D 53528 (Pages : 3) Name...

Reg. No...................................

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, JANUARY 2014

(U.G.—CCSS)

Complementary Course

Physics

PH IC 01—PROPERTIES OF MATTER AND THERMODYNAMICS

(2013 Admission onwards)

Time : Three Hours

Maximum : **30** Weightage

Part A

Answer **all** *questions.*
Each question carries ¼ *weightage.*

1. There is no change in volume of a wire due to change in its length on stretching. The Poisson ratio of the wire is :

    (a) —0.5.   (b) 0.5.

    (c) O.   (d) 1.

2. The bulk modulus for an incompressible liquid is :

    (a) Zero.   (b) One.

    (c) 10^{11} N–$m\hat{}$.   (d) Infinite.

3. The rigidity modulus of a material in the form of a wire can be determined using _____

4. With rise of temperature the surface tension of a liquid :

    (a) Does not change.   (b) Increases.

    (c) Decreases.   (d) Becomes zero.

5. The velocity of a falling raindrop attains limited value due to :

    (a) Air current.   (b) Up thrust of air.

    (c) Surface tension.   (d) Viscous force exerted by air.

6. Clouds float in the atmosphere because of :

    (a) Low temperature.   (b) Low viscosity.

    (c) Low density.   (d) Low surface tension.

7. The change in the internal energy of a gas is directly proportional to :

    (a) Change in volume.   (b) Change in pressure

    (c) Change in temperature.   (d) None of these.

Turn over

8. The ratio of two specific heats of a diatonic gas is :

    (a) 1.66.   (b) 1.4.

    (c) 1.33.   (d) 1.21.

9. Change in entropy depends :

    (a) On the transfer of heat.   (b) On change of temperature.

    (c) On the transfer of mass.   (d) On the thermodynamic state.

10. For a thermodynamic system work done in a process depends on :

    (a) The path.   (b) State of the system.

    (c) External Pressure.   (d) Temperature and Pressure.

11. The efficiency of a heat engine working between reservoirs at temperature 327°C and 27°C is :

    (a) 25%.   (b) 50%.

    (c) 75%.   (d) 100%.

12. The quantity remaining constant in the isothermal expansion of an ideal gas is :

    (a) Internal energy.   (b) Heat.

    (c) Pressure.   (d) Temperature and Pressure.

$(12 \times \frac{1}{4} = 3$ weightage$)$

Part B

Answer **all** *questions.*
Each question carries 1 weightage.

13. What is meant by elastic hysteresis ?

14. What is bulk modulus of elasticity ?

15. Will you prefer a thin or thick handle to carry your bag. Why ?

16. Distinguish between streamline flow and Turbulent flow of liquids.

17. What is the significance of Stoke's formula ? What is its use ?

18. How does temperature fall with height ?

19. What are the limitations of the first law of thermodynamics ?

20. Give two conditions of obtaining maximum amount of work.

21. What is a reversible cycle ?

$(9 \times 1 = 9$ weightage$)$

Part C

Answer any **five** *questions.*
Each question carries **2** *weightage.*

22. What is Stress energy ? A wire 4 m long and 3 x 10 m in diameter is stretched by a force of 8 kgwt. If the extension in the length amounts to 1.5 mm. Calculate the energy stored in the wire.

23. What is bending moment ? Derive an expression for the bending moment of a horizontal beam fixed at one end and loaded at the other end.

24. Calculate the work spend in spraying a drop of water of 1 mm radius into one million droplets of the same size. (S.T. of water = 0.0072N/m)

25. Calculate the mass of water flowing in 10 minutes through a tube 0.001 m in diameter, 0.4 m long under a constant pressure head of 20 cm of water. Coefficient of viscosity of water = 0.000089 SI units.

26. A tyre is pumped to a pressure of 2 atmospheres at 15°C when it suddenly bursts. Calculate the drop in temperature.

27. One gram of hydrogen occupies 11.1 litres at 0°C and 76 cm of mercury. What is the work done by the gas if heated to 1°C at constant pressure and how much heat must be supplied to it in the process ? Specific heat at constant volume is 2.411.

28. Show that the second law of thermodynamics enables us to define a scale of temperature independent of the properties of working substance. How is the scale realized in practice ?

(5 x 2 = 10 weightage)

Part D

Answer any **two** *questions.*
Each question carries **4** *weightage.*

29. Describe with the theory the Torsion pendulum method of determining the rigidity modulus of a material in the form of a wire.

30. Describe Poiseuille's method of determining the coefficient of viscosity of a low viscous liquid. What are the factors on which viscosity of gases depend ?

31. Explain the concept of reversible and irreversible process. Show that the efficiency of a reversible engine is maximum.

(2 x 4 = 8 weightage)