



Low Pressure Power Engineering (NIULPE 5th Class Certification): Chapters and Learning Outcomes

Unit 1 Heating Boilers		
1	Introduction to Boilers <i>Explain common terms relating to boilers.</i>	E.10.46
2	Firetube Heating Boilers <i>Describe the design and use of firetube boilers for heating purposes.</i>	E.19.88
3	Watertube Boilers <i>Describe the types of watertube and tubular boilers used in heating systems.</i>	E.19.86
4	Cast-Iron Sectional Heating Boilers <i>Describe and explain the uses of cast-iron boilers.</i>	E.19.87
5	Electric Boilers <i>Describe electric boilers with regard to their use and general design.</i>	E.10.49
6	Oil Burners for Heating Boilers <i>Describe the various oil burners used on heating boilers.</i>	E.19.89
7	Gas Burners for Heating Boilers <i>Describe the operation of the various types of gas burners used on heating boilers.</i>	E.19.90
8	Boiler Draft Equipment <i>Discuss, sketch and describe the basic equipment used to supply combustion air to a boiler furnace.</i>	E.11.51
Unit 2 Boiler Internals and Fittings		
9	Low-Pressure Boiler Fittings <i>Name, describe the purpose, and explain the operating principles of various boiler fittings found on steam boilers.</i>	E.19.91 E.19.92
10	Safety and Relief Valves <i>Discuss safety valves for power and heating boilers.</i>	E.11.54
11	Continuous and Intermittent blowdown <i>Describe the purposes, equipment and operation of continuous and intermittent blowdown.</i>	E.12.58
12	Water Columns and Gage Glasses <i>Describe different types of direct and inferential level gages or indicators.</i>	E.11.55
13	Introduction to Piping and Pipe Fittings <i>Discuss the basic types of piping, pipe connections, supports, drainage devices and insulation.</i>	E.9.43
14	Introduction to Valves <i>Discuss the design, application and maintenance of the most common types of valves used in power piping systems.</i>	E.9.44
15	Types of Pumps <i>Describe the various types of pumps in buildings and industrial plants.</i>	E.15.68



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16	Pump Operation and Maintenance <i>Describe all details pertaining to pump operation and various maintenance procedures performed on pumps.</i>	E.15.69
17	Air Compression <i>Describe the operating principles of the different types of air compressors.</i>	E.15.70
18	Lubrication Principles <i>Describe the importance and the principles of lubrication.</i>	E.16.71
19	Types of Bearing Lubrication <i>Describe the methods for simple care and maintenance of bearings and their related lubrication systems.</i>	E.16.72
Unit 3 Safety		
20	The Cost and Effects of Workplace Injuries <i>Describe the methods for simple care and maintenance of bearings and their related lubrication systems.</i>	E.5.23
21	Personal Protective Equipment <i>Describe the methods for simple care and maintenance of bearings and their related lubrication systems.</i>	E.5.24
22	Isolation of Mechanical and Electrical Equipment <i>Describe the methods for simple care and maintenance of bearings and their related lubrication systems.</i>	E.5.25
23	Confined Space Entry <i>Describe procedures needed to enter into, or work safely in confined spaces.</i>	E.5.26
24	Handling and Storage of Gases <i>Describe the procedures for safe storage and handling of cylinders containing gases.</i>	E.5.27
25	Handling of Hydrocarbon Fluids <i>Describe the methods for simple care and maintenance of bearings and their related lubrication systems.</i>	E.5.28
Unit 4 Basic Boiler Operations, Maintenance & Cleaning		
26	Steam Heating Equipment <i>Describe the operating principles of steam heating equipment and components.</i>	E.20.95
27	Steam Heating Systems <i>Describe the operating principles and maintenance procedures of steam heating systems and the components of these systems.</i>	E.20.96
28	Hot Water Heating Systems <i>Describe the various designs of hot water heating systems.</i>	E.20.97



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29	Hot Water and Steam Heating Boiler Operations <i>Describe accessories, operation and troubleshooting of a hot water heating system.</i>	E.20.98
30	Routine and Emergency Boiler Operation <i>Describe the routine safe and efficient operation of a packaged boiler.</i>	E.12.60
31	Boiler Maintenance <i>Describe the service and maintenance required for boilers.</i>	E.27.139
32	Boiler Cleaning <i>Discuss the procedure for preparing a boiler for inspection & cleaning, & describe mechanical & chemical boiler cleaning methods.</i>	E.27.140
33	Warm Air Furnace Components <i>Describe the components and maintenance requirements of typical warm air heating and ventilating systems.</i>	E.20.100
34	Ventilation and Air Filters <i>Describe the various ventilation systems found in buildings, as well as describe the various types of air filters used in these systems.</i>	E.20.101
Unit 5 Boiler Control Systems		
35	Basic Electricity <i>Describe the concepts of basic electricity and perform simple calculations using voltage, current, resistance and power.</i>	E.17.73
36	Basic Boiler Instrumentation and Control Systems <i>Describe specific types of instrumentation and controls used on boilers.</i>	E.18.82
37	Low-Water Fuel Cutoffs <i>Discuss the designs, operation and testing of low-water fuel cutoffs.</i>	E.18.83
38	Boiler Programming Controls <i>Describe the operation of programming controls and discuss the proper testing and maintenance procedures.</i>	E.18.84
39	Heating Boiler Feedwater Controls <i>Describe the various feedwater control methods and devices used on low-pressure steam boilers.</i>	E.21.103
40	Heating Boiler Operating Controls <i>Name and describe the various operating controls found on low-pressure heating boilers.</i>	E.21.104
41	Heating Boiler Combustion Controls <i>Explain the design and operation of various combustion controls on heating boilers.</i>	E.21.105
42	Pneumatic Controls for Heating Systems <i>Explain the purpose of the various components found in a pneumatic control system.</i>	E.21.106
43	Electric Controls for Heating Systems <i>Describe and explain the function of the various components of an electric control circuit.</i>	E.21.107



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44	Electronic Controls for Heating Systems <i>Describe and explain the function of the various components of an electronic control circuit.</i>	E.21.108
Unit 6 Water Treatment		
45	External Feedwater Treatment <i>Discuss the general principles, methods and equipment used in preparing raw feedwater for steam production in a boiler.</i>	E.13.61
46	Internal Feedwater Treatment and Testing Methods <i>Discuss the general principles, methods and equipment used in the internal treatment of raw feedwater for steam production in a boiler.</i>	E.13.62
47	Cooling Towers <i>Describe the operation and maintenance of cooling towers.</i>	E.14.65
Unit 7 Air Conditioning & Refrigeration		
48	Air Conditioning Systems I <i>Describe the operation of various air conditioning systems.</i>	E.26.131
49	Air Conditioning Systems II <i>Discuss the design of combined air conditioning systems, alternative system arrangements, and the factors to be considered when selecting an air conditioning system</i>	E.26.132
50	Refrigerants <i>Describe the different refrigerants used and explain the various properties of these refrigerants.</i>	E.23.113
51	Compression Refrigeration Systems <i>Describe the operating principle of compression refrigeration system.</i>	E.23.114
52	Refrigeration Compressors <i>Describe the operating principles and the components of refrigeration compressors and perform simple compressor calculations.</i>	E.23.115
53	Heat Exchangers for Refrigeration Systems <i>Describe the different types of heat exchangers used in refrigeration systems.</i>	E.23.116
54	Refrigeration Accessories <i>Describe the various accessories used in refrigeration systems.</i>	E.23.119
55	Absorption Refrigeration Systems <i>Describe the operating principles of the ammonia and lithium bromide absorption refrigeration systems.</i>	E.23.122
56	Absorption Refrigeration System Operation & Maintenance <i>Describe the various operation and maintenance procedures used on absorption refrigeration systems.</i>	E.23.123