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

(CUCBCSS—UG)

Physics

PHY 1C 01—PROPERTIES OF MATTER AND THERMO DYNAMICS

Time : Three Hours

Maximum : 64 Marks

Section A

Answer all questions.
Each question carries 1 marks.

1. The relation between the three elastic constants are ————.

2. For a given material the Young's modulus is 2.4 times the modulus of rigidity. Its Poisson's ratio is ————.

3. If temperature rises the coefficient of viscosity of a liquid ————.

4. A steel ball of mass m falls in a viscous liquid with a terminal velocity v. Another steel ball of mass 64 m. will fall through the same liquid with a terminal velocity ————.

5. At critical temperature the surface tension of a liquid is ————.

6. The efficiency of Carnot engine depends on ———— and ———— temperature.

7. Entropy is a measure of ———— of a system

8. The first law of thermodynamics is the conservation of ————.

9. The plot of isotherms will not be a straight line when a plot is drawn between ———— and ————.

10. A cooking pot should be ———— specific heat and ———— conductivity

(10 × 1 = 10 marks)

Section B

Answer all seven questions.
Each question carries 2 marks.

11. Distinguish between elasticity and plasticity.

12. Most of the beam which we use are of square cross section and not of circular cross section, Why ?

13. Even though lava is highly viscous it flows rapidly why ?

14. Define velocity gradient.

15. State and explain second law of thermodynamics.

Turn over

16. What are isobaric processes ?

17. Give the significance of Helmholtz function.

(7 × 2 = 14 marks)

Section C

Answer any **three** *questions.*

Each question carries 4 marks.

18. Derive an expression for couple per unit twist of the wire.

19. Explain the method of determination of coefficient of viscosity of a liquid by Stoke's method.

20. Discuss the effect of electrostatic pressure on a bubble. Give its application.

21. Discuss the principle and working of Carnot's refrigerator.

22. What is Carnot's cycle ? Show that change in entropy in a Carnot's cycle is zero.

(3 × 4 = 12 marks)

Section D

Answer any **three** *problems.*

Each problems carries 4 marks.

23. Calculate the work done in twisting a steel wire of radius 10^{-3} m. and length of 0.25 m. through an angle of 45°. The modulus of rigidity of the material is 8×10^{10} N m^{-2}.

24. A metal plate 100 cm^2 in area rests on a layer of oil 2 mm. thick. Calculate the horizontal force required to move the plate with a velocity of 2 cm/s. Co-efficient of viscosity of oil is 1.56 poise.

25. Calculate the loss of energy when 27 drops of water of S.T. 72×10^{-3} N/m , each of radius 0.6 mm. coalesce to form a single drop ?

26. Calculate the change in entropy when 0.25 kg. of water at 9°C is mixed with 0.5 kg of water at 30°C. Specific heat of water between 0°C and 30° C is 1 kilo cal/ Kg – K.

27. Calculate the depression of melting point of ice produced by one atmosphere increase of pressure. Given that latent heart of ice = 80 cals/gm. and specific volume of ice and water at 0°C are 1.091 cm^3 and 1.0 cm^3 respectively.

(3 × 4 = 12 marks)

Section E

Answer any **two** *problems.*

Each problems carries 8 marks.

28. Describe an experiment to determine the young's modulus of the given material using a cantilever with necessary theory.

29. Derive Poiseuille's formula and give its limitations.

30. State and prove Carnot's theorem for a reversible heat engine. Show that efficiency of any reversible heat engine is greater than that of any irreversible heat engine working between the same two temperatures. What is the importance of this theorem in Physics and Engineering?

31. Using Carnot's cycle derive Clausius Clapeyron's equation give its application.

$(2 \times 8 = 16 \text{ marks})$