

Process Technology I – Equipment

Learning Objectives

Session 1: Introduction to Class

1. List the attendance requirements for PT I - Equipment.
2. List the homework requirements for PT I - Equipment.
3. List the class participation requirements for PT I - Equipment.
4. List the evaluation requirements (quizzes and tests) for PT I - Equipment.
5. List the lab/tour requirements for PT I - Equipment.

Session 2: Introduction to Equipment and Tools

1. List types of equipment used in refining and petrochemical industries:
 - movers
 - power sources
 - processors
 - heating/cooling units
2. Describe equipment operations common to the refining and petrochemical industries.
3. Describe the appropriate uses of basic hand tools.
4. Describe the appropriate uses of basic power tools.
5. Describe the appropriate uses of sparking and non-sparking tools.
6. Describe hand and power tool safety.
7. Describe the appropriate care of hand and power tools.
8. Identify and describe the appropriate uses of lifting equipment.
9. Describe the importance of plant equipment maintenance and predictive/preventive maintenance procedures in the refining and petrochemical industries.
10. Discuss different plant approaches to assigning operator performed maintenance tasks.
11. Describe the Process Technician's role in performing maintenance tasks.

Session 3: Overview—Piping, Tubing, Hoses and Fittings

1. Recall the purpose of piping, tubing, hoses and fittings in the process industry.
2. Describe the uses of pipe, tubing, and hoses.
3. Explain pressure and temperature limits of hoses and fittings.
4. List and describe various fittings used for pipe, tubes, and hoses.
5. Discuss the uses, advantages, and cautions for the types of materials used for piping.

6. Discuss different schedules for piping thickness and ratings on flanges for required service.
7. Discuss selection and sizing criteria as related to pressure, temperature, flow and corrosiveness of fluids.
8. Identify types of connections.
9. Describe the use of sealant compounds.
10. List and describe different hose fittings for utility service.
11. Describe associated piping topics.
12. Identify and describe equipment tests.
13. Identify and describe plugs, caps and double-valving applications.
14. Describe the use of gaskets.
15. Describe the Process Technician's responsibilities regarding the selection, maintenance and repair of pipe, tubing, hoses, and fittings.
16. Identify typical problems associated with pipe, tubing, hoses, and fittings.

Session 4: Valves

1. Recall the purpose of valves in the process industry.
2. Recall common valve types.
3. Recall the components of valves.
4. Explain the purpose of each component.
5. Describe the operating principles of valves.
6. Describe safety and environmental concerns associated with valves.
7. Identify typical procedures associated with valves.
8. Describe the process technician's role in valve operation and maintenance.
9. Identify typical problems associated with valves.

Session 5: Pumps - Part I

1. Recall the purpose of pumps in the process industry.
2. Recall common pump types.
3. Recall the components of centrifugal pumps.
4. Explain the purpose of each component.
5. Describe the operating principles of centrifugal pumps.
6. Identify typical problems associated with centrifugal pumps.

Session 6: Pumps - Part II

1. Recall the components of positive displacement pumps.
2. Explain the purpose of each component.
3. Describe the operating principles of positive displacement pumps.

4. Identify typical problems associated with positive displacement pumps.
5. Describe safety and environmental concerns associated with pumps.
6. Identify typical procedures associated with pumps.
7. Describe the process technician's role in pump operation and maintenance.

Session 7: Review

No new learning objectives are introduced.

Session 8: Test #1

No new learning objectives are introduced.

Session 9: Compressors - Part I

1. Recall the purpose of compressors in the process industry.
2. Identify the common types/applications of compressors.
3. Recall the components of a compressor.
4. Explain the purpose of each component.
5. Describe the operating principles of compressors.

Session 10: Compressors - Part II

1. Recall the operating principles of compressors.
2. Describe safety and environmental hazards associated with compressors.
3. Identify typical procedures associated with compressors.
4. Describe the process technician's role in operation and maintenance.
5. Identify typical problems associated with compressors.

Session 11: Turbines

1. Recall the purpose of turbines in the process industry.
2. Identify the common types/applications of turbines.
3. Recall the components of a turbine.
4. Explain the purpose of each component.
5. Describe the operating principles of turbines.
6. Describe safety and environmental hazards associated with turbines.
7. Identify typical procedures associated with turbines.
8. Describe the process technician's role in turbine operation and maintenance.
9. Identify typical problems associated with turbines.

Session 12: Motors and Engines - Part I

1. Recall the purpose of motors and engines in the process industry.
2. Identify the common types/applications of motors and engines.
3. Recall major components of a typical electric motor.
4. Identify major components of engines.
5. Describe the operating principles of motors and engines.

Session 13: Motors and Engines - Part II

1. Review operating principles of motors and engines.
2. Describe safety and environmental hazards associated with motors and engines.
3. Identify typical procedures associated with motors and engines.
4. Describe the process technician's role in operation and maintenance.
5. Identify typical problems associated with motors and engines.

Session 14: Power Transmission and Lubrication

1. Describe the principles of transmission.
2. Describe the principles of lubrication.
3. Explain the role of transmission and lubrication in the process industry.
4. Describe the purpose of major transmission components.
5. Describe the operating principles of transmission.
6. Describe types of bearings.
7. Explain the functions of thrust, radial, and vibration bearings.
8. Describe gears and their uses.
9. Describe safety and environmental hazards associated with transmission and lubrication.
10. Identify typical procedures associated with transmission and lubrication.
11. Describe the process technician's role in transmission and lubrication procedures.
12. Identify typical problems associated with transmission and lubrication.

Session 15: Review

No new learning objectives are introduced.

Session 16: Test #2

No new learning objectives are introduced.

Session 17: Heat Exchangers - Part I

1. Recall the purpose of heat exchangers in the process industry.
2. Identify the common types/applications of heat exchangers.
3. Recall the components of heat exchangers.
4. Explain the purpose of each component.
5. Describe the operating principles of heat exchangers.
6. Describe safety and environmental hazards associated with heat exchangers.

Session 18: Heat Exchangers - Part II

1. Review the operating principles of heat exchangers.
2. Identify typical procedures associated with heat exchangers.
3. Describe the process technician's role in heat exchanger operation and maintenance.
4. Identify typical problems associated with heat exchangers.

Session 19: Cooling Towers

1. Recall the purpose of cooling towers in the process industry.
2. Identify the common types of cooling towers.
3. Define terms associated with cooling towers.
4. Recall the components of cooling towers.
5. Explain the purpose of each component.
6. Describe the operating principles of cooling towers.
7. Describe safety and environmental hazards associated with cooling towers.
8. Identify typical procedures associated with cooling towers.
9. Describe the process technician's role in cooling tower operation and maintenance.
10. Identify typical problems associated with cooling towers.

Session 20: Furnaces

1. Recall the purpose of furnaces in the process industry.
2. Identify the common types/applications of furnaces.
3. Define terms associated with furnaces.
4. Identify major components of furnaces.
5. Explain the purpose of each component.
6. Explain the operating principles of furnaces.
7. Describe safety and environmental hazards associated with furnaces and boilers.
8. Identify typical problems associated with furnaces.

Session 21: Boilers

1. Recall the purpose of boilers in the process industry.
2. Identify the common types/applications of boilers.
3. Define terms associated with boilers.
4. Identify major components of boilers.
5. Explain the purpose of each component.
6. Explain the operating principles of boilers.
7. Identify typical procedures associated with furnaces and boilers.
8. Describe the process technician's role in furnace and boiler operation and maintenance.
9. Identify typical problems associated with boilers.

Session 22: Review

No new learning objectives are introduced.

Session 23: Test #3

No new learning objectives are introduced.

Session 24: Filters and Dryers

1. Describe the purpose of filters and dryers in the process industry.
2. Identify the common types/applications of filters and dryers.
3. Define terms associated with filters and dryers.
4. Identify the components of filters and dryers.
5. Explain the purpose of each component.
6. Describe the operating principles of filters and dryers.
7. Describe safety and environmental hazards associated with filters and dryers.
8. Identify typical procedures associated with filters and dryers.
9. Describe the process technician's role in filter and dryer operation and maintenance.
10. Identify typical problems associated filters and dryers.

Session 25: Vessels

1. Recall the purpose of vessels in the refining and petrochemical industries.
2. Recall the common types/applications of vessels.
3. Identify the components of major vessel types.
4. Explain the purpose of each component.

Session 26: Vessels - Part I

1. Explain the operating principles of vessels.

Session 27: Vessels - Part II

1. Describe safety and environmental hazards associated with vessels.
2. Identify typical procedures associated with vessel operation and maintenance.
3. Describe the process technician's role in vessel operation and maintenance.
4. Identify typical problems associated with vessels.

Session 28: Process Diagrams - Part I

1. Explain the purpose of diagrams including why/when/where they are used.
2. Identify the major unit sections in flow sequence.
3. Recall symbols used for major process equipment.
4. Identify components on a typical PFD.
5. Identify components on a typical P&ID.

Session 29: Facility Tour

1. Apply course learning objectives on process equipment within a refining or petrochemical facility.

Session 30: Process Diagrams - Part II

1. Explain the purpose of diagrams including why/when/where they are used.
2. Identify the major unit sections in flow sequence.
3. Recall symbols used for major process equipment.
4. Identify components on a typical PFD.
5. Identify components on a typical P&ID.

Session 31: Review

No new learning objectives are introduced.

Session 32: Test #4

No new learning objectives are introduced.

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