D 74382 **(Pages : 2)** **Name**

Reg. No. . . . . .

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

(CUCBCSS–UG)

Complementary Course—Physics

PH 1C 01—PROPERTIES OF MATTER AND THERMODYNAMICS

Time : Three Hours Maximum : 64 Marks

Section A

Answer **all** *questions.*
Each question carries 1 mark.

1. If the work done in stretching a wire by 1 mm is 2 J, the work necessary for stretching another wire of the same material but double the radius and half the length by 1 mm is _____
2. A wire can support a load W without breaking. It is cut into two equal parts. The maximum load that each part can support is _____
3. The viscous drag on a small spherical body moving with a speed v is proportional to
4. When the body attain terminal velocity its acceleration is _____
5. In a capillary tube, water rises to a height of 4 cm. If the cross-sectional area of the tube were one-fourth, water would have risen to a height of _____
6. A Carnot engine works first between 200° C and 0° C and then between 0°C and —200°C . The ratio of its efficiency in these two cases is _____
7. Mean free path of the molecule of a gas depends on the molecular diameter *d* as _____
8. 3.2 kg of ice at —10° C just melts with a mass m of steam is _____
9. First law of thermodynamics is the law of conservation of _____
10. In the given process of an ideal gas if $dW = 0$ and $dQ < 0$ then the temperature will _____

(10 x 1 = 10 marks)

Section B

Answer all **seven** *questions.*
Each question carries 2 marks.

11. Name a material whose elastic limit is zero.
12. Out of the stress and strain, which is the cause and effect ? Why ?
13. What is Poise ?
14. Define surface tension. Give its dimension.
15. State and explain zerot'h law of thermodynamics.

Turn over

16. Explain why $C_p > C_v$.

17. Write down Clausius Clapyron equation.

(7 x 2 = 14 marks)

Section C

Answer any **three** *questions.*
Each question carries 4 *marks.*

18. Obtain the relation between various elastic constant.

19. Derive an expression for the work done in blowing a bubble.

20. Discuss the various factors which control surface tension of liquid.

21. Write down the relations for Helmholtz free energy, Enthalpy and Gibb's function. Explain its importance.

22. Use Maxwell's relations to obtain $C_p - C_v = R$.

(3 x 4 = 12 marks)

Section D

Answer any **three** *problems.*
Each problem carries 4 *marks.*

23. A solid sphere of mass 3 kg and diameter 0.2 m is suspended from a wire. The torque required to twist the wire is 5×10^{-2} Nm/radian. Calculate the period of oscillation.

24. A metal plate 5 cm x 5 cm rests on layer of castor oil 1 mm thick whose coefficient of viscosity is 1.55 NS m^{-}. Find the horizontal force required to move the plate with a speed of 2 cm/s.

25. Calculate the amount of energy evolved when 8 droplets of water of surface tension 0.072 N/m and radius 0.5 mm each combine into one.

26. Calculate the change in entropy of a system contains 1 kg ice at 0° C, which melts at the same temperature. Latent heat of ice 79.6 k cal/kg.

27. Calculate the change in boiling point of water when the pressure is increased by 1 atmosphere. B.P of water is 373 K. Specific volume of steam = 1.671 m^3 and Latent heat of steam 2.268×10^6 J kg^{-1}.

(3 x 4 = 12 marks)

Section E

Answer any **two** *problems.*
Each problem carries 8 *marks.*

28. Derive an expression for the depression produced at the midpoint of a uniform rectangular bar loaded at its middle. How is Y determined by this method ?

29. Derive an expression for the rate of flow of liquid through capillary tube.

30. What is Carnot's engine ? Derive an expression for its efficiency in terms of temperature of so and sink.

31. Using Maxwell's relation, prove that ratio of adiabatic to isothermal bulk modulus is equal to ratio of specific heats.

(2 x 8 = 16 marks)