

## Thermometry

**1. Temperature can be expressed as a derived quantity in terms of**

- |                          |                  |
|--------------------------|------------------|
| 1) Length and Mass       | 2) Mass and Time |
| 3) Length, Mass and Time | 4) None of These |

**2. A Celsius is a unit of**

- |            |         |                |                       |
|------------|---------|----------------|-----------------------|
| 1) Current | 2) Heat | 3) Temperature | 4) Quantity of Matter |
|------------|---------|----------------|-----------------------|

**3. Mercury is used in liquid thermometers because it has**

- 1) High specific heat and high conductivity
- 2) High specific heat and low conductivity
- 3) Low specific heat and low conductivity
- 4) Low specific heat and high conductivity

**4. Very low temperatures are measured by**

- |                              |                                 |
|------------------------------|---------------------------------|
| 1) Gas Thermometers          | 2) Pyrometers                   |
| 3) Thermocouple Thermometers | 4) Vapour Pressure Thermometers |

**5. The temperature of the sun is measured with**

- |                         |                                |
|-------------------------|--------------------------------|
| 1) Platinum Thermometer | 2) Gas Thermometer             |
| 3) Pyrometer            | 4) Vapour Pressure Thermometer |

**6. Of the following thermometers the one which is most useful for the measurement of a rapidly varying temperature is a**

- 1) Platinum Resistance Thermometer
- 2) Gas Thermometer
- 3) Thermoelectric Thermometer
- 4) Saturation Vapour Pressure Thermometer

**7. Standardization of thermometers is obtained with**

- |                             |                                    |
|-----------------------------|------------------------------------|
| 1) Jolly's Thermometer      | 2) Platinum Resistance Thermometer |
| 3) Thermocouple Thermometer | 4) Gas Thermometer                 |

**8. To measure temperature, most accurately one should use**

- |                                    |                           |
|------------------------------------|---------------------------|
| 1) Thermocouple Thermometer        | 2) Resistance Thermometer |
| 3) Constant Volume Gas Thermometer | 4) Mercury Thermometer    |

**9. A temperature  $T$  is measured by a constant volume gas thermometer**

- 1)  $T$  is independent of the gas used at all pressures
- 2)  $T$  is independent of the gas used only at high pressure
- 3) The ideal gas scale agrees with the absolute scale of temperature
- 4) The ideal gas scale does not agree with the absolute scale of temperature

**10. A constant volume gas thermometer works on**

- |                          |                 |                |                 |
|--------------------------|-----------------|----------------|-----------------|
| 1) Archimedes' principle | 2) Pascal's law | 3) Boyle's law | 4) Charles' law |
|--------------------------|-----------------|----------------|-----------------|

**11. The value of temperature coefficient of resistance thermometer is**

- |                      |                      |
|----------------------|----------------------|
| 1) Low and Negative  | 2) Low and Positive  |
| 3) High and Negative | 4) High and Positive |

**12. The temperature of a gas is measured with a**

- |                                    |                                |
|------------------------------------|--------------------------------|
| 1) Platinum Resistance Thermometer | 2) Pyrometer                   |
| 3) Gas Thermometer                 | 4) Vapour Pressure Thermometer |

**13. For a constant volume gas thermometer, one should fill the gas at**

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| 1) High temperature and high pressure | 2) High temperature and low pressure |
| 3) Low temperature and low pressure   | 4) Low temperature and high pressure |

**14. The resistance  $R_t$  of a conductor varies with temperature as shown in fig. If the**

**variation is represented as  $R_t = R_0(1 + \alpha t + \beta t^2)$**

- |   |   |
|---|---|
| 1) $\alpha$ and $\beta$ are both negative | 2) $\alpha$ is positive and $\beta$ is negative |
| 3) $\alpha$ and $\beta$ are both positive | 4) $\alpha$ is negative and $\beta$ is positive |

**15. On which of the following scales of temperature, the temperature is never negative**

- 1) Celsius                      2) Fahrenheit                      3) Reaumur                      4) Kelvin

**16. We plot the graph having temperature in  $^{\circ}\text{C}$  on x - axis and in  $^{\circ}\text{F}$  on y - axis. If the graph is straight line, then the correct statement is**

- 1) The line intercepts the positive x - axis  
2) The line intercepts the positive y - axis  
3) The line passes through origin  
4) The line intercepts the negative axis of both x and y - axes

**17. A thermometric liquid which can be used to measure temperature between -  $40^{\circ}\text{C}$  to +  $40^{\circ}\text{C}$  is**

- 1) Water                      2) Alcohol                      3) Mercury                      4) Phenol

**18. The study of physical phenomenon at low temperatures (below liquid nitrogen temperature) is called**

- 1) Refrigeration                      2) Radiation                      3) Cryogenics                      4) Pyrometer

**19. The absolute zero is the temperature at which**

- 1) Water freezes                      2) All substances exist in solid state  
3) Molecular motion ceases                      4) None of the above

**20. The reading of centigrade thermometer coincides with that of Fahrenheit thermometer in a liquid. The temperature of the liquid is**

- 1)  $-40^{\circ}\text{C}$                       2)  $0^{\circ}\text{C}$                       3)  $100^{\circ}\text{C}$                       4)  $300^{\circ}\text{C}$

**21. A centigrade and a Fahrenheit thermometer are dipped in boiling water. The water temperature is lowered until the Fahrenheit thermometer registers  $176^{\circ}\text{F}$ . What is the fall in temperature as registered by the Centigrade Thermometer?**

- 1)  $20^{\circ}\text{C}$                       2)  $40^{\circ}\text{C}$                       3)  $60^{\circ}\text{C}$                       4)  $80^{\circ}\text{C}$

22. A fixed mass of an ideal gas is maintained at constant volume the pressure of the gas at triple point of water is  $p_{tr}$  then the thermodynamic temperature of the gas when the pressure is P

- 1)  $273.16\left(\frac{P}{P_{tr}}\right)K$       2)  $273.16\left(\frac{P-P_{tr}}{P_{tr}}\right)K$       3)  $273.16\left(\frac{P_{tr}}{P}\right)K$       4)  $273.16\left(\frac{P+P_{tr}}{P}\right)K$

23. On the Celsius scale, the absolute zero of temperature is at

- 1)  $0^{\circ}C$       2)  $-32^{\circ}C$       3)  $100^{\circ}C$       4)  $-273.15^{\circ}C$

24. If a thermometer reads freezing point of water as  $20^{\circ}C$  and boiling point as  $150^{\circ}C$ , how much thermometer read when the actual temperature is  $60^{\circ}C$

- 1)  $98^{\circ}C$       2)  $110^{\circ}C$       3)  $40^{\circ}C$       4)  $60^{\circ}$

25. The higher and lower fixed points on a thermometer are separated by 160mm. When the length of the mercury thread above the lower temperature is 40 mm, the temperature reading would be

- 1)  $40^{\circ}C$       2)  $120^{\circ}C$       3)  $32^{\circ}C$       4)  $25^{\circ}C$

**Key**

- 1) 4    2) 3    3) 4    4) 4    5) 3    6) 3    7) 4    8) 3    9) 3  
10) 4    11) 4    12) 3    13) 2    14) 3    15) 4    16) 2    17) 2    18) 3  
19) 3    20) 1    21) 1    22) 1    23) 4    24) 1    25) 4

### Hints

20.  $\frac{C}{100} = \frac{F-32}{180}$       Here  $C = F = x$

$$\therefore \frac{x}{100} = \frac{x-32}{180}$$

$$9x = 5x - 160$$

$$\therefore x = -40$$

21.  $\frac{\Delta C}{100} = \frac{\Delta F}{180}$

$$\Delta C = \frac{5}{9}(212-176) = 20^{\circ}\text{C}$$

22.  $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

$$\therefore \frac{P_r}{273.16} = \frac{P}{T_2} \Rightarrow T_2 = 273.16 \left( \frac{P}{P_r} \right)$$

23.  $\frac{C}{100} = \frac{K-273}{100}$

$$C = 0 - 273$$

$$\therefore C = -273^{\circ}\text{C}$$

24.  $\frac{C}{100} = \frac{Z-X}{Y-X}$

$$\frac{60}{100} = \frac{Z-20}{150-20}$$

$$\therefore Z = \frac{490}{5} = 98^{\circ}\text{C}$$

25.  $160\text{mm} = 100^{\circ}\text{C}$

$$40\text{mm} = ?$$

$$\frac{40}{160} \times 100 = 25^{\circ}\text{C}$$