hooke’s law of elasticity
6. Explain the term “viscosity” of a fluid.
7. What are the characteristics of an ideal operational amplifier?
8. What do you understand by flip-flop ?
9. A rod of one meter length is moving along its length with a velocity 0.6c. Calculate its length as it appears to an observer on earth?
10. State Einstein mass-energy relation.

**PART B**

Answer any **FOUR** questions: 4 x 7.5 = 30

1. Explain distance –time graph and velocity –time graph for an object executing horizontal motion.
2. Explain the variation of acceleration due to gravity with i) altitude and ii) depth.
3. Obtain the expression for excess pressure over (i) a curved surface and (ii) a cylindrical drop.
4. With circuit diagrams explain the working of an op-amp based integrator and a differentiator.
5. Derive Lorentz transformation equations from special theory of relativity.

**PART C**

Answer any **FOUR** questions: 4 x 12.5 = 50

1. Show that path of a projectile projected at an angle α to the horizontal is a parabola. Derive an expression for its time of flight, maximum height reached and horizontal distance covered.
2. What is a stationary satellite? Define escape velocity. Show that the escape velocity from the surface of the earth is 11 km/s. Distinguish between orbital velocity and escape velocity.
3. With a neat sketch explain how you will determine the surface tension of a given liquid by capillary rise method
4. What are electronic counters? Explain four bit binary up counter with a suitable diagram.
5. Describe Michelson-Morley experiment. Discuss the results of the experiment.

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