**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**
**(MID SEMESTER EXAMINATION)**

**CLASS: BE** **SEMESTER: VII**
**BRANCH: CHEM ENGG./CEP&P** **SESSION: MO/2018**

**SUBJECT: CL7007 SAFETY AND HAZARDS IN CHEMICAL INDUSTRY**

**TIME: 1.5 HOURS** **FULL MARKS: 25**

**INSTRUCTIONS:**
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

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Q1 (a) Define the following terms: [2]
(i) Hazard (ii) Loss prevention (iii) Acceptable risk (iv) Tolerable risk
(b) Describe "Fire Pyramid" and it's different components. [3]

Q2 (a) Classify the fire on the basis of the type of fuel. [2]
(b) Write down the plant systems for utilities and auxiliary services. [3]

Q3 (a) What do you mean by runaway reaction? [2]
(b) What is the difference between detonation and deflagration explosion? [3]

Q4 (a) What do you mean by Upper flammability limit (UFL) and Lower flammability limit (LFL)? Expand the term MOC and MSOC. [2]
(b) Explain blast wave pressure at a fixed location. [3]

Q5 (a) Define: [2]
(i) Reliability (ii) Unreliability (iii) Failure probability density function
(iv) Mean time between failure

(b) Given the fault tree gates shown in Fig. 1 and following set of failure probabilities: [3]

| Component | Failure probability |
|---|---|
| 1 | 0.1 |
| 2 | 0.2 |
| 3 | 0.3 |
| 4 | 0.4 |

Compute a value for the failure probability of the top event.

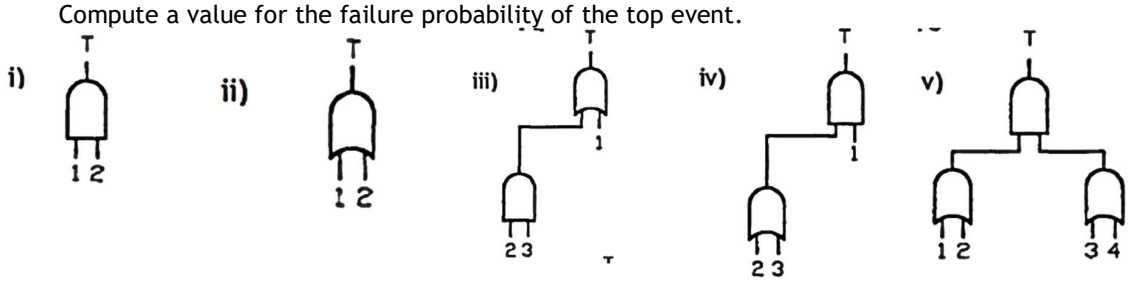


**Fig.1: Fault tree gates**

Q6 (a) What is HAZOP study? Explain different guide words. [2]
(b) Explain fault tree analysis with suitable example. [3]

**:::::: 13/09/2018 ::::::M**