PELM 4200, Plant Services

4 Credits, 6 months

Course Description

Topics include material and welding; piping and valves; electricity; energy plant instrumentation and controls; plant communication; boiler systems; and boilers. Content aligns with the SOPEEC (Association of Standardization of Power Engineers of Canada) Fourth Class Power Engineers reference syllabus for 4th Class Part A 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 Apply the concepts of basic electricity while preforming simple calculations using voltage, current, resistance, and power.
CLO2 Describe the basic principles of magnetism.
CLO3 Describe the design and application of electrical metering devices.
CLO4 Describe the operating principles of the various types of AC and DC motors and generators.
CLO5 Describe the operating principles of electrical transformers.
CLO6 Describe an electrical distribution system.
CLO7 Describe the overall purpose and function of plant instrumentation systems.
CLO8 Describe the construction and operation of common devices used to measure pressure, level, flow, temperature, humidity, and composition.
CLO9 Describe the basic types and functions of transmitters, recorders, controllers, and control actuators.
CLO10Describe the operation of programming controls for boilers, including applicable testing and maintenance procedures.
CLO11 Describe the design and operation of electronic control systems.
CLO12 Describe the design and operation of electrical control systems.
CLO13 Describe the Power Engineering profession.
CLO14 Describe the application of Jurisdictional Acts and Regulations with respect to boilers and pressure vessels.
CLO15 Describe the purpose of boiler and pressure vessel Codes and Standards.

CLO16 Describe the historical development of boilers, boiler design, components, and configuration.
CLO17 Describe the design, components, and characteristics of firetube boilers.
CLO18 Describe the design, components, and characteristics of watertube boilers.
CLO19 Explain the general design and application of electric boilers.
CLO20 Describe the special design considerations of boilers used in heating plants.
CLO21 Differentiate between ASME Section I and ASME Section IV boilers.
CLO22 Discuss the basic theory of combustion and the equipment used to provide proper combustion conditions within a boiler.
CLO23 Describe common fuel systems found in boiler systems.
CLO24 Describe basic concepts and equipment used to supply combustion air to boiler furnaces.
CLO25 Describe Feedwater systems used with boilers.
CLO26 Describe the equipment, operation, and purpose of boiler blowoff and blowdown systems.
CLO27 Describe the importance of fireside cleanliness, and the equipment and methods to maintain fireside cleanliness.

Evaluation

Assessment Type	Percentage
Chapter and Unit Quizzes	15%
Section Test 3	10%
Section Test 4	10%
E2 – 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