

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2022
(Regular/Improvement/Supplementary)

PHYSICS: COMPLEMENTARY COURSE FOR MATHEMATICS & CHEMISTRY

GPHY1C01T: PROPERTIES OF MATTER AND THERMODYNAMICS

Time: 2 Hours

Maximum Marks: 60

SECTION A: Answer the following questions. Each carries 2 marks.
(Ceiling 20 Marks)

1. What is a torsion pendulum?
2. What are beams? Explain the concept of bending of beams and bending moments.
3. Define Poisson's ratio. What are the theoretical limits of Poisson's ratio?
4. How does detergent remove dirt from clothes?
5. Briefly explain the terms: molecular range and sphere of influence.
6. Explain the concept of surface tension? Mention its unit?
7. What is viscous force? Define the coefficient of viscosity?
8. Why rain drops attain constant velocity when it falls through air?
9. What are the essential parts of a heat engine?
10. Distinguish between isothermal and adiabatic processes. Find work done during an isothermal process.
11. What is the relation between entropy and available energy?
12. Explain the term Carnot's refrigerator. Define the coefficient of performance.

SECTION B: Answer the following questions. Each carries 5 marks.
(Ceiling 30 Marks)

13. Show that in any kind of strain the work done per unit volume $w = (1/2) \times \text{stress} \times \text{strain}$.
14. Give the important steps involved in the determination of viscosity of a liquid by Poiseuille's method.
15. Explain the concept of pressure difference across a curved surface. Calculate the excess of pressure inside a liquid drop and a bubble formed by a liquid in air.
16. What is Clausius – Clapeyron latent heat equation? On the basis of this, explain the effect of pressure on boiling and melting points.

(PTO)

17. What is an indicator diagram? Show that the area of the Indicator diagram of a quasi static process is equal to the work done in a thermodynamic process.
18. Hundred gms of water at 80°C is converted into steam at 100°C . Calculate the increase in entropy. The specific latent heat of steam is $2260 \times 10^3 \text{ J/Kg}$. The specific heat capacity of water is $4.2 \times 10^3 \text{ J/Kg/K}$.
19. What is an isobaric process? Determine the work during an isobaric reversible expansion of 3 moles of an ideal gas while it is heated from 300K to 400K . Universal gas constant R is 8.314 J/Mol/K .

SECTION C: Answer any 1 question. Each carries 10 marks.

20. What is a cantilever? Derive an expression for the depression at the loaded end of a cantilever.
21. State and explain the first law of thermodynamics. Give mathematical form of first law of thermodynamics. Derive Mayer's relation using first law of thermodynamics.

(1 × 10 = 10 Marks)