Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
300 Level 2nd Semester Examination – Dec./Jan. 2017/18
SCT 368-1 Applied Thermodynamics

Uva Wellassa University

Instructions to candidates
Duration: One (01) hours
Number of questions: Two (02) Essays
Mark allocation: 50
Answer all questions
Thermodynamic property tables will be provided.

1.

a. State the Kelvin – Planck Statement related to the second law of thermodynamics by giving one practical example (Maximum 100 words) (6 marks)

b. The compression ratio of an air-standard Otto cycle is 8.5. Prior to the isentropic compression process, the pressure, temperature and volume of air is 100 kPa, 32°C, and 600 cm^3 respectively. The temperature at the end of the isentropic expansion process is 800 K. Using specific heat value at room temperature as R = 0.287 KPa.m^3/kg.K, determine the following by showing the cycle in P-V and T-S diagrams.

i. The highest temperature and pressure in the cycle.
(8 marks)

ii. The amount of heat transferred in heat addition process, in kJ.
(2 marks)

iii. The thermal efficiency.
(4 marks)

iv. The mean effective pressure.
(5 marks)

2. Consider a 210-MW steam power plant that operates on a simple ideal Rankine cycle. Steam enters the turbine at 10 MPa and 500°C and is cooled in the condenser at a pressure of 10 kPa. Show the cycle on a T- S diagram with respect to saturation lines, and determine

i. The quality of the steam of the turbine exit.
(10 marks)

ii. The thermal efficiency of the cycle.
(10 marks)

iii. The mass flow rate of steam
(5 marks)

(13)