1. Explain how a centigrade scale of temperature defined
   Describe the working principle of a resistance thermometer. Explain how the readings on the thermometer are obtained at the fixed points of the centigrade temperature scale
   (b) The resistance R_t of a platinum wire at temperature measured on the gas scale, is given by $R_t = R_0(1 + \alpha t + bt^2)$where $\alpha = 3.8 \times 10^{-3}$ and $b = -5.6 \times 10^{-7}$. What temperature will the platinum thermometer indicate when the temperature on the scale is 200°C?

2. The resistance of the element in a platinum resistance thermometer is 6.75Ω at triple point of water and 7.166 Ω at room temperature. What is the temperature of the room on a scale of resistance thermometer? state one assumption you have made. An[290K]

3. The resistance of platinum wire is 4 Ω at ice point and 5.6 Ω at steam. Find the temperature at which the resistance is 9.84 Ω

4. A particular constant –volume gas thermometer registers a pressure of $1.937 \times 10^4 Pa$ at the triple point of water and $2.618 \times 10^4 Pa$ at the boiling of a liquid. What is the boiling point of the liquid according to this thermometer

5. The resistance of a particular resistance thermometer at Celsius temperature θ as measured by a constant volume gas thermometer is. $R_\theta = 50 + 0.17\theta + 3 \times 10^{-4}\theta^2$ Calculate the temperature as measured on a scale of a resistance thermometer which corresponds to a temperature of 60℃ at a gas thermometer.

6. The value of property X of a substance X is given by $X_t = X_0 + 0.5t + 2 \times 10^{-4}t^2$ Where t = temperature in ℃ measured in gas thermometer scale. What will be the Celsius temperature at 50℃ on this thermometer scale?

7. The resistance of the wire as measured by gas thermometer varies with temperature θ according to the equation. . $R_\theta = (1 + 50\alpha\theta + 200\alpha\theta^2)$Determine temperature on resistance thermometer that corresponds to 50℃ on the gas scale.

8. A thermocouple has the cold junction immersed in an ice water mixture at 0℃. When the hot junction is in boiling water, the e.m.f is 1.65 mV. Estimate the temperature of the hot junction when the e.m.f is 1.47 mV. [Ans: 89.1 °C]

9. The volume V_θ of a fixed mass of mercury at a temperature θ℃ measured on a perfect gas scale is given by, $V_\theta = V_0(1 + \alpha\theta + b\theta^2)$ where $\alpha = 1.818 \times 10^{-4}$ and $b = 0.8 \times 10^{-8}$. Calculate the temperature expected on the mercury thermometer when the temperature on the gas scale is 40℃

10. The Uganda National Bureau of Standards (UNBS) is responsible for measuring the temperatures of various substances and materials to ensure accurate standardization. However, the lab team often struggles with inaccurate readings especially when measuring temperatures across a wide range from very cold (-200℃) to extremely hot substances (1200℃). The lab technician has approached you, a physics student for expert advice on how to solve this problem using the right kind of thermometer.

    Task

    a) Use a labelled diagram to explain to the technician the mode of operation of the type of thermometer he would use to measure accurate temperatures over wide ranges
    b) In some other experiments carried out from the same lab, the volume of a gas that was recorded by a constant pressure gas thermometer at kelvin temperature T was 12.4litres. calculate T if the volume at triple point of water was 22.5litres