LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRSTSEMESTER – APRIL 2018

17/16UPH1AL01- PHYSICS FOR MATHEMATICS - I

Date: 30-04-2018 Dept. No. Max. : 100 Marks
Time: 01:00-04:00

PART A

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

1. A car is moving with a velocity of 15ms^{-1} and accelerates uniformly at the rate of 2 ms^{-2} to reach a velocity of 20 ms^{-1}. Find the time taken.
2. Draw the velocity time graph for a particle moving with uniform velocity.
3. State Kepler's laws of planetary motion.
4. Give the dimensions of gravitational constant G.
5. Calculate the elastic energy stored up in a wire originally 5 m long and 10^{-3} m in diameter which has been stretched by 3 x 10^{-4} m due to a load of 10 kg.
6. What is surface tension? Give its unit and dimensions.
7. In an OPAMP based inverting amplifier, if the input voltage is 1.5 V, feedback resistance is 10kΩ and input resistance is 20kΩ. What is the output voltage?
8. Solve using K map F(A,B,C) = ∑(0,2,4,6).
9. What is called as frame of reference?
10. If 4 kg of substance is fully converted into energy how much energy is produced?

PART B

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

11. Determine the time period of oscillations of a liquid in an U tube.
12. a) Estimate the mass of the earth.

    b) If the mass of the sun is 2 x 10^{30} kg, distance of earth from the sun is 1.5x10^{11}m and the period of revolution of the latter around the former is 365.3 days, find the value of G.
13. Determine the torque per unit twist of a wire clamped at one end.
14. With a neat diagram explain the OPAMP based inverting summing amplifier.
15. What is time dilation? Obtain the expression for time dilation.
16. Derive Poiseuille's formula for the rate of flow of liquid in a capillary tube.

PART C

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

17. Define simple harmonic motion. Derive expressions for displacement, velocity and acceleration in SHM.
18. a) What is escape velocity? Derive an expression for escape velocity. (6+6.5)
    b) Determine the potential energy and kinetic energy of a satellite orbiting around the earth.
19. Define the three moduli of elasticity. Establish the relation between them.
20. With a neat diagram explain the working of JK flip flop.
21. What is a Mod 10 counter? Explain its working with a diagram.
22. Derive the Lorentz space time transformation equations.

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