

FIRST SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT)
EXAMINATION, NOVEMBER 2014

(U.G.—CCSS)

Complementary Course—Physics

PH 1C 01—PROPERTIES OF MATTER AND THERMODYNAMICS

(2013 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Part A

*Answer all questions.
Each question carries $\frac{1}{4}$ 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) 0 . (d) 1 .
2. Rubber is _____elastic than glass.
3. A horizontal beam fixed at one end and loaded at the free end is called a _____
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. The viscous drag on a spherical body moving with a speed V is proportional to :
(a) \sqrt{u} . (b) u .
(c) u^2 . (d) $\sqrt{2u}$.
7. A reversible heat engine can have 100% efficiency if the temperature of sink is :
(a) Less than that of source. (b) Equal to that of source.
(c) 0°C . (d) OK.

Turn over

8. The ratio of two specific heats of a diatomic 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. Absolute zero is the temperature at which isothermal and adiabatic processes are identical ;
- (a) True. (b) False.
(c) cannot be defined. (d) None of these.
11. In a complete Carnot cycle, the change in Entropy of the universe is :
- (a) Positive. (b) Negative.
(c) Infinite. (d) Zero.
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 x $\frac{1}{4}$ = 3 weightage)

Part B

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

13. What is meant by elastic hysteresis ?
14. **Springs are usually made of steel and not of copper. Why ?**
15. **Explain the phenomenon of surface tension.**
16. **Distinguish between streamline flow and Turbulent flow of liquids.**
17. **Why do gases have two specific heats ?**
18. **Explain the terms : (a) Thermodynamic state ; (b) Thermodynamic equilibrium**
19. **What are the limitations of the first law of thermodynamics ?**
20. **Give Kelvin's statement of the second law of thermodynamics.**
21. **How does pressure effect the melting point of a substance ?**

(9 x 1 = 9 weightage)

Part C

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

22. What is Stress energy ? A wire 4m long and 3×10^{-4} m in diameter is stretched by a force of 8kgwt. If the extension in the length amounts to 1.5mm. Calculate the energy stored in the wire.
23. What is Cantilever ? A Cantilever of length 0.5m is depressed by 0.015m at a distance 0.3m from the fixed end.
24. Define angle of contact. By how much will the surface of mercury be depressed in a glass tube of radius 0.01cm if the angle of contact of mercury is 135° and its surface tension is 0.488N/m.
25. Calculate the mass of water flowing in 10 minutes through a tube 0.001m in diameter, 0.4m long under a constant pressure head of 20cm 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. Explain Brownian motion. How is it explained ?
28. Prove that for a Perfect gas, $C_p - C_v = R$.

(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 a **Carnot's** engine. Draw the P-V indicator diagram for a cycle of its operations between two given temperatures and deduce from it the thermal efficiency of the engine.
31. Starting from Maxwell's relations derive **Clapeyron's** equations.

(2 x 4 = 8 weightage)