Register Number :

Name of the Candidate :

B.Sc. DEGREE EXAMINATION, 2008

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(PHYSICS)

(FIRST YEAR)

(**PART - III**)

(PAPER - I)

530. PROPERTIES OF MATTER AND THERMAL PHYSICS

December]   [Time : 3 Hours

Maximum : 100 Marks

SECTION - A   (10 × 2 = 20)

Answer any TEN questions.

All questions carry equal marks.

1. What are the theoretical limits to the value of Poisson's ratio ?

2. Define the term elastic fatigue.

3. Define modulus of elasticity and give its dimensions.

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19. (a) Explain the radial flow of heat method of determining the thermal conductivity of a material.

(OR)

(b) A bar of length 30 cm and uniform cross–section 5 cm^2 consists of two halves AB of copper and BC of iron welded together at B. The end A is maintained at 200°C and C at 0°C. The sides of the bar are thermally insulated. Find the rate of flow of heat along the bar when the steady state is reached. Thermal conductivity of copper is 385 $Wm^{-1} K^{-1}$ and that of iron is 51·3 $Wm^{-1} K^{-1}$.

20. (a) State and prove Carnot's theorem.

(OR)

(b) Obtain an expression for efficiency of Otto engine.

SECTION - C   (3 × 15 = 45)

2

B

4. Define: angle of contact.

5. Define surface energy. How it is related to surface tension ?

6. Obtain the dimensions of coefficient of viscosity.

7. Define coefficient of diffusion and give its unit and dimensions.

8. Bring out the similarities between the laws of osmotic pressure and perfect gas laws.

9. Define the term effusion of gases.

10. What are isotropic and anisotropic solids ?

11. Define temperature gradient.

12. Define volume coefficient of a gas.

13. Find the efficiency of a Carnot's engine working between 127°C and 27°C.

14. Define entropy. What happens to entropy of reversible and irreversible processes ?

15. State first law of thermodynamics.

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SECTION - B   (5 × 7 = 35)

Answer ALL questions.
All questions carry equal marks.

16. (a) Derive an expression for bending moment.

(OR)

(b) Describe the method of determination of Young's modulus of a bar by vibration method.

17. (a) Describe Ostwald viscometer. How it is used to compare the viscosities of two liquids ?

(OR)

(b) A liquid drop of radius R breaks up into 64 small drops. Calculate the change in energy.

18. (a) What is osmotic pressure ? Describe an experiment to measure the osmotic pressure of a give solution.

(OR)

(b) State Fick's law of diffusion and explain their analogy to laws of heat conductions.

Turn over

5

Answer any THREE questions.
All questions carry equal marks.

21. Describe Konig's method for the determination of Young's modulus of abeam with necessary theory.

22. Describe with necessary theory, the Rankine's experiment for the measurement of the viscosity of a gas.

23. Deduce the relation between the osmotic pressure and the elevation of boiling point of a solution. Explain how the molecular weight of the solute can be determined from the elevation of the boiling point.

24. Give the theory of cylindrical flow of heat. Describe an experiment to find the coefficient of thermal conductivity of rubber.

25. Write an essay on principle and function of air - conditioners.