

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc.DEGREE EXAMINATION –PHYSICS

SECOND SEMESTER – APRIL 2018

PH 2500 / PH 2501 / PH 2503– MECHANICS & SOUND / MECHANICS

Date: 24-04-2018

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART – A

Answer ALL questions:

(10x2=20 Marks)

1. What is a Bifilar pendulum and what are the types of it?
2. Determine the angular momentum of a mass 0.5kg, whirled in a circle at the end of a string 0.4m long, the other end of which is held in the hand. The number of revolutions/ sec. is 40.
3. Define centre of gravity.
4. The resultant of two parallel forces are 100N & 30N, when acting in the same and opposite directions, respectively Find the individual forces?
5. State Torricelli's theorem.
6. A pitot tube is fixed in a main of diameter 0.15m and the difference of pressure indicated by the gauge is 0.04m of water column. Find the volume passing through the main in a minute.
7. What are generalized coordinates?
8. State the principle of virtual work.
9. Define a frame of reference.
10. State the postulates of special theory of relativity.

PART – B

Answer any FOUR questions:

(4x7.5=30 Marks)

11. a) Obtain an expression for the period of oscillation of a Torsion pendulum.
b) A metal disc of 0.1m radius and mass 1kg is suspended in a horizontal plane by a vertical wire attached to its centre. If the diameter, length of the wire are 10^{-3} m, 1m respectively and the period of oscillation of the disc is 5 sec, find the rigidity modulus of the wire? **(5+2.5)**
12. a) Define i) metacentre and ii) metacentric height.
b) Explain how the metacentric height of a ship is determined experimentally. **(3+4.5)**

13. Explain the principle and working of venturimeter.

14. a) What is meant by configuration of space?

b) How this concept is used to describe the motion of a system of particles?

(3+4.5)

15. Derive an expression for the addition of velocities using Lorentz transformation.

PART – C

Answer any FOUR questions:

(4x12.5=50 Marks)

16. Explain how 'g' can be determined using compound pendulum.

17. Derive expressions for the position of the Centre of Gravity of i) a solid cone and ii) a solid tetrahedron.

(6+6.5)

18 a) State and prove Bernoulli's theorem.

b) Discuss any two applications of the theorem.

(4+8.5)

19. a) State and explain D'Alembert's principle.

b) By applying Lagrange's equation of motion to the Atwood's machine, find the acceleration of the system.

(4+8.5)

20. Derive Lorentz transformation equations, stating the assumptions made.
