QP CODE: 23104623

23104623

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR/IMPROVEMENT/REAPPEARANCE EXAMINATIONS, FEBRUARY 2023

First Semester

Complementary Course - PH1CMT02 - PHYSICS - PROPERTIES OF MATTER AND THERMODYNAMICS

(Common to B.Sc Chemistry Model I, B.Sc Geology Model I)

2017 Admission Onwards

12BC4259

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. What is shearing strain?
2. Give the expression for work done per unit volume for volume strain.
3. If length of the cantilever is doubled without changing any other characteristics, then the depression at the loaded end will change by what factor for the same load.
4. Why the beams used in construction of bridges have a cross-section shape of the letter I?
5. What is the effect of impurities on surface tension?
6. What is hydrodynamics?
7. What do you mean by Brownian motion?
8. What is the effect of temperature and pressure on the viscosity of gases?
9. What is a thermodynamic system?
10. Mention the conditions for a process to be an isothermal.
11. Define coefficient of performance of a refrigerator.
12. Explain the third law of thermodynamics.

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Derive an expression for torsional rigidity of a cylindrical material.
14. A steel wire of radius 1 mm is bent to form a circle of radius 50 cm. Calculate the bending moment if the Young's modulus is 2 $x10^{10}$ N/m^2
15. The pressure inside a soap bubble of radius 2 cm can balance a liquid column of height 72 cm and density 800 kg/m^3. Calculate the surface tension of the soap solution.
16. A capillary tube 1mm diameter and 20 cm length is fitted horizontally to a vessel full of alcohol of density 0.8 gm/cc. The centre of capillary tube is 30 cm below the surface of the alcohol. If the viscosity of alcohol is 1.2 X 10^{-3} Ns/m^2, find the quantity of alcohol flowing out in 5 minutes.
17. 9 droplets of water of equal size are falling though air with terminal velocity 0f 0.1 m/s. If they combine to form a larger drop calculate the terminal velocity of the new drop formed.
18. Derive an expression for the work done during an adiabatic process.
19. State and explain Zeroth and first law of thermodynamics.
20. The efficiency of a Carnot's engine changes from 1/5 to 1/2 when the source temperature is raised by 120K. Calculate the temperature of the Sink.
21. State and explain the two versions of Second law of thermodynamics.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Explain the term rigidity modulus of the material. Derive an expression for the couple required to twist a cylindrical rod of circular cross section through an angle θ at one end, the other end being kept fixed, and hence deduce an expression for the rigidity modulus of the rod.
23. Distinguish between uniform and non-uniform bending. Deduce the relation for depression at the middle of a uniform beam supported between two knife edges and loaded at the middle.
24. Explain surface tension. Discuss the molecular theory of surface tension.
25. Derive Maxwell's thermodynamical relations. Give its Physical Significance.

(2×10=20)