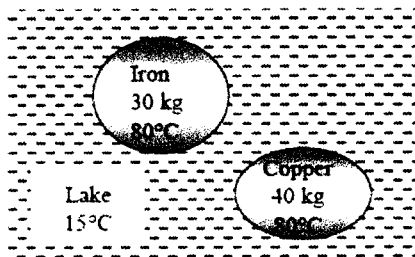


- 一、 針對熱力學第一定律、第二定律、及第三定律，請各給予不同的表示式或敘述，並討論前兩個定律在工程應用上的重要性。(15分)

二、 某一氣體的定壓膨脹係數為 $\alpha = \frac{1}{T} \left(1 + \frac{3a}{VT^2} \right)$ 、等溫壓縮係數 $\kappa = \frac{1}{p} \left(1 + \frac{a}{VT^2} \right)$ ，

其中 a 是一個常數，試求出此氣體的狀態方程式。(25分)

- 三、 A hot iron block and a hot copper block (as shown in the following figure) are dropped into a large lake. Please find the total amount of entropy change when both blocks cool to the lake temperature. Assume the specific heats of iron and copper at room temperature are $C_{\text{iron}} = 0.45 \text{ kJ/kg} \cdot ^\circ\text{C}$ and $C_{\text{copper}} = 0.386 \text{ kJ/kg} \cdot ^\circ\text{C}$. (20分)



- 四、 What are the major difference between the classical thermodynamics and statistical thermodynamics? (5分)
- 五、 Consider a simple ideal Rankine cycle with fixed boiler and condenser pressures. If the cycle is modified with reheating, (select the correct statement) (a) the turbine work output will decrease. (b) the amount of heat rejected will decrease. (c) the pump work input will decrease. (d) the moisture content at turbine exit will decrease. (e) the amount of heat input will decrease. (5分)
- 六、 解釋名詞：(每小題5分共30分)
- (1). 非理想溶液(non-ideal solution)、
 - (2). 剩餘性質(residual property)、
 - (3). 柯布法則(Kopp's Rule)、
 - (4). 自由膨脹(free expansion)、
 - (5). 維里狀態方程式(virial equation of state)、
 - (6). 泡點壓力(bubble point pressure)。