Exercises on Psychrometry

(* Adapted from *ASHRAE Fundamentals Handbook 2001*, Chapter 6)

1. Moist air exists at 40°C dry-bulb temperature, 20°C thermodynamic wet-bulb temperature, and 101.325 kPa pressure. Determine the humidity ratio, enthalpy, dew-point temperature, relative humidity, and specific volume.

2. Moist air, saturated at 2°C, enters a heating coil at a rate of 10 m³/s. Air leaves the coil at 40°C. Find the required rate of heat addition.

3. Moist air at 30°C dry-bulb temperature and 50% rh enters a cooling coil at 5 m³/s and is processed to a final saturation condition at 10°C. Find the kW of refrigeration required.

4. A stream of 2 m³/s of outdoor air at 4°C dry-bulb temperature and 2°C thermodynamic wet-bulb temperature is adiabatically mixed with 6.25 m³/s of recirculated air at 25°C dry-bulb temperature and 50% rh. Find the dry-bulb temperature and thermodynamic wet-bulb temperature of the resulting mixture.

5. Moist air at 20°C dry-bulb and 8°C thermodynamic wet-bulb temperature is to be processed to a final dew-point temperature of 13°C by adiabatic injection of saturated steam at 110°C. The rate of dry airflow is 2 kg/s (dry air). Find the final dry-bulb temperature of the moist air and the rate of steam flow.