## FE-Style Questions

**35-FE1:** A boiler feedpump accepts saturated liquid a 9.59 kPa and boosts the pressure to 1 MPa. The isentropic efficiency of the pump is 60%. The energy per unit mass added by the boiler feed pump is most nearly
 a) 800 J/kg

 b) 1000 J/kg
 c) 1700 J/kg

 d) 2400 J/kg

**35-FE2**: For the problem above, the temperature of the water leaving the boiler pump is most nearly
 a) 45.2 C
 b) 45.4 C
 c) 46.1 C
 d) 47.0 C

## Practice Problems

**35-1:**  A classroom contains 6000 cubic feet of air-water vapor mixture at 1 atm total pressure. The dry bulb temperature is 70 °F and the wet bulb temperature is 65 °F. Assuming a closed constant total pressure system, determine:

1. relative humidity
2. partial pressure of water vapor
3. dew point
4. amount of water that must be added or removed from the room to achieve 40% relative humidity at the same dry bulb temperature.

**35-2:**  1000 cubic feet per hour of moist air at atmospheric pressure, 80 °F, and 70% relative humidity is to be cooled to 50 °F at constant total pressure. Find whether or not this can be done without the removal of water from the air. If it cannot, determine the minimum amount of water that must be removed in lbm/hr.

**35-3:** 30 cubic feet of air with a dry bulb temperature of 90 °F and a relative humidity of 80% will be taken through a 2-step cooling/dehumidification, followed by heating to get to a dry bulb temperature of 65 °F and a relative humidity of 50%. Determine the following for the cooling/dehumidification process:

(a) the wet bulb temperature of the air before dehumidification,

(b) the dew point temperature of air after dehumidification,

(c) the amount of moisture removed during the dehumidification process, and

(d) the amount of heat removed during the cooling part of the dehumidification process.

## Answers

**35-FE1:** Should be around 1700 J/kg

**35-FE2:** T\_pump\_outlet ~ 45.4 [C]

**35-1:** rh~0.77, P\_w,1 = 0.2794 [psia], T\_dp = 62.43 [F], m\_w removed = 2.626 [lbm]

**35-2:** You will have to remove water from the air, at roughly a rate of 0.54 [lbm/hr]

**35-3:**(a)84 °F

(b) 46 °F

(c) 0.038 lbm

(d) Q = -62 Btu