

Enrollment No.....



Faculty of Engineering
End Sem Examination Dec-2023
FT3EL12 Safety in Chemical Industries

Programme: B.Tech.

Branch/Specialisation: FT

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. _____ and _____ are types of measures of dispersion. **1**
 (a) Nominal, Real (b) Nominal, Relative
 (c) Real, Relative (d) Absolute, Relative
- ii. The term "CHEMTREC" stands for- **1**
 (a) Chemical Transportation Emergency Centre
 (b) Chemical Training Centre
 (c) Chemical Treatment Centre
 (d) Chemical Toxicity Recovery Centre
- iii. At LPG yard, if LPG gas leaked, for detection purposes the alarm level is set as low as practicable, preferably no higher than ____ of the lower explosion limit (LEL). **1**
 (a) 20% (b) 10%
 (c) LEL of LPG (d) 100% of LEL
- iv. The self-sustaining process of rapid oxidation of a fuel is: **1**
 (a) Vapour Lock (b) Flash Point
 (c) Combustion (d) Vapour Pressure
- v. When dealing with an unknown gas incident, the hazardous materials technician must be alert for _____ and _____ hazards. **1**
 (a) Oxygen Deficiency, Carbon Monoxide
 (b) Specific Gravity, Viscosity
 (c) Water Solubility, Boiling Point
 (d) Flammability, Toxicity

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vi.	Which of the chemicals that are being used in our plant is having the lowest flash point? (a) Petrol (b) Paint (c) Propane (d) HSD	1
vii.	The Bhopal gas tragedy happened on: (a) December 3,1994 (b) December 3,1984 (c) October 3,1984 (d) October 3,1994	1
viii.	Uphaar Cinema Fire was occurred in: (a) June 13, 1997 (b) June 13, 1996 (c) July 13, 1996 (d) July 13, 1997	1
ix.	Which one of the following techniques is used to analyze the cause and effect of product failure? (a) Quality Function Deployment (b) Fault Tree Analysis (c) Value Analysis (d) Failure Mode and Effect Analysis	1
x.	In HAZOP study, deviation can be defined as- (a) Guide word + parameter (b) Study node+ guide word (c) Study node+ causes (d) Guide word+ consequences	1
Q.2	i. Define criteria pollutants with example.	2
	ii. Enumerate the effects of the air pollution on human health and vegetation.	3
	iii. Explain Short term exposure limit, threshold limit values, and ceiling level of toxic gases.	5
OR	iv. Discuss the statutory rules and regulation on LPG and CNG gas transport on motor vehicle in India.	5
Q.3	i. What is flammability? Discuss about the flammabilities of chemicals.	2
	ii. Discuss the regulatory requirement for LPG storage.	8
OR	iii. What are the components of refrigerated LNG storage tank? Discuss with the help of Crawford diagram.	8

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Q.4	i. What is Flash point? Explain the difference between flash point & fire point.	3
	ii. Define detonation and blast waves. Discuss in detail about the explosion suppression system.	7
OR	iii. Write the possibility and methods of preventing BLEVE in process plants.	7
Q.5	i. Explain the importance of classification and labelling of chemicals.	4
	ii. With the help of case study, explain the methodology for conducting an accident investigation.	6
OR	iii. Discuss the various steps in conducting the accident investigation and reporting. Also classify accident as per IS 3786.	6
Q.6	Attempt any two:	
	i. Explain Fault tree analysis used in quantifying risk.	5
	ii. Briefly explain the HAZOP method for risk assessment.	5
	iii. Define the use of FTA in technique in quantitative risk assessment. Explain with suitable example.	5

Marking Scheme

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Q.1	i)	d) Absolute, Relative		1
	ii)	A) Chemical Transportation Emergency Centre		1
	iii)	b). 10%		1
	iv)	c). Combustion.		1
	v)	d). Flammability, Toxicity		1
	vi)	c). Propane		1
	vii)	b). December 3,1984		1
	viii)	a). June 13, 1997		1
	ix)	d). Failure Mode and Effect Analysis		1
	x)	a). Guide word + parameter		1
Q.2	i.	Define criteria pollutants	1 Mark	1
		with example	1 Mark	1
	ii.	Effects of the air Vegetation	(As per explanation)	3
	iii.	Explain Short term exposure limit,	1 Mark	1
		Threshold limit values, and	2 Marks	2
OR		Ceiling level of toxic gases.	2 Marks	2
	iv.	Discuss on LPG	2 Marks	2
		CNG gas transport on motor vehicle in India.	3 Marks	3
Q.3	i.	What is flammability	1 Mark	1
		Discuss about the flammabilities of chemicals.	1 Mark	1
	ii.	Requirement for LPG storage	(4 Marks*2)	8

OR	iii.	Components of refrigerated LNG storage tank	5 Marks	5
		Discuss with the help of Crawford diagram.	3 Marks	3
Q.4	i.	What is Flash point	1 Mark	3
		The difference between flash point & fire point.	2 Marks	
	ii.	Define detonation and blast waves.	2 Marks	2
		The explosion suppression system.	5 Marks	5
OR	iii.	Explaining BLEVE	4 Marks	7
		Preventions	3 Marks	
Q.5	i.	Explain the importance of Classification and	2 Marks	2
		Labelling of chemicals.	2 Marks	2
	ii.	Explain the investigation.	(As per explanation)	6
OR	iii.	The various investigation reporting.	4 Marks	4
		Details of IS 3786.	2 Marks	2
Q.6		Attempt any two		
	i.	Fault tree analysis	3 Marks	5
		Risk.	2 Marks	
	ii.	The HAZOP	4 Marks	5
		Risk Assessment	1 Mark	
	iii.	Explain with suitable example.	5 Marks	5
