PELM 4400, Prime Movers & Auxiliaries

4 Credits, 6 months

Course Description

Areas covered are types of prime movers and heat engines, plant auxiliary systems, basic concepts of compression and absorption refrigeration, HVAC fundamental for facility operators, building environmental systems and controls, and typical industrial plant configurations as identified in the Alberta Boilers Safety Association Reference Syllabus for 4th Class Part B Power Engineering.

Pre and Co-requisites

It is strongly recommended that students have:

- Math 20-1 or 20-2
- Physics 20 or Science 20
- English 20

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student shall be able to:

CLO1 Discuss the historical conversions of heat energy into mechanical energy.
CLO2 Describe the construction and operation of steam turbines.
CLO3 Explain the operation and maintenance requirements of condensers and cooling towers.
CLO4 Describe the application, startup, operation, and maintenance required for gas turbines.
CLO5 Understand the application, construction, and operation of internal combustion engines.
CLO6 Explain the various lighting systems and some of the basic design considerations for lighting a space.
CLO7 Explain the various water supply systems used in buildings.
CLO8 Describe the design and components of various drainage systems used in facilities.
CLO9 Explain the basic concept of refrigeration and refrigerants.
CLO10 Describe the operating principles of compression refrigeration systems.
CLO11 Describe the purposes and operating principles of refrigeration system operational and safety controls.
CLO12 Explain the operating principles and maintenance of refrigeration systems.
CLO13 Describe the operating principle, maintenance, and operation of absorption refrigeration systems.
CLO14 Outline the potential hazards inherent to refrigeration plants, the CSA requirements intended to mitigate hazards, and typical responses taken in the case of a significant leak.
CLO15 Explain the methods and techniques for condition air for plants and buildings.
CLO16 Explain the equipment and principles of humidification.
CLO17 Describe the air flow behavior and movement of air through distribution systems.

CLO18 Describe the various ventilation systems, including various types of air filters used in these systems.
CLO19 Understand the designs and components of duct systems used in HVAC applications.
CLO20 Describe the components, operating principles, and maintenance procedures of steam heating systems.
CLO21 Describe the various designs, equipment, and operation of hot water heating systems.
CLO22 Describe common heating systems encountered by Power Engineers.
CLO23 Explain central, unitary, and combined HVAC systems.
CLO24 Identify steam-related processes employed in common hydrocarbon plants.
CLO25 Identify steam related processes in common energy intensive industries.

Evaluation

Assessment Type	Percentage
Chapter and Unit Quizzes	15%
Section Test 7	10%
Section Test 8	10%
E4 – Final Exam	65%

Course Completion Requirements

Minimum passing mark of 65% or C is required.

Grading Scale

4.0 Grade Scale	Alpha Grade	Percentage Grade
4.0	A+	93-100
4.0	A	85-92.9
3.7	A-	80-84.9
3.3	B+	77-79.9
3.0	B	74-76.9
2.7	B-	70-73.9
2.3	C+	67-69.9
2.0	C	64-66.9
1.7	C-	60-63.9
1.3	D+	55-59.9
1.0	*D	50-54.9
0.0	F	0-49.9

Land Acknowledgement

We respectfully acknowledge that Keyano College is on Treaty No. 8 Territory, the ancestral and traditional territory of the Cree, Dene, and Métis people.

Review Date: March 4, 2024