國立臺北科技大學 109 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）

注意事項：

1. 本試題共 3 題，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。

1. A piston cylinder has the water volume separated into V_1=0.2 m³ and V_2=0.3 m³ by a stiff membrane. The initial state in V_1 is 1000 kPa quality x=0.75 and in V_2 it is 1600 kPa and 250°C. Now the membrane ruptures and the water comes to a uniform state with 200°C.
   a. Find the final pressure (5%)
   b. Fine the final volume (5%)
   c. Fine the work in the process (10%)
   d. Fine the heat transfer in the process (10%)

2. A 5kg granite rock was placed over a fire and warms to 200°C. A pot with cold water at 15°C is now placed on top of the rock piece and it should be brought to the boiling temperature T. Assume the fire is put out and we have no external heat transfer.
   a. What is the mass of water we can have in the pot? (15%)
   b. Fine the entropy generation in the overall process. (15%)

3. A piston cylinder contains 0.01 kg air at 290K, 96kPa. A reversible adiabatic compression brings it to 1/10 of initial volume. After this process combustion adds 1000kJ/kg of energy (heat) in a constant P process to state 3.
   a. Plot the two process in a P-v and T-s diagram. (10%)
   b. Find pressure (P) and temperature (T) for state 2. (10%)
   c. Find temperature (T) for state 3. (10%)
   d. Find the work in the two processes. (10%)