Heat Transfer

Course Number: ME-02-102

PDH: 4

Approved for: AK, AL, AR, FL, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, SC, SD, TN, TX, UT, VA, VT, WI, WV, and WY

State Board Approvals

Florida Provider # 0009553 License #868
Indiana Continuing Education Provider #CE21800088
Maryland Approved Provider of Continuing Professional Competency
New Jersey Professional Competency Approval #24GP00025600
North Carolina Approved Sponsor #S-0695
NYSED Sponsor #274

Course Author: Mathew Holstrom

How Our Written Courses Work

This document is the course text. You may review this material at your leisure before or after you purchase the course.
After the course has been purchased, review the technical material and then complete the quiz at your convenience.
A Certificate of Completion is available once you pass the exam (70% or greater). If a passing grade is not obtained, you may take the quiz as many times as necessary until a passing grade is obtained).
If you have any questions or technical difficulties, please call (508) 298-4787 or email us at admin@PDH Pro.com.

TERMINAL OBJECTIVE

1.0 Given the operating conditions of a thermodynamic system and the necessary formulas, **EVALUATE** the heat transfer processes which are occurring.

ENABLING OBJECTIVES

1.1 **DESCRIBE** the difference between heat and temperature.

1.2 **DESCRIBE** the difference between heat and work.

1.3 **DESCRIBE** the Second Law of Thermodynamics and how it relates to heat transfer.

1.4 **DESCRIBE** the three modes of heat transfer.

1.5 **DEFINE** the following terms as they relate to heat transfer:
- a. Heat flux
- b. Thermal conductivity
- c. Log mean temperature difference
- d. Convective heat transfer coefficient
- e. Overall heat transfer coefficient
- f. Bulk temperature

1.6 Given Fourier's Law of Conduction, **CALCULATE** the conduction heat flux in a rectangular coordinate system.

1.7 Given the formula and the necessary values, **CALCULATE** the equivalent thermal resistance.

1.8 Given Fourier's Law of Conduction, **CALCULATE** the conduction heat flux in a cylindrical coordinate system.

1.9 Given the formula for heat transfer and the operating conditions of the system, **CALCULATE** the rate of heat transfer by convection.

1.10 **DESCRIBE** how the following terms relate to radiant heat transfer:
- a. Black body radiation
- b. Emissivity
- c. Radiation configuration factor

ENABLING OBJECTIVES (Cont.)

1.11 **DESCRIBE** the difference in the temperature profiles for counter-flow and parallel flow heat exchangers.

1.12 **DESCRIBE** the differences between regenerative and non-regenerative heat exchangers.

1.13 Given the temperature changes across a heat exchanger, **CALCULATE** the log mean temperature difference for the heat exchanger.

1.14 Given the formulas for calculating the conduction and convection heat transfer coefficients, **CALCULATE** the overall heat transfer coefficient of a system.

1.15 **DESCRIBE** the process that occurs in the following regions of the boiling heat transfer curve:

a. Nucleate boiling
b. Partial film boiling
c. Film boiling
d. Departure from nucleate boiling (DNB)
e. Critical heat flux

TERMINAL OBJECTIVE

2.0 Given the operating conditions of a typical nuclear reactor, **DESCRIBE** the heat transfer processes which are occurring.

ENABLING OBJECTIVES

2.1 **DESCRIBE** the power generation process in a nuclear reactor core and the factors that affect the power generation.

2.2 **DESCRIBE** the relationship between temperature, flow, and power during operation of a nuclear reactor.

2.3 **DEFINE** the following terms:
- a. Nuclear enthalpy rises hot channel factor
- b. Average linear power density
- c. Nuclear heat flux hot channel factor
- d. Heat generation rate of a core
- e. Volumetric thermal source strength

2.4 **CALCULATE** the average linear power density for an average reactor core fuel rod.

2.5 **DESCRIBE** a typical reactor core axial and radial flux profile.

2.6 **DESCRIBE** a typical reactor core fuel rod axial and radial temperature profile.

2.7 **DEFINE** the term decay heat.

2.8 Given the operating conditions of a reactor core and the necessary formulas,
CALCULATE the core decay heat generation.

2.9 **DESCRIBE** two categories of methods for removing decay heat from a reactor core.

Intentionally Left Blank

Purchase this course to see the remainder of the technical materials.