LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2016**

16UPH1AL01 – PHYSICS FOR MATHEMATICS - I

Date: 09-11-2016
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

PART A

Answer **ALL** questions: **(10×2=20 marks)**

1. A man walks 7 km in 2 hours and 2 km in 1 hour in the same direction. What is the man's average velocity for the whole journey?
2. Draw the velocity time graph for a particle moving with constant velocity.
3. State Kepler's law of planetary motion.
4. Define gravitational potential.
5. Define Coefficient of viscosity.
6. A soap bubble 50 mm in diameter contains a pressure of 2×10^5 N/m^2. Find the surface tension in the soap film**.**
7. Draw the circuit of an inverting operational amplifier.
8. Draw the symbol of an EX-OR gate and give its truth table.
9. State the basic postulates of Special theory of relativity.
10. What are inertial and non – inertial frames of reference?

PART B

Answer **ANY FOUR** questions: $(4 \times 7.5 = 30$ marks)

11. (a) State and explain Newton's law of gravitation.   **(4 marks)**

    (b) How would you find the mass and density of earth using Newton's law of

    gravitation?   **(3.5 marks)**

12. Describe the Quincke's method of determining the surface tension of Mercury.

13. Solve the following simultaneous equation using op amp.

    x+2y=10

    2x-y=5.

14. Derive the Einstein's Mass – energy equivalence.

15. With a neat circuit diagram, explain the working of a full binary adder.

16. Define simple harmonic motion. Explain displacement, velocity and acceleration in SHM.

PART C

17.(a) Define escape velocity. Show that the escape velocity from the surface of
      the earth is 11km/s.   **(7.5 marks)**
   (b) Estimate the mass of the sun, assuming the orbit of the earth round the sun to be a
      circle. The distance between the sun and the earth is 1.49×10^{11}m and $G = 6.66 \times 10^{-11}$Nm^2/kg^2.   **(5 marks)**

18.(a) Define the three types of elastic moduli.   **(4 marks)**
   (b) Obtain the relation connecting them.   **(8.5 marks)**

19.With a neat circuit diagram, explain the working of
   (a) Inverting and non – inverting amplifier (b) summing amplifier.

                                  (4 + 4 + 4.5 marks)

20. Describe Michelson - Morley experiment with a neat diagram and explain the
     physical significance of negative results.

21. (a) Solve the following expression using 4 variable k map method.
        $F(A,B,C,D) = \Sigma (2,3,4,6,10,11,15) + \Sigma_d(7,12,13)$.   **(8 marks)**
   (b) Draw the symbol and truth table of EX-OR gate.   **(4.5 marks)**

22.Explain the vertical oscillations of a spring when it is connected in parallel and series.

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