

มหาวิทยาลัยสงขลานครินทร์

คณะวิศวกรรมศาสตร์

การสอบปลายภาค ประจำภาคการศึกษาที่ 1

ประจำปีการศึกษา 2546

วันที่ 8 ตุลาคม 2546

เวลา 13.30-16.30 น.

วิชา 216-331 Thermodynamics II

ห้อง R 300

Name..... No.....

Attempts all questions.

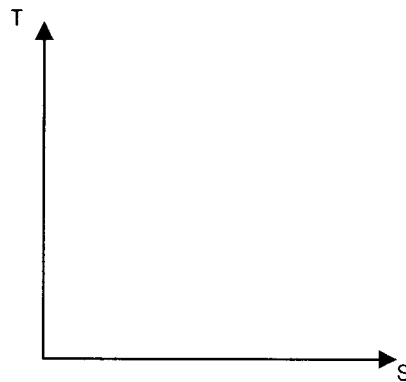
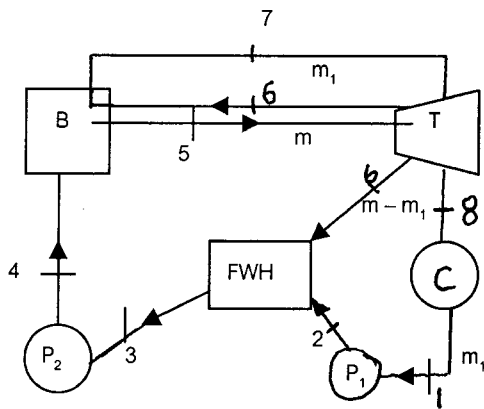
ผศ.ดร.ชูเกียรติ กุปตานนท์

ผู้ออกข้อสอบ

ข้อสอบ	คะแนน
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รวม	

1. Consider an ideal steam cycle that combines the reheat and the regenerative cycle. The net power output of the turbine is 100 MW. Steam enters the high-pressure turbine at 8 MPa, 550°C . After expansion to 0.6 MPa, some of the steam goes to an open feedwater heater and the balance is reheated to 550°C , after which it expands to 10 kPa

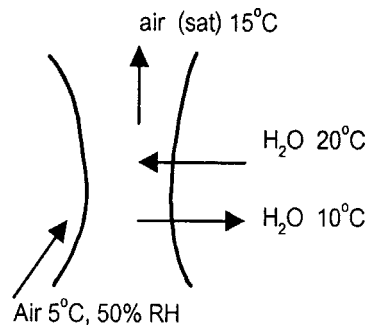
- Draw a line diagram of the unit and show the state points on a T-s diagram.
- What is the steam flowrate to the high pressure turbine?
- What power motor is required to drive each of the pumps?



2. Water enters a cooling tower at 20°C and leaves at 10°C. The air enters at 5°C and 50% RH, and leaves, saturated, at 15°C.

Determine the ratio of mass flowrate of entering water and air, and the percentage of entering water which leaves with the air as steam.

The pressure may be taken as $101.3 \times 10^3 \text{ N/m}^2$ throughout, and the enthalpy of vapor at entry is 2510 kJ/kg.



3. Gaseous propane is burned with 50% excess air at a pressure of 970 mbar. If the entering air is dry, determine :
- the mole analysis of the product gas assuming complete combustion,
 - the dew point of the gas mixture, and
 - the percent of the H_2O formed that is condensed if the product gases are cooled to $20^\circ C$.

4. A gas turbine uses $C_8H_{18}(liq.)$ as fuel and 400% theoretical air. The air and fuel enter at $25^\circ C$ and the products of combustion leave at $627^\circ C$. The output and the fuel composition are measured and it is found to be 1 kg/kW.hr

Determine the heat transfer from the engine per kg.mole of fuel.

Given ; enthalpy of $C_8H_{18}(liq.)$ at $25^\circ C = - 249,950$ kJ/kg.mole