Reg. No ..... Name **22U144**

B. Sc. DEGREE END SEMESTER EXAMINATION : OCTOBER 2022

SEMESTER 1 : COMPLEMENTARY PHYSICS FOR CHEMISTRY

COURSE : **19U1CPPHY2 : PROPERTIES OF MATTER AND THERMODYNAMICS**

(For Regular – 2022 Admission and Improvement / Supplementary - 2021/2020/2019 Admissions)

Time : Three Hours Max. Marks: 60

PART A

Answer any 8 (2 marks each)

1. Derive an expression for the rate of flow of a liquid through a capillary tube.
2. Discuss any three applications of surface tension.
3. Distinguish between elastic after effect and elastic fatigue.
4. Entropy of an irreversible process always increases. Why?
5. Why a hot liquid moves faster than a cold liquid?
6. Briefly explain the term "Stress".
7. What is stoke's law?
8. What is a cantilever?
9. How the first law of thermodynamics can be applied in a cyclic process?
10. State Kelvin's statement of second law of thermodynamics.

(2 x 8 = 16)

PART B

Answer any 6 (4 marks each)

11. A metal disc having mass 1 kg and radius 0.1 m is suspended as a torsional pendulum using a wire of length 1 m and radius 0.5×10^{-3} m. If the period of torsional oscillation is 4 seconds, find the rigidity modulus of the wire.
12. Explain the working principle of a refrigerator.
13. Calculate the work done in stretching a wire of length 1 m and cross-section $1mm^2$ through 1 mm . Youngs modulus of the material is 200 GPa.
14. Calculate the energy released when 8 droplets of water of radius 0.5mm coalesce to form a single drop. Given, surface tension of water 0.072N/m.
15. Calculate the increase of entropy when 1 g of water is heated from 0^oC to 100^oC . Given, specific heatcapacity of water = 4200 $Jkg^{-1}K^{-1}$.
16. 1 Kg of air expands adiabatically so that it cools by 200K. Calculate the work done. γ(gamma)=1.4, C_P= 1000J/Kg.K
17. A bar one metre long , 0.04 m broad and 0.005 m thick is supported on two knife edges 0.8 m apart. The depression produced by a 2 kg mass suspended from the centre of the knife edges is 0.005 m. Calculate the Young's modulus of the material of the bar.
18. The excess pressure inside a soap bubble of radius 8mm is balanced by a 2.5mm column of oil of density 800 kg/m^3 . Determine the surface tension of the soap solution.

(4 x 6 = 24)

PART C

Answer any 2 (10 marks each)

19. Derive the expression for bending moment. Use it to arrive at the equation for the depression at the end of a cantilever.

20. Describe adiabatic process and isothermal process. Derive the expression for work done in each case.

21. Derive Stoke's formula for the velocity of a small sphere falling through a viscous fluid.

22. Obtain an equation for couple per unit twist when a cylindirical rod fixed at one end and given a twist at the other end.

(10 x 2 = 20)