Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
200 level 2nd Semester Examination – Dec./Jan. 2017
SCT 253-1 Thermodynamics (Repeat)

Uva Wellassa University

**Instructions to candidates**
Duration: 01 hour
Number of questions: 02
Answer **all** questions
Mark allocation: 60 marks

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1.

a. Briefly explain the following terms.

Thermodynamic System, Thermodynamic Equilibrium, Reversible Process, Adiabatic Process

(08 marks)

b. Explain the diffrence between an extensive variable and an intensive variable. Give two examples for each type.

(08 marks)

c. State the zeroth law of thermodynamics. What is the thermodynamical parameter introduced in the zeroth law of thermodynamics ?

(06 marks)

2.

a. State the first law of thermodynamics, Clearly define all the terms.

(06 marks)

b. Write an equation for the differential form of internal energy of a gas dU, in terms of dT and dV, if the internal energy can be defined in terms of volume and temperature of the gas.

(04 marks)

c. Using the equation in part (b) and the second law of thermodynamics, obtain an expression for the heat capacity at constant volume.

(06 marks)





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d. Let 1.00 kg of liquid water at 100 °C be converted to steam at 100 °C by boiling at standard atmospheric pressure (which is 1.00 atm or $1.01 \times 10^5$ Pa). The volume of that water changes from an initial value of $1.00 \times 10^{-3}$ $m^3$ as a liquid to 1.671 $m^3$ as steam. Assume that the latent heat of vaporization of water is, $L = 2.20 \times 10^6$ J $kg^{-1}$.

I. How much work is done by the system during this process ?

(04 marks)

II. How much energy is transferred as heat during the process ?

(04 marks)

III. What is the change in the system's internal energy during the process?

(04 marks)

e. Write down the "Kelvin - Plank statement" and "Clausius statement" regarding the second law of thermodynamics.

(04 marks)

f. A Carnot's engine whose low temperature reservoir is at 27 °C has an efficiency of 40 %. What should be the temperature of high temperature reservoir ? What should be the temperature of the high temperature reservoir if the efficiency is to be raised to 60 % ?

(06 marks)