

元智大學 107 學年度 碩士班 招生試題卷

系(所)別：機械工程學系碩士班 組別：不分組

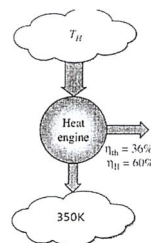
科目：熱力學

用紙第 1 頁共 2 頁

●不可使用電子計算機

2018 研究所熱力考題

- Starting with the first Tds relation $ds = \frac{du}{T} + \frac{P}{T} dV$, prove (證明) that isentropic process ($s = \text{constant}$) will also lead to (導致) isothermal process ($T = \text{constant}$) for incompressible substances (ex. solid or liquid, $c_v = c_p = c$, $du = c dT$) (15%)
- (a) Please define coefficient of performance of refrigerator (COP_R) and heat pump (COP_{HP}) (10%)
(b) Prove that $\text{COP}_{HP} = \text{COP}_R + 1$ (10%)
- What's 2nd law of Carnot principle: (10%)
- A heat engine that rejects waste heat (移除廢熱) to a sink at 350 K has a thermal efficiency of 36% and a second law efficiency of 60%. Determine the temperature of the source (T_H) that supplies heat to the engine. (10%)



- What is the definition of performance (or efficiency) (5%)
- What's the difference between saturated vapor (飽和氣) and superheated vapor (過熱氣)? (10%)
- What's the difference between lower heating value (LHV, 低熱值) and higher heating value (HHV, 高熱值)? (5%)
- Which of the object (物體) could not be modeled (視為) as thermal energy reservoirs (a) oceans, (b)

元智大學 107 學年度 碩士班 招生試題卷

系(所)別：機械工程學系碩士班 組別：不分組

科目：熱力學

用紙第 2 頁共 2 頁

●不可使用電子計算機

lakes, (c) classroom (d) rivers, Explain (5%)

9. What's 2nd law of thermodynamics – Kevin Plank Statement ? (5%)

10. In the absence of any friction (忽略摩擦力的影響), can a heat engine have an efficiency of 100%? Explain. (10%)

11. What final state (最終狀態) will maximize (最大化) the work output of a device? (5%)