



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

SECOND SEMESTER – APRIL 2017

PH 2503 / PH 2501 / PH 2500 -MECHANICS

Date: 04-05-2017
01:00-04:00

Dept. No.

Max. : 100 Marks

PART – A

Answer ALL the questions: (10 x 2 = 20 Marks)

1. What is a bifilar pendulum?
2. Define centre of mass.
3. What are concurrent forces?
4. What is metacentre of a floating body?
5. A pitot tube is fixed in a main of diameter 0.15 m and the difference of pressure indicated by the gauge is 0.04 m of water column. Find the volume of water passing through the main in a second.
6. State Graham's law for diffusion of gases.
7. Define generalized coordinates.
8. What is meant by configuration space?
9. What is weightlessness?
10. Define gravitational potential.

PART – B

Answer any FOUR questions: (4 x 7.5 = 30 Marks)

11. (a) State and prove the law of conservation of angular momentum. **(4.0)**
(b) Explain the principle of rocket propulsion. **(3.5)**
12. Determine the position of centre of pressure for a rectangular lamina immersed vertically in a liquid with one edge in the surface of the liquid.
13. State Fick's law. Obtain the relation between time of diffusion and length of column.
14. What are constraints of a motion? Explain the holonomic and non-holonomic constraints.
15. State Kepler's laws of planetary motion. Deduce Newton's law of gravitation from Kepler's laws.

PART – C

Answer any FOUR questions:(4 x 12.5 = 50 Marks)

16. (a) Derive an expression for the period of oscillation of a compound pendulum and prove that the centre of suspension and the centre of oscillation are interchangeable. **(6+3)**
- (b) Using compound pendulum, how the acceleration due to gravity is determined? **(3.5)**
17. Define centre of gravity. Find the position of centre of gravity of a solid and a hollow tetrahedron.
18. (a) State and prove Bernoulli's theorem. **(7.5)**
- (b) Explain how a Venturimeter is used to measure the rate of flow of liquids through pipes. **(5.0)**
19. State D'Alembert's principle and hence derive Lagrange's equations of motion for holonomic conservative system.
20. Derive the expressions for (a) escape velocity and (b) total energy of an artificial satellite. **(6+6.5)**
