D 53527 **(Pages : 3)** **Name.....**

Reg. No. . . . . .

FIRST SEMESTER B.Sc. DEGREE EXAMINATION JANUARY 2014

(UG–CCSS)

Complementary Course – Physics

PH 1C 01— PROPERTIES OF MATTER AND THERMODYNAMICS

(2012 and earlier Admissions)

Time : Three Hours Maximum : 30 Weightage

Section A

Answer **all** *questions.*

12 *Objective type questions, in bunches of four questions.*

Each bunch carries a weightage of 1.

1. When the radius of a metal wire is doubled its Young's modulus will be :

   (a) Doubled. (b) Halved.

   (c) Remains the same. (d) None of these.

2. The unit of coefficient of viscosity is :

   (a) Poise. (b) Weber.

   (c) Joules/second. (d) None of the above.

3. The expression for excess pressure inside a soap bubble of radius R and surface tension T is given by :

   (a) 2 T/R. (b) 4 T/R.

   (c) T/R. (d) None of these.

4. The Helmholtz function is given by :

   (a) F = U – TS. (b) F = T — US.

   (c) F = S – UT. (d) None of these.

5. The expression for work done/unit volume in twisting a wire is given by _____

6. The radius of an air bubble in deep water _____ with the depth of water.

7. The Stoke's equation for the viscous drag acting on a sphere falling through a high viscous medium is given by _____

8. The energy of the gas molecule at absolute zero temperature is called _____

Turn over

9. What is the dimension formula for the modulus of elasticity?
10. Write down the relation between surface tension and surface energy.
11. What is angle of contact?
12. What is a 'reservoir' in thermodynamics?

(12 x ¼ = 3 weightage)

Section B

Answer **all** *questions.*

Each question carries a weightage of 1.

13. State Hooke's law in elasticity.
14. What is a torsion pendulum?
15. Write down an expression for the geometrical moment of inertia of a cylindrical wire. Explain the symbols used.
16. How does detergent remove dirt from cloths?
17. Define the term 'terminal velocity' of a body falling through a highly viscous medium.
18. Give one application of Stoke's formula for viscous drag.
19. State second law of thermodynamics.
20. Why does a gas has two specific heat capacities?
21. "Entropy of the universe is increasing". Comment

(9 x 1 = 9 weightage)

Section C

Answer any **five** *questions.*

Each question carries a weightage of 2.

22. Derive the relation, w = ½ x strain x strain; where w is the work done/unit volume in twisting a wire
23. Derive a relation for the geometrical moment of inertia of a rectangular bar of thickness *d* and breadth ***b.***
24. Determine the elastic energy stored up in a wire, originally 5 meter long and 1 mm in diameter, which has been stretched 3/10 mm due to a load of 10 Kg. Take $g = 300n$ m/s^.
25. Water is conveyed through a horizontal tube 6 cm, in diameter and 4 kilometer in length, at the rate at 20 liters per second. Assuming only viscous resistance, calculate the pressure required to maintain the flow. Coefficient of viscosity of water is 0.001 S.I units.

26. Briefly explain molecular theory of surface tension.

27. Write a brief note on Carnot's refrigerator.

28. Discuss the effects of pressure on boiling and melting points of liquids.

(5 x 2 = 10 weightage)

Section D

Answer any **two** *questions.*

Each question carries a weightage of 4.

29. What is a cantilever? Derive the expression for the depression at the loaded end of a cantilever.

30. Derive an expression for the excess pressure on a curved liquid surface. Obtain the excess pressure inside a spherical soap bubble.

31. What is an adiabatic process? Derive the gas equations for an adiabatic process.

(2 x 4 = 8 weightage)