19. (a) Explain the cylindrical shell heat flow method of determining the thermal conductivity of rubber.

(OR)

(b) The opposite faces of a metal plate of 0·2 cm thickness are at a difference of temperature of 100° C and the area of the plate is 200 sq. cm. Find the quantity of heat that will flow through the plate in one minute if K = 80 $Wm^{-1} K^{-1}$.

20. (a) Show that the entropy of perfect gas remains constant in a reversible process but increases in an irreversible process.

(OR)

(b) A Carnot engine is operated between a source of temperature 450 K and a sink of temperature 250 K. If the engine receives 200 J of heat from the source. Calculate the amount of heat rejected to the sink and also, find the efficiency of the engine.

Register Number :

Name of the Candidate :

1 2 6 0

B.Sc. DEGREE EXAMINATION, 2008

(PHYSICS)

(FIRST YEAR)

(GROUP - A - MAIN)

(PART - III)

(PAPER - I)

530. PROPERTIES OF MATTER AND THERMAL PHYSICS

May]   [Time : 3 Hours

Maximum : 100 Marks

SECTION - A   (10 × 2 = 20)

Answer any TEN questions.
All questions carry equal marks.

1. Define Hooke's law in elasticity.

2. What is the difference between uniform bending and non - uniform bending of a beam ?

Turn over

3. Explain 'Elastic fatigue'.

4. Define surface tension. Give its units.

5. Explain angle of contact.

6. Give the units and dimensions of co-efficient of viscosity.

7. State and explain Feck's law of diffusion.

8. "Diffusion in gases is faster than in liquids". - Why ?

9. State the laws of osmotic pressure.

10. Define the co-efficient of linear expansion of a rod.

11. Define the pressure co-efficient of a gas.

12. Write a note on "Thermostat".

13. State and explain second law of thermodynamics.

14. Explain the concept of entropy.

15. Explain the principle of Air Conditioners.

SECTION - B $(5 \times 7 = 35)$

Answer ALL questions.
All questions carry equal marks.

16. (a) Obtain an expression for the couple per unit twist on a cylinder.

(OR)

(b) Give the theory and method for determining the modulus of rigidity of a wire using a Torsion pendulum.

17. (a) Describe, with relevant theory, determination of surface tension of water by capillary method.

(OR)

(b) Derive Stoke's law for the motion of a body in a viscous medium from dimensional considerations.

18. (a) Describe an experiment for the determination of diffusivity.

(OR)

(b) Discuss the depression of freezing point of a solution.

Turn over

SECTION - C   (3 × 15 = 45)

Answer any THREE questions.
All questions carry equal marks.

21. Define the elastic constants. Establish the relations between them.

22. Derive Poiseuille's formula for the flow of a liquid through a capillary tube. Mention its limitations. Discuss the Poiseuille's method for determining the co-efficient of viscosity of a liquid.

23. Discuss the elevation of boiling point of solution. Describe the determination of molecular weight of the solute from the elevation of the boiling point.

24. Describe, with relevant theory, the determination of thermal conductivity of rod by Forbe's method.

25. Explain Diesel cycle. Describe the working of a diesel engine. Derive expression for the efficiency of a diesel engine.