**D** **495B3** **Total pages: 2**

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# SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**EIGHTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2024**

**Chemical Engineering**

**(2020 SCHEME)**

**Course Code : 20CHT456**

**Course Name : Safety Engineering of Process Plants**

**Max. Marks : 100** **Duration:3 Hours**

## PART A

***(Answer all questions. Each question carries 3 marks)***

1. Explain the concept of process safety and its significance in industrial operations.
2. What is the primary purpose of a work permit system in hazardous work environments?
3. Define flammability diagram and explain its purpose in the context of process safety.
4. What are the factors affecting thermal runaway reactions?
5. Define the term teratogenic.
6. Explain people oriented errors.
7. Describe Dow and Mond index.
8. Define the concept of a chemical exposure index.
9. What is the significance of Safety Integrity Level (SIL) in process safety?
10. What is the purpose of conducting an Event Tree Analysis?

## PART B

***(Answer one full question from each module, each question carries 14 marks)***

### MODULE I

11. Elaborate on the Bhopal gas tragedy and the insights learnt from major industrial accidents. 14

**OR**

12 Explain the importance of Material Safety Data Sheets (MSDS) in ensuring workplace safety. Discuss the key information typically included in an MSDS and how it assists workers in handling hazardous materials safely. Evaluate the legal and ethical responsibilities of employers in providing access to MSDS to employees and how compliance with MSDS regulations contributes to overall safety culture. 14

### MODULE II

13. Explain UVCE and BLEVE. 14
Differentiate between detonation and deflagration

**OR**

14. Explain the types of fire extinguishers and built-in fixed fire fighting systems in workspace. 14

### MODULE III

15. Define electric flashover. List out and explain its consequences. 14

**OR**

16. What are the various factors that contribute to mechanical hazard and explain in detail the safety measures to prevent it? 14

**MODULE IV**

17. Explain how hazardous chemicals are transported safely by road? 14
What are the risks involved in transporting hazardous chemicals on roads, and suggest methods to reduce them?
Explain the new technologies that make the transportation of hazardous chemicals safer?

**OR**

18. Evaluate the significance of flame arresters in safeguarding against fires and explosions in industrial environments. Describe the working principles of flame arresters and the different types commonly used in process safety applications. 14

**MODULE V**

19. A chemical processing plant is undergoing a HAZOP study to identify potential hazards and operability issues in a new reactor system. Outline the key steps involved in conducting a HAZOP analysis for this scenario, including node identification, deviation analysis, and consequence assessment. Additionally, discuss how the findings of the HAZOP study can be used to implement preventive measures and enhance the safety of the reactor system. 14

**OR**

20. Explain the concept of inherent safety in process industries, highlighting its principles and importance in risk reduction. Provide real-world examples to illustrate the application of inherent safety principles in process design and operations. 14

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