

**FIRST SEMESTER B.A./B.Sc. DEGREE EXAMINATION
NOVEMBER 2019**

(CBCSS—UG)

Physics/Applied Physics

PHY 1C 01—PROPERTIES OF MATTER AND THERMO DYNAMICS

(2019 Admissions)

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. What do you mean by the term modulus of elasticity ? What are the different types ?
2. Distinguish between uniform and non-uniform bending of beams.
3. Why hollow cylinders are used in shafts ?
4. What do you mean by surface tension ? What is its unit ?
5. Distinguish between streamline and turbulent flows of liquids.
6. Write down the Stokes's formula. What are the terms involved?
7. Distinguish between isochoric and isobaric processes.
8. Explain Carnot's theorem.
9. Give Kelvin's statement of the second law of thermodynamics.
10. Obtain the change of entropy of working substance in a Carnot cycle.
11. What is the effect of pressure on the melting point of a system ? Give an example.
12. Explain the principle of increase of entropy.

(Ceiling 20)

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. Determine the work done in stretching a wire of length 2 m. and cross-section 1 mm^2 through 1 mm. Given, the Young's modulus of the material of the wire is 210 GPa.

Turn over

14. Determine the energy released when 8 droplets of water of radius 0.5 mm. coalesce to form a single drop. Given, the surface tension of water is 0.072 Nm^{-1} .
15. Estimate the pressure inside a drop of a liquid of radius 2 mm. at room temperature. Given, the surface tension of the liquid at room temperature is $4.65 \times 10^{-1} \text{ Nm}^{-1}$.
16. In a Poiseuille's capillary flow method of determining the co-efficient of water, 50 ml of water is collected in 6 minutes. If the constant pressure used is 0.4 m., length of the capillary tube is 0.8 m. and the diameter of the capillary tube is 1 mm, what will be the viscosity value obtained in the experiment ?
17. Using a suitable figure, explain the working principle of a Carnot's refrigerator.
18. Calculate the change of entropy when 100 g of water is heated from 0°C to 100°C . Given, the specific heat capacity of water is $4200 \text{ J Kg}^{-1}\text{K}^{-1}$.
19. A Carnot engine whose cold reservoir is 300 K has an efficiency of 0.25. How much the temperature of the source be increased to increase the efficiency to 0.75 ?

(Ceiling 30)

Section C (Essay Type)

*(Answer in about **two** pages, any **one** question. Answer carries 10 marks).*

20. Determine the work done per unit volume when a body undergoes (i) Volume strain ; and (ii) shearing strain.
21. Distinguish between isothermal and adiabatic processes. Obtain expressions for the work done in the two processes.

(1 × 10 = 10 marks)