5U117

Name : .....

Reg.No: .....

FIRST SEMESTER DEGREE EXTERNAL EXAMINATION DEC. /JAN. 2015-16

(2015 ADMISSION)

CC15UPH1C01-PROPERTIES OF MATTER AND THERMODYNAMICS

(COMPLEMENTARY)

Time: 3 hrs Maximum marks: 64

Section A
(Answer all, each carries one mark)

1. The strain produced in a stretched spring is .....

a) linear strain b) volume strain c) shearing strain d) none of these

2. What are the theoretical limits of Poissons ratio?

3. Two wires of same metal are twisted by same couple, what is the ratio of angle of twist If $r_1:r_2=1:2$?

4. Critical radius of a drop is.....

5. On charging the bubble, it's excess of pressure

(a) does not change (b) increases (c) decreases (d) none of these

6. Kerosine oil rises up in the wick of a lantern because of .....

7. Helmoltz free energy remains constant in a ..... process.

8. Internal energy of a real gas depends upon:

(a)Only on the temperature (b) Only on the volume of the gas

(c) Only on the pressure of the gas (d) Size of the molecule

9. In a reversible adiabatic process, entropy:

(a) increases (b) remains unchanged (c) decreases (d) none of these

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 is bending moment?

12. Why girders for supporting roofs are formed in the shape of I?

13. What is viscosity? Define coefficient of viscosity.

14. What is Brownian motion?

15. Explain the concepts of entropy and disorder.

16. The conduction of heat from a hot body to a cold body is reversible or irreversible proces
    Explain.

17. What is indicator diagram? State its importance.

(7×2=14)

Section C
(Answer any two, each carries four marks)

18. Derive expression for the period of oscillation of a tortion pendulum.

19. Describe stoke's method of determination of coefficient of viscosity.

20. Calculate the work done by an ideal gas during an adiabatic process.

21. State the second law of thermodynamics. Deduce the efficiency of an ideal heat engine.

(2×4=8)

Section D
(Answer any three, each carries 4 marks)

22. A light metal rod of length 0.8m and radius 2 cm is clamped at one end and loaded at the f
end with 6kg. Calculate the depression at the free end.

23. A wire of radius 2mm and length 2m is twisted through 60°. Find the angle of shear at (a) surface of the wire, (b) a point midway between axis and the surface of the wire. If the rigidity modulus is $6X10^{10}N/m^2$, find the torsional couple applied.

24. An air bubble of radius 1.5cm is allowed to rises through along cylindrical column of a viscous liquid and travels at a steady rate of 0.2 cm s^{-1}. If the density of the liquid is 1470 kg m find its viscosity. Assume $g=9.8ms^{-2}$, neglect the density of air.

25. A quantity of air at 27°C and atmospheric pressure is suddenly compressed to half of its original volume. Find the final pressure. (Given $\gamma=1.4$, $2^{1.4}=2.64$)

26. A Carnot's engine whose lower temperature heat-sink is at 27°C has its efficiency 40%. What is the temperature of the heat source?

(3×4=12)

Section E
(Answer any two, each carries 10 marks)

27. Define Young's modulus, bulk modulus, modulus of rigidity and Poisson's ratio. Obtain the relations connecting these quantities.

28. Explain the excess of pressure of the curved surface. Derive expression for the excess of pressure for (a) spherical liquid drop in air, (b) an air bubble formed in the liquid and (c) an air bubble formed by the liquid film in air.

29. What is the first law of thermodynamics? Also derive the Mayer's relation $C_P - C_V = R$.

30. Deduce Clausius-Clapeyron's latent heat equation. Explain the effect of pressure on the boiling point of liquids and melting point of solids on the basis of above equation.

(2×10=20)

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