



QP CODE: 19101022



Reg No :

Name :

B.Sc.DEGREE(CBCS)EXAMINATION, DECEMBER 2018

First Semester

Complementary Course - PH1CMT02 - PHYSICS - PROPERTIES OF MATTER AND THERMODYNAMICS

(Common to B.Sc Chemistry Model I, B.Sc Geology Model I)

2017 Admission (Reappearance)

F649D46C

Maximum Marks: 60

Time: 3 Hours

Part A

Answer any **ten** questions.

Each question carries **1** mark.

1. Give one example of nearly perfectly elastic and plastic material.
2. Why hollow shafts are preferred to solid ones for transmitting torques in rotating machinery?
3. What do you mean by neutral surface?
4. If length of the cantilever is doubled without changing any other characteristics, then the depression at the loaded end will change by what factor for the same load.
5. What is surface tension? What is its unit?
6. Write any two advantages of surface tension.
7. Write down the expression for terminal velocity of a sphere falling through a viscous medium.
8. What do you mean by Brownian motion?
9. Explain thermodynamic variables?
10. What is an indicator diagram? Give its physical significance.
11. Give the expression for the efficiency of a Carnot's Engine and explain the terms.
12. Distinguish between Heat Engine and refrigerator?

(10×1=10)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. A uniform metal disc of diameter 10 cm and mass 1 kg is fixed symmetrically to the lower end of a torsion wire of length 1 m and diameter 1 mm, the upper end of which is fixed. The time period of the torsional oscillations is 2 s. Calculate the modulus of rigidity of the material of the wire.





14. Find the load required to stretch a steel wire of diameter 1 mm by 0.04% of its original length. Young's modulus of steel is $2 \times 10^{10} \text{ N/m}^2$
15. Find the relation between the radius and excess pressure inside (a) a spherical liquid drop and (b) a spherical liquid bubble.
16. A horizontal pipe 15 cm in diameter has a constriction 7.5 cm in diameter. If the velocity of water in the constriction is 10 m/s, find the difference between pressure there and the rest of the pipe. Which pressure is greater?
17. Derive Bernoulli's equation for the streamline flow of a liquid.
18. Obtain the expression for the workdone, when an ideal gas expands or compress isothermally?
19. Find the work done in an adiabatic process in terms of temperature.
20. Find the change in entropy when 10 kg of water at 80°C is mixed with 7 kg of water at 30°C .
[specific heat capacity of water is $4.18 \times 10^3 \text{ J/kg/K}$]
21. State and explain third law of thermodynamics and briefly explain the concept of entropy.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **10** marks.

22. Explain the term Poisson's ratio. Obtain the relation connecting Young's modulus (Y), rigidity modulus (η) and Poisson's ratio (σ).
23. Explain the term rigidity modulus of the material. Derive an expression for the couple required to twist a cylindrical rod of circular cross section through an angle θ at one end, the other end being kept fixed, and hence deduce an expression for the rigidity modulus of the rod.
24. Obtain the Poiseuille's equation for the volume of liquid flowing through a pipe.
25. Define thermodynamic potentials and derive the Maxwell's thermodynamical relations

(2×10=20)

