

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Principle of Chemical Process Safety
Program: M.TECH PD
Course Code:

Semester: II
Time 03 hrs.
Max. Marks: 100

Instructions:

SECTION A

S. No.		Marks	CO
Q 1	Write short notes on Detonation and deflagration.	5	CO1
Q 2	Explain fire triangle.	5	CO1
Q.3	Write the difference between BLEVE and VCE.	5	CO2
Q 4	What is PPE? When is PPE necessary?	5	CO3

SECTION B

Q 5	Determine the LOC of a mixture of 2% hexane, 3% propane, and 2% methane by volume.	10	CO4
Q 6	If UFL for a substance is 11% volume at 0.0 MPa gauge, what is the UFL at 6.2 MPa gauge? Or Estimate the flash point of a solution of 50 mol% water and 50 mol% methanol.	10	CO5
Q 7	A burning dump emits and estimated 3 g/s of oxides of nitrogen. What is the average concentration of oxides of nitrogen from this source directly downwind at a distance of 3 km on an overcast night with a wind speed of 7 m/s? Assume that this dump is a point ground level source.	10	CO2
Q 8	Write down the various characteristics for fire and explosion. Describe with examples the three ingredients of any fire.	10	CO1

SECTION-C (Answer any two)

Q 9	Draw a flammability diagram for Propylene. The experimentally reported LOC for Propylene is 11.5%. Label all the points and lines in the diagram clearly.	20	CO5
Q 10	A tank truck hauling liquid benzene has overturned on I-94 in Detroit and a pool of benzene 30m in diameter has formed. The terrain is fairly flat. It is 1PM on a clear, sunny day. The wind is blowing at 7m/s. The ambient temperature is 30 °C. a) Estimate the evaporation rate of the benzene in kg/s. b) Use a dispersion model to estimate the downwind distance, in meters, to the ERPG-1 concentration.	20	CO4
Q 11	Use Britter-McQuaid dense gas dispersion model to determine the distance to the 1% concentration for a release of chlorine gas. Assume that the release occurs over a duration of 500 s with a volumetric release rate of 1 m ³ /s. The wind speed at 10m	20	CO5

height is 10m/s. The boiling point for the chlorine is -34°C and the density of the liquid at the boiling point is 1470kg/m^3 . Assume ambient conditions at 298 K and 1 atm.		
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