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Total number of pages:[2]

Total number of questions: 09

B.Tech. CHEMICAL ENGG. 7<sup>th</sup> /8<sup>th</sup> Sem

Subject SAFETY IN CHEMICAL PLANTS

Code BTCH 803 Paper ID :

Batch:2004 onwards/2011onwards/2015 onwards[Tick Relevant]

Time allowed: 3 Hrs

Max Marks:60

**Important Instructions:**

- Section A is compulsory
- Attempt any four questions from section B
- Attempt any two questions from section C
- Assume any missing data
- Additional instructions, if any

**PART A (2×10)**

Q.1. Answer in brief:

- Define OSHA incidence rate and fatality rate.
- Differentiate between fault tree and event tree.
- Describe the Indian Legislation on safety for the storage of flammable materials.
- What do you mean by inerting. How does it prevent fire?
- Enlist various steps in accident prevention in industry.
- Write about the temperature dependence on LFL and UFL?
- What is Material factor? How is it used to determine Dow F&E Index?
- What is deflagration? List the factors upon which it depends in a gas-air mixture.
- What is Threshold Limit Value? Give its various types?
- Define MTBF.



**PART B (5×4)**

- Q.2 Define toxicity. What are the various modes of entry of toxic materials in our body. How can we measure toxicity?
- Q.3 Define hazard identification. Explain the various hazard identification methods?
- Q.4 A large open tank with a 5-ft diameter contains toluene. Estimate the evaporation rate from this tank assuming a temperature of 77°F and a pressure of 1 atm. If the ventilation rate is 3000 ft<sup>3</sup>/min, estimate the concentration of toluene in this workplace enclosure. Given  $P^{\text{sat}}$  for toluene = 0.0371 atm.
- Q.5 Describe different steps in creating disaster management system.
- Q.6 What do you understand by Revealed and Unrevealed failures in a system? Show that for Unrevealed failures the process is unavailable during a period equal to half of the inspection interval.

**PART C (10×2)**

- Q. 7 (a) Discuss how static charge build up can lead to a hazard. Also mention various methods to control it.
- (b) A jacketed water cooled batch reactor gets damaged due to failure of cooling system. The result could be pressure exceeding the bursting pressure of reactor. Perform an HAZOP study using guide words to improve the safety of the process.
- Q. 8 (a) What are occupational diseases? Give causes, main symptoms, and the method of prevention of any two of the occupational diseases?
- (b) Estimate the LFL and the UFL for hexane, and compare the calculated limits to the actual values determined experimentally. Given that actual values of LFL and UFL for hexane are 1.2 vol. % and 7.5 vol. % respectively.
- Q. 9 Write a detailed note on any two :
- Bhopal Gas Tragedy
  - Fukushima nuclear Disaster
  - Vapour Cloud Explosion