

M.E./M.Tech - DEGREE EXAMINATIONS, NOV / DEC 2025

Second Semester

Industrial Safety Engineering

24PISPC204 / 20PISPC204- SAFETY IN CHEMICAL INDUSTRIES

Regulations - 2024

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. A primary criterion for selecting the material of construction for a pressure vessel is a) Price of the material b) Color of the material c) Chemical compatibility with contents d) Vendor's popularity	1	K1	CO1
2. The main purpose of a flare system in a chemical plant is a) To increase production capacity b) To cool down process fluids c) To safely dispose of excess or waste gases d) To monitor pressure inside reactors	1	K2	CO1
3. Thermal relief devices are primarily used to a) Cool down hot liquids b) Control pressure during startup c) Relieve pressure caused by thermal expansion d) Measure heat transfer rates	1	K1	CO2
4. Vent systems in chemical plants are primarily used to a) Improve heat transfer efficiency b) Deliver raw material to reactors c) Release non-combustible and inert gases safely d) Control catalyst regeneration	1	K1	CO2
5. What is the main purpose of an operating procedure in chemical plants? a) Document process flow diagrams b) Provide detailed step-by-step instructions for safe operation c) Schedule equipment maintenance d) Perform financial audits	1	K1	CO3
6. Trip systems in refinery units are designed to a) Enhance product quality b) Automatically shut down equipment under unsafe conditions c) Record operating data d) Control refining rates	1	K2	CO3
7. Process commissioning primarily involves a) Designing new equipment b) Routine maintenance checks c) Starting up and validating process systems under real operating conditions d) Disposal of waste products	1	K2	CO4
8. Condition monitoring techniques include all except a) Vibration analysis b) Corrosion monitoring c) Product packaging inspection d) Acoustic emission testing	1	K1	CO4

9. What is a key consideration in the layout of petroleum product storage tanks? 1 K1 CO5
 a) Maximizing tank size irrespective of safety
 b) Adequate separation distances between tanks to prevent fire spread
 c) Placing all tanks close together to save space
 d) Using only underground tanks
10. Purging in maintenance operations is performed to 1 K2 CO6
 a) Lubricate equipment
 b) Remove flammable or toxic gases from process lines or vessels
 c) Cool down equipment
 d) Increase pressure in pipelines

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. State the functions of a heat exchanger. 2 K1 CO1
12. Discuss the factors to be considered in a design process. 2 K2 CO1
13. State the precautions to be adopted to ensure safety in storage and handling of corrosive liquids. 2 K1 CO2
14. Discuss the protections required to safe guard against over pressure. 2 K2 CO2
15. What is meant by plant monitoring system? 2 K1 CO3
16. Define NDT. 2 K1 CO3
17. Differentiate pre commissioning and post commissioning. 2 K2 CO4
18. List the various equipment system activities to be followed in chemical industries. 2 K1 CO4
19. Classify the various types of emergency planning in a plant. 2 K2 CO5
20. Name some common protective devices used in process industry. 2 K1 CO5
21. Differentiate LPG and LNG. 2 K2 CO6
22. Outline how Hydrogen is stored in an industry. 2 K2 CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Apply engineering and operational design principles to develop a safety standard for a chemical process industry 11 K3 CO1
- OR**
- b) Demonstrate how different types of reactor failures can occur in a chemical process, and recommend appropriate preventive actions for each case. 11 K3 CO1
24. a) Utilize the principles of pressure system design to select and justify appropriate pipework and valve types for a high-pressure process. 11 K3 CO2
- OR**
- b) Apply relevant design standards and codes to develop a basic pressure vessel specification for a chemical process. 11 K3 CO2
25. a) Demonstrate the importance of hand over and permit system with a case study. 11 K2 CO3
- OR**
- b) Elaborate in detail about the operation of fired heaters, driers and storage. 11 K2 CO3
26. a) Explain the various types of inspections to be carried out in the commissioning phase. 11 K2 CO4
- OR**
- b) Describe the key aspects of a plant inspection checklist and prepare one suitable for chemical plant. 11 K2 CO4

27. a) Apply fire prevention and protection principles to design a safety plan for a chemical industry facility. 11 K3 CO5

OR

b) Demonstrate how disaster management strategies can be implemented in a chemical plant to minimize risks and ensure worker safety. 11 K3 CO5

28. a) Illustrate the application of different NDT methods in testing high-pressure piping systems, showing how they help ensure operational safety. 11 K3 CO6

OR

b) Interpret the importance of safe storage practices for hazardous chemicals in preventing accidents. 11 K3 CO6