

國立臺北科技大學 108 學年度碩士班招生考試

系所組別：1303 車輛工程系碩士班

第二節熱力學試題（選考）

第一頁 共一頁

注意事項：

1. 本試題共五題，每題二十分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

- 一、An automobile engine produces 100 kW on the output shaft with a thermal efficiency of 33%. The fuel it burns gives 36000kJ/kg as energy release. Find the total rate of energy rejected to the ambient (10%) and the rate of fuel consumption in kg/s. (10%)
- 二、A car engine burns 6 kg fuel at 1500 K and rejects energy to the radiator and exhaust at a temperature of 700 K. If the fuel provides 35000kJ/kg, what is the maximum amount of work the engine can provide? (20%)
- 三、A compressor receives air at 100 kPa, 298 K, with a velocity of 5 m/s. At the compressor discharge, the air exits at 1000 kPa, 500 K, with a velocity of 25 m/s, and then flows into a constant-pressure aftercooler, where it is cooled down to 360 K. The power input to the compressor is 50 kW. Determine the heat transfer in the aftercooler. (20%)
- (Air $C_v = 0.7176 \text{ kJ/kgK}$, $C_p = 1.004 \text{ kJ/kgK}$ $R = 0.287 \text{ kJ/kgK}$)
- 四、A wind turbine with a rotor diameter of 20 m takes 35% of the kinetic energy out as shaft work on a day with 20°C , 100 kPa and wind speed of 35 km/hr. What power is produced? (20%)
- (Air $C_v = 0.7176 \text{ kJ/kgK}$, $C_p = 1.004 \text{ kJ/kgK}$ $R = 0.287 \text{ kJ/kgK}$)
- 五、A piston/cylinder contains air at 500 kPa, 300 K and a volume of 0.01 m^3 . A constant-pressure process gives 50 kJ of work out. Find the final volume (6%), the temperature (6%) of air, and the heat transfer. (8%)

(Air $C_v = 0.7176 \text{ kJ/kgK}$, $C_p = 1.004 \text{ kJ/kgK}$ $R = 0.287 \text{ kJ/kgK}$)