

EN203

SOLUTIONS TO NUMERICAL PROBLEMS
IN QUIZ-2

Q.1) Rigid vessel. \rightarrow Constant volume process.

$$\therefore \frac{P_1}{T_1} = \frac{P_2}{T_2} \quad \text{or} \quad T_2 = \frac{P_2}{P_1} \times T_1$$

$$\therefore \text{Final Temperature, } T_2 = \frac{P_2}{P_1} \times T_1$$

$$C_v = \frac{R}{\gamma - 1} = \frac{1}{29} \frac{8.314}{1.4 - 1} = 0.71675 \text{ kJ/kg.K.}$$

$$\text{Change in Internal Energy; } \Delta U = m C_v \Delta T$$

From First law

$$\text{Work Done } W_s = Q - \Delta U$$

In the above formulae ~~plug~~ plug-in the input values from your ~~question~~ Question to get the correct answers.

For those of you, ~~whose~~ whose answers are close to the exact values of the answers, I have given marks, even though Moodle has ~~marked~~ marked them ~~as~~ wrong.

Q.2) The Steady State, Steady flow Energy Equation for the System is

$$\dot{m}_w(h_{w,2} - h_{w,1}) + \dot{m}_o(h_{o,2} - h_{o,1}) = 0 \quad \text{--- (1)}$$

Change in Enthalpy of oil:

$$(h_2 - h_1)_{oil} = 1.68(t_{o,2} - t_{o,1}) + 10.5 \times 10^4(t_{o,2}^2 - t_{o,1}^2)$$

Change in Enthalpy of water:

$$(h_2 - h_1)_{water} = 4.189(t_{w,2} - t_{w,1})$$

From Eq. (1),

$$\text{Mass flow in rate of water} = - \frac{\dot{m}_{oil}(h_{o,2} - h_{o,1})}{(h_{w,2} - h_{w,1})}$$

In the above formulae plug-in the input values from your question to get the correct answers.

For those of you, whose answers are close to the exact values of the answers, I have given marks, even though Moodle has marked them wrong.