

博士資格考 熱力部分 50% 每題10分

1. 試繪出冷凍循環示意圖。
 2. 試簡繪液態水與水蒸氣之溫度容積圖，並呈現等壓線及臨界點。
 3. 若 $PV^n = \text{常數}$
則 $\int_1^2 P dV = ?$
 4. 以圖說明標準空氣奧圖循環 (PV圖或TS圖)，並以圖表達此循環熱效率與壓縮比之關係。
 5. 請用PV圖表示理想氣體的卡諾循環。
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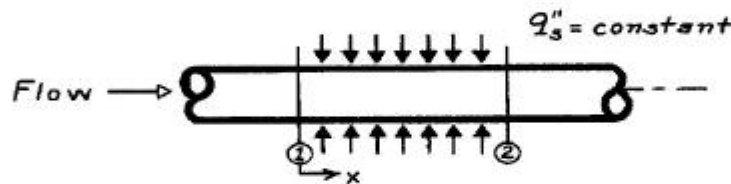
1. (15%) (a). Please describe the physical mechanisms of conduction, convection and radiation, and write their rate equations.

(b). What is the difference between natural convection and force convection ?

2. (20%) Consider flow in a circular tube. Within the test section length (between 1 and 2) a constant heat flux q''_s is maintained.

(a). For the following two cases, sketch the surface temperature $T_s(x)$ and the fluid mean temperature $T_m(x)$ as a function of distance along the test section x . In case A flow is hydrodynamically and thermally fully developed. In case B flow is not developed.

(b). Assuming that the surface flux q''_s and the inlet mean temperature $T_{m,1}$ are identical for both cases, will the exit mean temperature $T_{m,2}$ for case A be greater than, equal to or less than $T_{m,2}$ for case B ? Briefly explain why



3. (15%) A two-dimensional rectangular plate is subjected to the boundary conditions shown. Derive an expression for the steady state temperature distributions $T(x,y)$.

