

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

考試日期：0301，節次：1

1. Air is compressed adiabatically and steadily from 1 bar and 27°C to 10 bars at a rate of 5 kg/min. Please determine the power input required and the final temperature reached for a reversible process (assume that c_p and c_v of air is constant and $= 1 \text{ kJ/kg}^{\circ}\text{K}$, $0.714 \text{ kJ/kg}^{\circ}\text{K}$). (25%)
2. One kilogram of air in a rigid insulated tank is initially at $P_1 = 1 \text{ bar}$ and $T_1 = 300^{\circ}\text{K}$. The air is stirred by a paddle wheel until its pressure is 1.5 bars. Please determine a) the actual work done and b) the minimum work done. (25%)
3. Explain why the back work ratio of vapor power cycles is much lower than that of gas turbine cycles, and why the gas turbine cycles can still possess thermal efficiencies equivalent or even higher than that of vapor power cycles. (25%)
4. Please identify the restrictions of thermal efficiencies for the design of Otto and Brayton cycles. (25%)