

<b>Name:</b>	
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, May 2022**

**Course: Hazard Identification, Risk Analysis and Management (HSFS 7011) Semester: II**  
**Program: MTech HSE/ HSE(DM) Time : 03 hrs.**  
**Course Code: HSFS 7011 Max. Marks: 100**

**Instructions: Students are advised to answer questions sequentially and start each answer of a new sheet of paper.**

**SECTION A**  
**(5Qx4M=20Marks)**

S. No.	Question	Marks	CO
Q1	Write full forms of 1) ALOHA 2) PHAST 3) FDS 4) ERPG	4	CO3
Q2	What are the factors that determine the effect of thermal radiation from a pool fire?	4	CO2
Q3	Define – Reliability and Meantime between failure. Give examples.	4	CO3
Q4	What is the use of determination of explosion energy and how does it help in consequence assessment?	4	CO1
Q5	What input is required for designing an effective pressure relief system? Which pressure relief device is suitable for a process a) which may experience sudden rise in the pressure b) gradual rise in pressure?	4	CO1

**SECTION B**  
**(4Qx10M= 40 Marks)**

Q6	What conditions/scenarios/areas do not fall under the hazardous areas specified by standard IEC 60079-10-1? Explain the difference between grade of release and zone with the help of an example.	10	CO4
Q7	Describe a domino accident. What are the difficulties associated with performing a domino accident analysis?	10	CO3
Q8	Explain Layers of Protection and the concept of multiple barriers with the help of diagram(s).	10	CO4
Q9	Describe the risk management workflow. What are the various inputs required at each of the following steps 1) Hazard identification 2) Risk Analysis and 3) Risk Assessment	10	CO4

**SECTION-C**  
**(2Qx20M=40 Marks)**

Q10	The standard practice while estimating the risk is to consider the worst case scenario but the experience has shown that a worst case scenario may not be the most credible accident scenario. What are the steps involved in developing a maximum credible accident scenario and what	20	CO5
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	is the criteria used for establishing the credibility of an accident? Give examples of accidents which qualify as credible and the ones which are not credible.		
Q11	<p>The best approach to ensuring safety at a chemical plant is implementation of inherently safer design to initial design stages of a chemical plant. Discuss the various strategies used for making a plant inherently safer. Give examples to explain the concept of inherently safer design.</p> <p style="text-align: center;">Or</p> <p>Vapour cloud explosion is far more dangerous than any other explosion because of the ability of flammable vapour to drift large distance before finding an ignition source. Discuss in detail the advantage and limitations of various methods available for estimation of overpressure from a VCE? What could be done to minimize the risk of a VCE happening?</p>	<b>20</b>	<b>CO5</b>