

國立臺北科技大學

九十二學年度製造科技研究所入學考試

熱力學試題

填准考證號碼

第一頁 共一頁

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注意事項：

1. 本試題共【4】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. Please answer the following questions: (25%)
 - (a) Increase of entropy principle
 - (b) Clapeyron equation
 - (c) Joule-Thomson coefficient
 - (d) Cogeneration
 - (e) Throttling steam Calorimeter

2. Sketch the T-s and p-v diagrams: (25%)
 - (a) Rankine cycle
 - (b) Diesel cycle
 - (c) Ericsson cycle
 - (d) Brayton refrigeration cycle
 - (e) Vapor compression refrigeration cycle

3. The working substance in a Carnot engine is 0.05 kg of air. The maximum cycle temperature is 940 K, and the maximum pressure is 8.4 MPa. The heat added per cycle is 4.2 kJ. Determine the maximum cylinder volume if the minimum temperature during the cycle is 300 K. (25%)

4. Two kilograms of oxygen are expanded isothermally from 380 K and 700 kPa to 100 kPa while obeying the van der Waals equation of state. Determine the change in internal energy and entropy for the process.

van der Waals constants for oxygen

$$a = 136.9 \text{ kPa (m}^3 / \text{kgmol)}^2$$

$$b = 0.0315 \text{ m}^3 / \text{kgmol}$$

(25 %)