มหาวิทยาลัยสงขลานครินทร์

คณะวิศวกรรมศาสตร์

การสอบปลายภาค ประจำภาคการศึกษาที่ 1 ประจำปีการศึกษา 2547

วันที่ 9 ตุลาคม 2547 เวลา 13.30-16.30 น.

วิชา 216-331 Thermodynamics II ห้อง R 300

<u>คำสั่ง</u>

1. ข้อสอบมี 5 ข้อ ให้ทำทุกข้อ
2. ไม่อนุญาตให้นำตำราเข้าห้องสอบ

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ผู้ออกข้อสอบ

ข้อสอบ	คะแนน
1	
2	
3	
4	
5	
รวม	

ชื่อ-สกุล..... รหัส.....

1. Consider a steam power plant which operates on a reheat Rankine cycle and has a net power output of 150 MW. Steam enters the high-pressure turbine at 10 MPa and 500°C and the low-pressure turbine at 1 MPa and 500°C. Steam leaves the condenser as a saturated liquid at a pressure of 10 kPa. The adiabatic efficiency of the turbine is 80 percent, and that of the pump is 95 percent. Show the cycle on a T-s diagram with respect to saturation lines, and determine ;
   (a) the quality (or temperature, if superheated) of the steam at the turbine exit,
   (b) the thermal efficiency of the cycle, and
   (c) the mass flow rate of the steam.

ชื่อ-สกุล..... รหัส.....

2. A 0.9-m^3 rigid tank is divided into two equal compartments by a partition. One compartment contains Ne at 20°C and 100 kPa, and the other compartment contains Ar at 50°C and 200 kPa. Now the partition is removed, and the two gases are allowed to mix. Heat is lost to the surrounding air at 20°C during this process in the amount of 15 kJ. Determine ;

   (a) the final mixture temperature and

   (b) the final mixture pressure.

ชื่อ-สกุล..... รหัส.....

3. Air enters a window air conditioner at 1 atm, 32°C, 70 percent relative humidity at a rate of 8 m^3/min, and it leaves as saturated air at 12°C. Part of the moisture in the air which condenses during the process is also removed at 12°C.

   Determine the rate of heat and moisture removal from the air

ชื่อ-สกุล..... รหัส.....

4. A gaseous fuel with a volumetric analysis of 60 percent CH_4 , 30 percent H_2 , and 10 percent N_2 is burned to completion with 130 percent theoretical air. Determine

   (a) the air-fuel ratio and

   (b) the fraction of water vapor which would condense if the product gases were cooled to 20°C at 1 atm.

ชื่อ-สกุล..... รหัส.....

5. Ethane gas (C_2H_6) at 25°C is burned in a steady-flow combustion chamber at a rate of 5 kg/h with stoichiometric amount of air which is preheated to 500 K before entering the combustion chamber. An analysis of the combustion gases reveals that all the hydrogen in the fuel burns to H_2O but only 95 percent of the carbon burns to CO_2 , the remaining 5 percent forming CO. If the products leave the combustion chamber at 800 K.

   Determine the rate of heat transfer from the combustion chamber.