



INDIAN SCHOOL DARSAIT DEPARTMENT OF PHYSICS



| | | |
|---|---|--------------------|
| Subject : Physics | Topic : Thermal Properties of Matter | Worksheet No. 11 |
| Resource Person : Mrs. Jayalakshmi Ratish | Date : _____ | |
| Name of the Student : _____ | Class & Division : XI A/B | Roll Number : ____ |

- 1 At what temperature does Fahrenheit and Celsius scale coincide?
- 2 A body cools from 60°C and 40°C in 7 minute when placed in a surrounding which is maintained at a temperature of 10°C . What the final temperature of the body after 7 mins?
- 3 How much heat energy is absorbed when 50 g ice cube melts at 0°C ? (Latent heat of fusion = $3.35 \times 10^5 \text{ J/kg}$).
- 4 A blacksmith fixes iron ring on the rim of the wooden wheel of a bullock cart. The diameters of the rim and the iron ring are 5.243 m and 5.231 m respectively at 27°C . To what temperature should the wheel be heated so as to fit the rim of the wheel? (α of iron is $1.20 \times 10^{-5} \text{ }^{\circ}\text{C}^{-1}$)
- 5 The temperature of 100 g of water is to be raised from 24°C to 90°C by adding steam to it. Calculate the mass of the steam required for this purpose. Take specific heat of water = $4.2 \times 10^3 \text{ J kg}^{-1} \text{ }^{\circ}\text{C}^{-1}$ and Latent heat of vaporization $2268 \times 10^3 \text{ J/kg}$.
- 6 One end of a 0.25 m long metal bar is in steam and the other in contact with ice. If $12 \times 10^{-3} \text{ kg}$ of ice melts per minute, what is the thermal conductivity of the metal? Cross-section of the bar is $5 \times 10^{-4} \text{ m}^2$ and latent heat of ice is 80 kcal/kg.
- 7 An iron sphere has a radius of 10 cm at a temperature of 0°C . Calculate the change in volume of the sphere if it is heated to 100°C . (α of iron is $1.20 \times 10^{-5} \text{ }^{\circ}\text{C}^{-1}$)
- 8 A faulty thermometer has its fixed points marked as 5° and 95° . The temperature of a body as measured by the faulty thermometer is 59° . Find the correct temperature of the body on Celsius scale.
- 9 A steel beam is 5 m long at a temperature of 20°C . On a hot day, the temperature rises to 40°C .
 - (a) What is the change in length of the beam due to thermal expansion?
 - (b) Suppose the ends of the beam are initially in contact with a rigid vertical supports. How much force will the expanded beam exert on the supports, if it has cross sectional area of 60 cm^2 . Given α of steel is $1.20 \times 10^{-5} \text{ }^{\circ}\text{C}^{-1}$ and Y of steel is $2 \times 10^{11} \text{ N/m}^2$.

- 10 Calculate the temperature (in Kelvin) at which a perfect blackbody radiates at the rate of 5.67 W/cm^2 , given that $\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$
- 11 How much heat energy is liberated when 100 g of copper in a vessel is cooled from 100°C to 50°C ? Given specific heat capacity of copper is $385 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1}$.
- 12 How much the temperature of a brass rod should be increased so as to increase its length by 1%? Given that α of brass is $2.0 \times 10^{-5} \text{ }^\circ\text{C}^{-1}$
- 13 A metal plate 4 mm thick has a temperature difference of 32°C between its faces. It transmits 200 kcal/h through an area of 5 cm^2 . Calculate the thermal conductivity of the material of the plate.
- 14 Two equal plates with thermal conductivities K_1 and K_2 are joined together to form a single plate of double thickness. Obtain equivalent conductivity.
- 15 A body at 80°C cools to 64°C in 5 minutes and to 52°C in the next 5mins. What will be its temperature after another 5 mins. Also calculate temperature of surrounding.
- 16 The density of mercury is 13.6 g/cc at 0°C and its coefficient of cubical expansion is $1.82 \times 10^{-4} \text{ }^\circ\text{C}^{-1}$. Calculate density of mercury at 50°C