LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

THIRD SEMESTER – NOVEMBER 2012

# PH 3104 - PHYSICS FOR MATHEMATICS - I

 Date : 07/11/2012 Dept. No. Max. : 100 Marks

 Time : 9:00 - 12:00

**PART – A**

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

1. What are cyclic coordinates?
2. Sketch the distance – time and velocity – time graph for uniformly accelerating mmotion.
3. State Newton’s law of gravitation.
4. An electron of rest mass 9.1 ×10-31 Kg is moving with a speed of 0.99c. What is its total energy?
5. Define coefficient of viscosity of a liquid.
6. Define Poisson’s ratio. Give its theoretical limiting values.
7. Draw the circuit diagram of an Op-amp based Inverting amplifier.
8. Simplify Y= $\left[A\overbar{B}\left(C+BD\right)+\overbar{A }\overbar{B}\right]C$
9. State the postulates of special theory of relativity.
10. Explain the term ‘frame of reference’

**PART – B**

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

1. (i) What are generalized coordinates? (2)

 (ii) What are constraints? Explain the different classification of constraints with examples.(5.5)

1. Deduce Einstein’s mass – energy equivalence relation.
2. Show that the excess of pressure inside a soap bubble is$ \frac{4T}{r}$.
3. (i) Simplify using K map: Y=F(A,B,C,) = Σ (0,2,4,6,7) (2.5)

 (ii) With a neat circuit diagram explain the working of a half adder. (5)

1. On the basis of Lorentz transformation, derive the expressions for length contraction and time dilation.

**PART – C**

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

1. Setup and solve Lagrange’s equation for (i) simple pendulum and (ii) Atwood’s machine
2. Describe in detail the Cavendish method for determining G.
3. Obtain the relation connecting the three modulii of elasticity.
4. With a neat circuit diagram explain the working of an Op-amp based Inverting summing amplifier, integrator and differentiator. (4+4+4.5 marks)
5. Explain the construction and working of Michelson’s Morley experiment. Discuss the results.

\*\*\*\*\*\*\*\*