

**COLLEGE OF ENGINEERING AND TECHNOLOGY**

**SCHOOL OF BIOENGINEERING, DEPARTMENT OF CHEMICAL ENGINEERING**

**B. Tech. Open elective**

**ACADEMIC YEAR 2023-24 – ODD SEMESTER D**

**Continuous Learning Assessment II**

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| Reg. No. | R | A |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| Course Code: **18CHO104T** | Course Title: **PROCESS PLANT SAFETY** | | |
| Sem & Year: V & III year | Date: 13/10/2023 | Duration: 100 Minutes | Max. Marks: 50 |

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|  | **Course Outcomes (COs)** | **Program Outcomes (POs)** | | | | | | | | | | | | | **PSOs** | | | |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | | 2 | 3 |
| **CO2** | *Understand the various aspects of Chemical plant safety* | 1 | 2 | 3 | - | 1 | - | - | - | - | - | - | - | - | | - | - |
| **CO3** | *Understand the various aspects of Industrial accidents and Fire safety* | - | 1 | - | - | - | - | - | - | - | - | - | 3 | - | | 2 | - |

**Part A Answer the Following 10x1 Marks = 10 Marks**

|  |  |  |  |  |  |  |
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| **Q. No.** | **Questions** | **Marks** | **CO** | **BL** | **PO** | **Marks Scored** |
| **1.** | The acronym “MSDS” stands for   1. Material Security Data Sheet 2. **Material Safety Data Sheet** 3. Master Security Data Sheet 4. Mass Safety Data Sheet | 1 | 2 | L2 | 1,3 |  |
| **2.** | The HAZCHEM code for Methane is 2 SE, in this number ‘S’ relates to what?   1. Fire extinguisher type 2. Property of the chemical 3. Evacuation of the personnel 4. **Personal Protective equipment** | 1 | 2 | L2 | 1,3 |  |
| **3.** | Which does not fall under health hazard?   1. Eye irritation 2. Carcinogenicity 3. Reproductive toxicity 4. **Reactive mixing** | 1 | 2 | L1 | 1,3 |  |
| **4.** | A radioactive material falls under which hazardous class?   * 1. Class 9   2. Class 8   3. **Class 7**   4. Class 6 | 1 | 2 | L1 | 1,3 |  |
| **5.** | ‘Ergonomics’ is related to human   * 1. Comfort   2. Safety   3. **Comfort and Safety**   4. Risk and Hazard | 1 | 2 | L1 | 1,3 |  |
| **6.** | To help prevent accidents, people who use tools must   1. Be very careful 2. Not wear glasses 3. **Be trained and authorized to use them** 4. Not be sleepy | 1 | 3 | L1 | 1,3 |  |
| **7.** | According to this theory, every one of any given set of workers has an equal chance of being involved in an accident.   1. Domino theory 2. Multiple causation theory 3. **Pure chance theory** 4. Accident proneness theory | 1 | 3 | L2 | 1,3 |  |
| **8.** | If the fire produced from electrical contact, what type of fire extinguisher you will use?   1. Water type 2. **CO2 type** 3. Foam type 4. Wet chemical | 1 | 3 | L2 | 1,3 |  |
| 9. | During fire extinguishing, if we exclude the oxygen content, then the method is called -------   1. **Smothering** 2. Starvation 3. Cooling 4. Inhibiting | 1 | 3 | L2 | 1,3 |  |
| **10.** | ---------fire extinguishers are specifically designed in order to tackle a class K fire   1. Carbon dioxide 2. **Wet chemical** 3. Water 4. None | 1 | 3 | L1 | 1,3 |  |

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| **Q.No.** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **Ans.** |  |  |  |  |  |  |  |  |  |  |

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| Reg. No. | R | A |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Part B Answer the following 4 x 4 Marks = 16 Marks**

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| **Q. No.** | **Questions** |
| **11.** | Explain the four routes of exposure of chemicals into the human body. |
| **12.** | Discuss acute toxicity and chronic toxicity with examples. |
| **13.** | Explain any two accident causation theories.  **Domino theory:** According to W.H. Heinrich (1931), who developed the so-called domino theory, 88% of all accidents are caused by unsafe acts of people, 10% by unsafe actions and 2% by “acts of God”. He proposed a “five-factor accident sequence” in which each factor would actuate the next step in the manner of toppling dominoes lined up in a row. The sequence of accident factors is as follows:   * ancestry and social environment * worker fault * unsafe act together with mechanical and physical hazard * accident   damage or injury.  **Multiple causation theory**  Multiple causation theory is an outgrowth of the domino theory, but it postulates that for a single accident there may be many contributory factors, causes and sub-causes, and that certain combinations of these give rise to accidents. |
| **14.** | Explain the fire extinguisher applicable for class B and C fires.  **CARBON DIOXIDE (CO2) tpe:**   * Class “B” or “C” fires * 2.5-100 lb. of CO2 *(8-30 seconds discharge time)* * Has *NO* pressure gauge--capacity verified by weight * 3-8 ft. maximum effective range * Extinguishes by *smothering* burning materials * Effectiveness *decreases* as temperature of burning material increases. |

**Part C Answer the following 2 x 12 Marks = 24 Marks**

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| **Q. No.** |  |
| **15.** | Explain the criteria, factors and environmental guidelines followed for the Industrial siting**.** |
| **16.** | Explain the classification of dangerous chemicals in detail. Discuss the safe handling and storage methods of flammables and combustibles. |
| **17.** | Explain the process steps involved in accident investigation analysis. |
| **18.** | An chemical manufacturing industry, employs 950 people for its production. The data provided below is two years accident data.   |  |  |  |  | | --- | --- | --- | --- | | **Year** | **Occupational injury** | **Average hours worked** | **Days lost due to injury** | | 2019 | 20 | 2800 | 650 | | 2020 | 22 | 2950 | 800 |   Calculate Frequency rate, Incidence rate, Severity rate, Frequency severity Incidence, Frequency severity rate, Safe-T-Score. Report the safety performance. |

**Attainment Level (H:76 to 100%; M :50 to 75%; L: ≤ 50%)**

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|  | **Quality** | **Marks Scored** | **% of Marks** | **Attainment** |
| **CO2** | **L1 = 18 Marks** |  |  | **H/M/L** |
| **L2 = 19 Marks** |
| **CO3** | **L1 = 6 Marks** |
| **L2 = 19 Marks** |
| **L3 = 12 Marks** |  |
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