Tutorial – 2 Batch B

PLEASE ANSWER THESE QUESTIONS ON PAPER HANDWRITTEN, SCAN IT (NO PHOTOGRAPHS) PROPERLY AND SUBMIT THEM AS ONE PDF FILE. NAME THE PDF FILE AS

Your RollNumber_tut2.pdf

IN EACH PAGE CLEARLY WRITE (YOUR HAND WRITING) YOUR ROLL NUMBER, NAME AND YOUR GROUP INFORMATION (A or B) AT THE CENTRE OF PAGE (NOT AT THE TOP OR BOTTOM).

1 A block of copper at a pressure of 1 atm (approximately 100 kPa) and a temperature of $5\ ^{o}C$ is kept at constant volume. If the temperature is raised to $10\ ^{o}C$, what will be the final pressure?

If the vessel holding the block of copper has a negligibly small thermal expansivity and can withstand a maximum a maximum pressure of 1000 atm, what is the highest temperature to which the system may be raised?

(Note: The volume expansivity β and isothermal compressibility ƙ are not always listed in handbooks of data. However, β is three times the linear expansion coefficient α, and ƙ is the reciprocal of the bulk modulus B. For this problem, assume that the volume expansivity and isothermal compressibility remain practically constant within the temperature range of 0 to $20\ ^{o}C$ at the values of $4.95 \times 10^{-5}\ K^{-1}$ and $6.17 \times 10^{-12}\ Pa^{-1}$, respectively.)

2) When the reference junction of a thermocouple is kept at the ice point and the test junction at the Celsius temperature t, the emf E of the thermocouple is given by $E = \alpha t + \beta t^2$, where α = 0.20 mV/°C and β = -5.0xl0^{-4} mV/deg$^{2.}$
Suppose that the emf E is taken as the thermometric property, and a temperature t* is defined by the linear equation t* = A E + B, and that t* = 0 at the ice point and t* = 100 at the steam point. Find the numerical value of A and B. Find the values of t* at t = -100° C, 200° C, 300° C and 400° C.

3) Find the work required to isothermally blow a soap of bubble to radius r?