

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

SECOND SEMESTER – APRIL 2010

PH 2503 - MECHANICS
(FROM 08-BATCH ONWARDS)

Date & Time: 20/04/2010 / 1:00 - 4:00

Dept. No.

Max. : 100 Marks

PART – A

Answer **ALL** questions

(10 X 2 =20 Marks)

1. Distinguish between couple and Torque with an example each.
2. Draw a graph of length against time period of oscillations of a compound pendulum and mark the equivalent length for any time period .
3. Explain streamline flow with an example.
4. State the conservation of angular momentum with an example.
5. Distinguish between orbital velocity and escape velocity.
6. What are constraints of motion?
7. Arrive at the dimensional formula of the universal gravitational constant using the Newton's law of gravitation.
8. State the principle of virtual work.
9. Define gravitational potential.
10. What is configuration space?

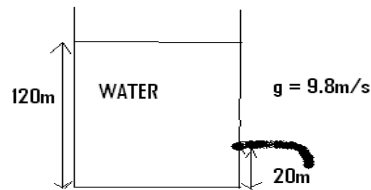
PART – B

Answer any **FOUR** questions.

(4x7 ½ =30Marks)

11. Show that the centre of oscillation and centre of suspension in a compound pendulum are reversible.
12. State Kepler's law of planetary motion. Derive Newton's law from Kepler's law.
(3+4½ marks)
13. Show that the centre of pressure on a rectangular lamina submerged in a liquid is 2/3 below the top of the lamina.
14. In the tank given below water flows through a tap. Calculate the velocity of flow using the laws of fluid dynamics. Explain briefly the formula used. Assume the acceleration due to gravity as 9.8m/s^2 and density of water to be 1000Kg/m^3 .

(P.T.O.)



15. State and explain the D'Alembert's principle.

PART – C

Answer any FOUR questions.

(4x12½ =50Marks)

16. Obtain an expression for the time period of oscillation of a Bifilar pendulum with parallel threads.

17. Explain the stability of floating bodies in terms of meta centre and meta centric height. Explain how the meta centric height of a ship is estimated. (5+7½ Marks)

18. Explain the equation of continuity in fluid dynamics. Hence derive the Bernoulli's equation. (5+7 ½Marks)

19. Derive an expression for the gravitational potential from first principles. Derive an expression for orbital velocity of a satellite. (5+7½ Marks)

20. a) Obtain Lagrange's equation using D'Alembert's principle. (6.5Marks)

b) Discuss the application of Lagrange's equation to Atwood's machine. (6 Marks)

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