Total No. of Questions: 6   Total No. of Printed Pages:2

Enrollment No......................................

Faculty of Engineering
End Sem Examination May-2023
FT3CO19 Hazard Identification & Risk Assessment
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.   Which of the following is hazard based on effects?   1
           (a) Sociological hazards   (b) Physical hazards
           (c) Anthropogenic hazards   (d) Health hazards
     ii.   Safety hazards is a part of-   1
           (a) Hazards based on origin
           (b) Hazards based on effects
           (c) Hazards based on energy source
           (d) None of these
     iii. MTBF is used to calculate-   1
           (a) Failure mode of equipment
           (b) Failure impacts of equipment
           (c) Availability time of equipment
           (d) None of these
     iv.   MTTF is used for-   1
           (a) Reliability of equipment
           (b) Process study of equipment
           (c) Check strength of equipment
           (d) None of these
     v.   In FMEA the letter F denotes-   1
           (a) Failure   (b) First   (c) For   (d) Free
     vi.   Fault Tree Analysis is a-   1
           (a) Top-Down approach   (b) Side-wise approach
           (c) Bottom-up approach   (d) None of these
     vii. Storage tank fire is a type of-   1
           (a) Flash fire   (b) Jet fire   (c) Pool fire   (d) BLEVE

P.T.O.

     viii. Plume model is used in-   1
           (a) Source model   (b) Vulnerability analysis
           (c) QRA   (d) Dispersion model
     ix.   The letter N in F-N curve denotes-   1
           (a) Number of incidents
           (b) Number of fatalities
           (c) Number of man hours lost
           (d) Number of Equipment failures
     x.   The letter F in F-N curve denotes-   1
           (a) Frequency of incidents   (b) Focussed target
           (c) Failure of equipment   (d) None of these

Q.2 i.   Define hazard & risk.   2
     ii.   What is fire, explosion & toxic gases?   3
     iii. How do you perform HAZOP study? Explain with an example.   5
OR   iv.   What are the hazards in process plant design and operation?   5

Q.3 i.   What is failure rate?   2
     ii.   How do you calculate MTTF from MTBF? Explain bathtub curve.   8
OR   iii. Discuss the methods of improving plant availability. Why is availability important?   8

Q.4 i.   What is FTA?   3
     ii.   How is failure mode effect analysis different from Hazop? What are the five steps of the FMEA process?   7
OR   iii. Prepare ETA of poisonous gas release considering top event & pivot events. Consider top event as – large scale release.   7

Q.5 i.   What are flash fires, pool fires & jet fires with a proper example.   4
     ii.   How do you control Vapour cloud explosion and what are the causes of VCE?   6
OR   iii. Explain the causes & effects of BLEVE.   6

Q.6   Attempt any two:
     i.   What is the ALARP principle in process safety?   5
     ii.   Differentiate between individual risk & risk indices.   5
     iii. Explain QRA. Why it is needed?   5

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Marking Scheme
FT3CO19 Hazard Identification & Risk Assessment

Q.1 i) Which of the following is hazard based on effects? **1**

Health hazards

ii) Safety hazards is a part of **1**

Hazards based on effects

iii) MTBF is used to calculate **1**

Availability time of equipment's

iv) MTTF is used for **1**

Reliability of equipment

v) In FMEA the letter F denotes **1**

Failure

vi) Fault Tree Analysis is a **1**

Bottom-up approach

vii) Storage tank fire is a type of **1**

Pool fire

viii) Plume model is used in **1**

Dispersion model

ix) The letter N in F-N curve denotes **1**

b. Number of fatalities

x) The letter F in F-N curve denotes **1**

a- Frequency of incidents

Q.2 i. Hazard & Risk. **1/1**

ii. Fire, Explosion & Toxic Gases. **1/1/1**

iii. Checklist for HAZOP study **5**

OR iv. 5 hazards in process plant design and operation **5**

Q.3 i. Failure Rate. **2**

ii. Calculation MTTF from MTBF   4 marks **4/4**
Bathtub Curve   4Marks

OR iii. methods of improving plant availability & importance of availability **5/3**

Q.4 i. FTA. **3**

ii. How is failure mode effect analysis different from Hazop / steps of the FMEA process? **4/3**

OR iii. Chart on of ETA. pivot & top evets **4/3**

Q.5 i. What are Flash Fires/Pool Fires/Jet Fires **2/1/1**

ii. How do you control Vapour cloud explosion / causes of VCE? **4/2**

OR iii. causes / effects of BLEVE. **3/3**

Q.6

i. ALARP principle **5**

ii. Differentiate between individual risk   2.5 Marks
& risk induces.   2.5 Marks **5**

iii. Explain QRA and why it is needed. **5**
QRA   3 Marks
Importance 2 Marks

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