Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
300 Level 2nd Semester Examination – Dec. 2018 / Jan. 2019
SCT 368-1 Applied Thermodynamics - Repeat

Uva Wellassa University

Instructions to candidates
Duration: One (01) hour
Number of questions: Three (03) Essay Questions
Mark allocation: 50
Answer any two (02) questions.
Thermodynamic property tables will be provided.

1. A certain quantity of air at a pressure of 1 bar and temperature of 70°C is compressed adiabatically until the pressure is 7 bar in Otto cycle engine. 465 kJ of heat per kg of air is now added at constant volume. Take for air c_p = 1.0 kJ/kg K, c_v = 0.706 kJ/kg K. Show each operation on p-V and T-s diagrams.
(Note: For an adiabatic process from 1 to 2 we can write $P_1V^K{}_1=P_2V^K{}_2$, K is specific heat ratio)

Determine:

a. compression ratio of the engine. (6 mark)

b. temperature at the end of compression. (6 mark)

c. temperature at the end of heat addition. (6 mark)

d. thermal efficiency of the cycle (7 mark)

2. Consider a 250-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

a. the quality of the steam of the turbine exit. (10 mark)

b. the thermal efficiency of the cycle. (10 mark)

c. the mass flow rate of steam (5 mark)