
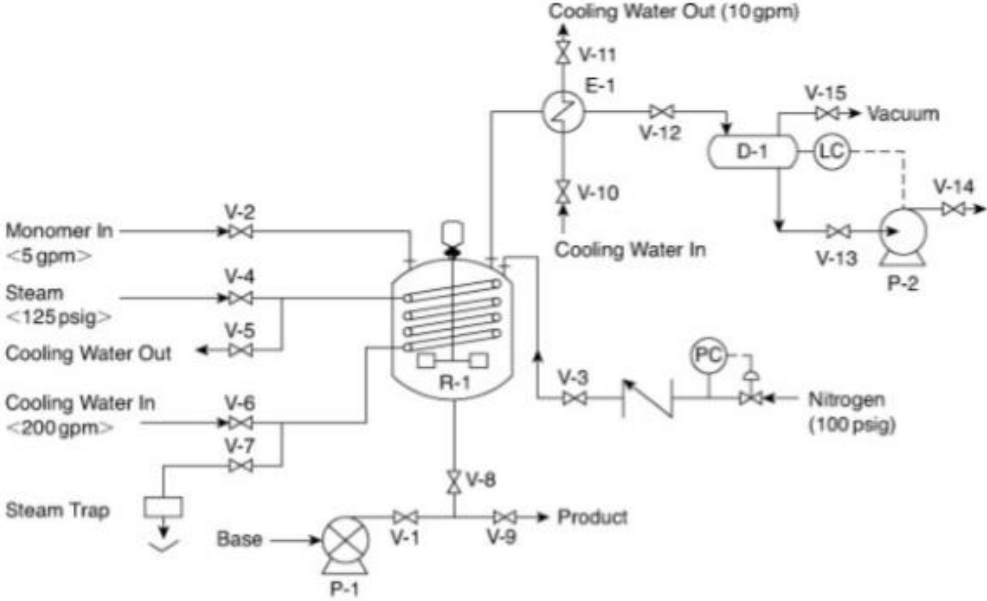
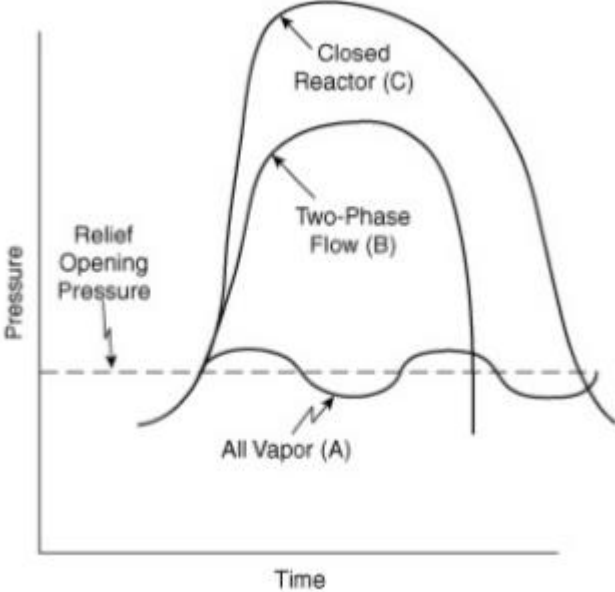


Name:			
Enrolment No:			
UPES End Semester Examination, May 2023			
Course: Chemical Process Safety Program: B.Tech (FSE) Course Code: HSFS 3008		Semester: VI Time : 03 hrs. Max. Marks: 100	
Instructions: <ul style="list-style-type: none"> This question paper contains three sections. No codes and additional support material is allowed for reference. Any data missing, may be suitably assumed and stated. Draw figures, wherever necessary to support your answer. 			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	List out variety of hazards associated in a chemical plant.	4	CO1
Q 2	Explain the six ingredient that makes a successful SAFETY program for a chemical process plant.	4	CO1
Q 3	A process has a reported fatality accident rate of 2, compute the deaths per person per year.	4	CO3
Q 4	Draw a general layout of a chemical storage plant showing necessary safety devices.	4	CO4
Q 5	How to establish the thermal stability of the system rather than to control the rate of heat release so as to minimize risk from reactive hazards?	4	CO2
SECTION B (4Qx10M= 40 Marks)			
Q 6	A worker is told her chances of being killed by a particular process are 1 in every 400 years. <ol style="list-style-type: none"> Should the worker be satisfied or alarmed? What should her chances be, assuming an average chemical plant? What is the FAR? 	5+5	CO3
Q 7	<ol style="list-style-type: none"> State two conditions necessary for chemical reaction to take place? Create a practical scenario of chemical reactivity occurrence in a chemical plant. 	4	CO3

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Q 8	<p>A company had a spray painting operation to paint automotive parts. The spray painting was done in a paint booth to reduce workers' exposure and to collect any paint droplets that might be entrained in the exhaust air. The paint droplets were collected by fibrous filters. At the end of each day, the filters were removed, placed in plastic bags, and stored for disposal in a separate building. Due to environmental concerns over volatile emissions from paint solvents, the paint supplier reformulated the paint to use a less volatile solvent. This change was done in consultation with the paint company. Several tests were done to ensure that the reformulated paint worked well with the existing spray equipment and that the resulting quality was satisfactory. The company eventually switched over to the reformulated paint. Several days later the disposal building caught on fire, apparently due to a fire started by the paint filters.</p> <p>Can you explain how this happened? Any suggestions for prevention.</p>	10	CO4														
Q 9	<p>Compare hazards associated during transportation of dangerous substances by road and air.</p> <p style="text-align: center;">OR</p> <p>When a pressure relief valve is exposed to an atmospheric back pressure with following information :</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>Fluid:</td> <td>Natural Gas</td> </tr> <tr> <td>Required Capacity:</td> <td>5900 lb/hr</td> </tr> <tr> <td>Set Pressure</td> <td>210 psig</td> </tr> <tr> <td>Overpressure:</td> <td>10%</td> </tr> <tr> <td>Back Pressure:</td> <td>Atmospheric</td> </tr> <tr> <td>Inlet Relieving Temperature:</td> <td>120F</td> </tr> <tr> <td>Molecular Weight:</td> <td>19.0</td> </tr> </table> $A = \frac{W \sqrt{TZ}}{C K P_1 K_n \sqrt{M}}$ <p>a) Calculate orifice area b) Explain how you select smallest standard size valve that will flow the required relieving capacity?</p>	Fluid:	Natural Gas	Required Capacity:	5900 lb/hr	Set Pressure	210 psig	Overpressure:	10%	Back Pressure:	Atmospheric	Inlet Relieving Temperature:	120F	Molecular Weight:	19.0	10	CO3
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<p>SECTION-C (2Qx20M=40 Marks)</p>																	

<p>Q 10</p>	<p>i. PI refer the polymerization reactor without safety reliefs. As a fire safety officer, specify the locations of reliefs in the reactor system.</p>  <p>ii. Assume that an exothermic reaction is occurring within a reactor, explain under what situations the inside temperature will rise? PI refer the pressure versus time runaway reaction curve to support your answer.</p> 	<p>10</p> <p>CO3</p> <p>10</p>	
<p>Q 11</p>	<p>Write short notes on any four from following :</p> <p>a) Causes and consequences from water-sensitive chemicals.</p>	<p>5x4=20</p>	<p>CO2</p>

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| | <p>b) What do you understand by a gas cylinder having two concentric colour bands?</p> <p>c) What Color scheme is used in chemical transportation through pipe lines?</p> <p>d) Inspection techniques for boilers and reaction vessels.</p> <p>e) Differentiate between inherent safety and engineered safety</p> <p>f) What is the NFPA Hazard Diamond?</p> | | |
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