D 135238 **(Pages : 2)** **Name.....**

Reg. No.....

FIRST SEMESTER (CBCSS—U.G.) DEGREE EXAMINATION
NOVEMBER 2025

Physics

PHY 1C 01—PROPERTIES OF MATTER AND THERMODYNAMICS

(2019 Syllabus)

Time : Two Hours Maximum : 60 Marks

The symbols used in this question paper have their usual meanings

Section A (Short Answer Type)

Answer **all** *questions in two* **or** *three sentences, each correct answer carries a maximum of* 2 *marks.*

1. State Newton's law of viscous force in streamline flow.
2. In what respects is the viscosity of a gas different from that of a liquid ?
3. Draw the P-V diagrams for expansion, compression, isobaric and isochoric processes.
4. Explain the effect of pressure on melting point of a substance.
5. Calculate the work done in blowing a bubble of radius *r* and surface tension T ?
6. Can a heat engine convert all the heat energy into useful work ? Explain.
7. How does entropy change during a reversible adiabatic expansion of an ideal gas ?
8. Explain why girders are made in the form of I - section ?
9. Write down the relationships between the various elastic constants.
10. What is elasticity and how does it differ from plasticity ?
11. Explain terminal velocity.
12. Show that surface energy is numerically equal to surface tension.

(Ceiling - 20)

Turn over

Section B (Paragraph / Problem Type)

Answer **all** *questions in a paragraph of about* **half a page** *to* **one page**, *each correct answer carries a maximum of* 5 *marks.*

13. Water flows through two capillary tubes under a given pressure head. If the diameter of the first tube is twice that of the second and the length of the first is four times that of the second, compare the rate of flow through the tubes.

14. Calculate the temperature at which ice will freeze if the pressure is increased by 135.2 atmospheres. The change in specific volume when 1 gram of water freezes into ice is 0.091 cm^3. One atmospheric pressure = 10^6 *dynes*/cm^2. Latent heat of fusion of ice = 80cal/g and J = 4.2×10^7ergs/cal.

15. With suitable examples explain the connection between entropy and disorder.

16. A spherical air bubble of radius 0.5 mm is formed in water at a depth 1 m from its surface. If surface tension of water is 0.072 N/m. and the atmospheric pressure is 76 cm. of mercury find the pressure inside the bubble.

17. A metal rod of length 0.5 m. and radius 1 cm. is clamped at one end and loaded at the free end with 6 kg. Calculate the depression of the free end. Y = 0.9×10^{11} N/m^2.

18. A flat plate of area 10 cm^2 is separated from a large plate by a layer of glycerin 1 mm. thick. If the viscous co-efficient of glycerin is 1.495 N *s* m^{-2}, calculate the force required to move the plate with a velocity of 1 cm/s.

19. Calculate the change in entropy when 10 gm. of ice at 0ºC is converted into steam at 100°C. Given the latent heat of fusion of ice = 336×10^3J/kg. and latent heat of steam 2268×10^3 J/kg.

(Ceiling - 30)

Section C (Essay Type)

Essays - Answer in about **two pages**, *any* **one** *question.*
The question carries 10 *marks.*

20. State and explain Kelvin - Planck and Clausius statement of second law of thermodynamics. Show that they are equivalent.

21. Define co-efficient of viscosity. Describe Poiseuille's method to determine it.

(1 × 10 = 10 marks)