

Thermodynamics II

Course code: 28162
Credits: 3
Course Type: Theoretical
Prerequisites: Thermodynamics I
Course Length: 51 hours

Outlines:

1- Cycles:

Rankine Cycle, Effect of Pressure and Temperature on Cycle Performance. Rankine Cycle with Reheat, Rankine Cycle with Regeneration, Deviations between actual and ideal Rankine Cycles. Vapor compression refrigeration cycles, Absorption cycle, Otto and Diesel Cycles, Sterling Cycles, Brayton Cycle, Gas turbine cycle with regeneration, Multi-stage inter-cooling and reheat Gas turbine cycle, Jet Engine Cycle.

2- Thermodynamic Relations

Maxwell's Thermodynamic Relations. Clapeyron Equation, Calculation of Enthalpy, Internal Energy, and Entropy Using Thermodynamic Relations. Equation of state, Generalized Compressibility chart, Real gas, Ideal Gas, Enthalpy and Entropy deviation Charts for Real Gas.

3- Mixtures

Mixture of Ideal Gases, mixture of water vapor and dry air, Dry and wet bulb temperature, humidity ratio, relative humidity, application of first law, Psychrometric properties, Psychrometric chart, adiabatic saturation process, mixing process.

4- Fuels and Combustion

Fuels, Combustion process, combustion products, enthalpy of formation, adiabatic flame temperature, enthalpy of combustion, fuel lower and higher heating values

5- Flow through converging-diverging channels

Stagnation properties, one dimensional compressible adiabatic reversible flow, speed of sound, Mach number, Normal shock.

Reference:

Fundamentals of Thermodynamics, Sixth Edition, Sonntag, Borgnakke, and Van Wyeln, John Wiley, 2003