Chapter- 12

Thermal Properties of Matter

Very Short Answer Type Questions (1 mark)

01. There is a hole in a metal disc. What happens to the size of the hole if the metal disc is heated?

02. The diameters of steel rods A and B having the same length are 2cm and 4cm respectively. They are heated through 100^0c. What is the ratio of increase of the length of A to that of B?

03. Which molecules, the molecules of 0^0c ice or of 0^0c water have more potential energy, and why?

04. Why pendulums made of invar are used in a pendulum clock?

05. A good conductor of heat is a good conductor of electricity. Why?

06. What is the temperature of the triple - point of water on the Fahrenheit scale?

07. Write the S.I unit of Co-efficient of thermal conductivity?

08. Birds are often seen to swell their feathers in winter. Why?

09. Why do Eskimos build double-walled houses of blocks of ice?

10. Is the temperature coefficient of thermal expansion always positive?

11. What is the unit of heat capacity?

12. Why water is taken as a very good coolant?

13. Why does the gap is made between the section of the slab of a bridge?

14. How does the melting point depend on pressure?

Short Answer Type Questions (2 and 3 marks)

15. Briefly describe the various scales of temperature and give the relation between them.

16. Define α and β. Obtain a relation between them.

17. Find the fractional change in the density of glycerine if its temperature is increased from 20^0C to 50^0C. Given the coefficient of cubical expansion for glycerine is $4.9\times10^{-4}\ ^0C^{-1}$. Also, find the % change?

18. What do you mean by the latent heat of fusion and latent heat of vaporization? Also, write its mathematical expression.

19. Define thermal conduction. Discuss the variable and steady-state of a rod being heated at one of its ends.

20. Distinguish between conduction, convection, and radiation.

21. What is Newton's law of cooling? Derive its mathematical relation.

22. A blacksmith fixes an iron ring on the rim of the wooden wheel of a bullock cart. The diameters of the rim and iron ring are 5.243m and 5.231m respectively at 27^0c. To what temperature should the ring be heated so as to fit the rim of the wheel? (" α for iron = 1.2 X $10^{-5}c^{-1}$)

23. Two rods A and B, one of equal length. Each rod has its ends at temperatures T_1 and T_2. What is the

24. Two metal strips A and B each of length L_0 and thickness d at temperature 'T^0C' be fastened together so that their ends coincide. The temperature coefficient of linear

expansion of A is α_A and that of B is α_B ($\alpha_A > \alpha_B$). Find the radius of the curvature of the strip when it is heated.

25. How much heat is needed to change 10g of ice at -10^0C to 10g steam at 110^0c?

26. When 0.15kg of ice at 0^0c it mixed with 0.30kg of water at 50^0c in a container, the resulting temperature is 6.7^0C. calculate the heat of fusion of ice.

27. 10gm of water at 10^0c mixed with 10gm of ice at -10^0c. Find the final temperature of the water.

28. A pan filled with hot food cools from 94^0 to 86^0c in 2 minutes. When the room temperature is 20^0c. How long will it take to cool from 71^0c to 69^0c?

Long Answer Type Questions (5 marks)

29. State Stefan's law of radiation for a perfect black body. Derive Newton's law of cooling from it.

30. (a) Define thermal conductivity and write its expressions and find its unit and dimension.

(b) What is meant by a perfect black body? State and prove Kirchhoff's law leads to the conclusion that good absorbers are good emitter