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Name :

Reg.No:

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016
(Regular/Supplementary/Improvement)
(CUCBCSS-UG)
CC15UPHIC01- PROPERTIES OF MATTER AND THERMODYNAMICS
(Physics Complementary Course)
(2015 Admission Onwards)

Time: 3 hrs

Maximum marks: 64

Section A
(Answer all, each carries one mark)

1. For a perfectly incompressible material, the Poisson's ratio is.....
2. Strain has
 - a) dimensions of length b) dimensions of area c) dimensions of volume d) no dimensions
3. Couple per unit twist is proportional to the length.
4. When you stretch a spring, what type of strain is produced in it?
5. What is the dimension of coefficient of viscosity?
6. Among the following liquids which of them have more surface tension?
 - (a) glycerol (b) water (c) mercury (d) ethyl alcohols
7. Entropy is a measure of
8. An adiabatic process occurs at constant
 - (a) temperature (b) pressure (c) heat (d) none of these.
9. In the given process of ideal gas, if $dW=0$ and $dQ<0$ then the temperature will
10. The efficiency of Carnot's engine working between 127°C and 27°C is

(10×1=10)

Section B
(Answer all, each carries two marks)

11. What are I-form girders? What are its advantages?
12. Differentiate between angles of twist and angle of shear?

13. Explain terminal velocity.
14. Small insects can walk on water surface. Why?
15. What do you mean by isobaric process and isochoric process?
16. Explain the concepts of entropy and disorder.
17. What is T-S diagram? What is the importance of T-S diagram?

(7×2=14)

Section C

(Answer any three, each carries four marks)

18. Show that the potential energy per unit volume of a strained wire is $U = \frac{1}{2} \times \text{Stress} \times \text{Strain}$.
19. Explain the effect of electric charge placed on a soap bubble.
20. From the first law of thermodynamics, prove that $C_p - C_v = R$.
21. Calculate the work done by an ideal gas during an isothermal process.
22. Explain the principle of torsion pendulum and find the period of oscillation

(3×4=12)

Section D

(Answer any three, each carries 4 marks)

23. Find the Young's modulus of the material of a wire of length 6m and diameter 1.5mm, which is stretched by 0.35 mm when a load of 1.5kg is applied.
24. A metal disc of 10cm radius and mass 1kg is suspended in a horizontal plane by a vertical wire attached to its centre. If the diameter of the wire is 1mm, length 2m and the period of torsional vibrations 4s, find the rigidity of the wire.
25. A soap bubble is spherical in shape and has a diameter of 8cm. If the surface tension of the surface separating soap solution and air is $40 \times 10^{-3} \text{N/m}$; What is the excess of pressure of the air in the bubble over the atmospheric pressure?
26. A solid melts at 220°C and the Latent heat of melting is 60cal/g. If the decrease in the specific volume is $0.08 \text{cm}^3/\text{g}$, calculate the change in melting point if pressure is increased by 3 atm.

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27. A quantity of air ($\gamma=1.4$) at 27°C is compressed suddenly to $\frac{1}{5}$ of its original volume. Find the final temperature.

(3×4=12)

Section E

(Answer any two, each carries 10 marks)

28. Define coefficient of viscosity. Establish Poiseuille's equation.

29. Calculate the work done in a Carnot's cycle of operation. Deduce the efficiency of a Carnot's engine in terms of the temperatures between which it works.

30. Define Helmholtz function and Gibbs function and derive related Maxwell's thermodynamic relations.

31. A cantilever having a circular cross-section is loaded at its free end. Obtain an expression for depression of this end.

(2×8=16)
