

Name:	 UPES UNIVERSITY WITH A PURPOSE
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, July 2021

Course: Process Design and Flow sheeting

Semester: II Sem

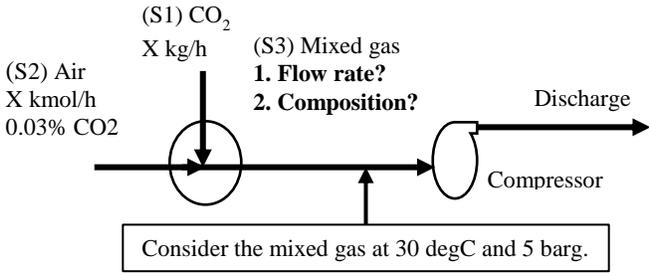
Program: M.Tech CE+PD

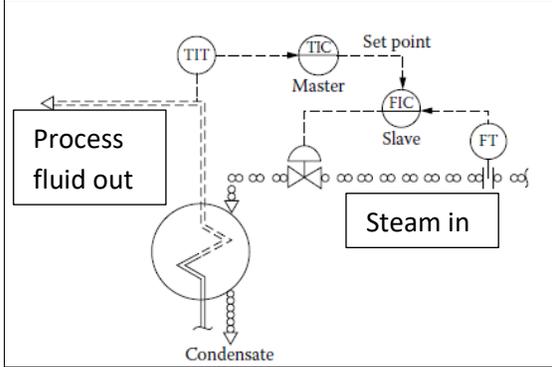
Time 03 hrs.

Course Code: CHPD 7008

Max. Marks: 100

Instructions: Assignment Based Questions

S. No.		Marks	CO
	Section A		
Q 1	Explain the following, which needs due consideration while establishing a new plant. 1) Environmental factors 2) Health and Safety factors	5	CO1
Q 2	What are the differences of principle of operation for a gravity separator and distillation column?	5	CO1
Q 3	Describe the line numbering philosophy with an example.	5	CO2
Q 4	Describe the steps involved in production manufacturing process	5	CO2
Q 5	Explain the information we may get from a P&ID.	5	CO3
Q 6	Name four thermodynamic packages used in simulation software and their best applications.	5	CO3
	Section B		
Q 1	What is the principle of gravity separator design? Explain the design steps.	10	CO3
Q 2	What is pump characteristics curve and system curve? Explain with a diagram	10	CO3
Q 3	<p>Carbon dioxide is added at a rate of “X” kg/h to an air stream and the air is sampled at a sufficient distance downstream to ensure complete mixing. Refer to the below diagram. Assume normal carbon dioxide content of air to 0.03 % (v/v). X = last two digits of respective students’ sap ID.</p> <div style="text-align: center;">  </div> <p>Consider mixed gas (with composition) molecular weight for calculation, if necessary</p>	10	CO4
Q 4	<p>Draw a P&ID for the following. Use proper symbol for equipment, valves. Provide line number, equipment number. Also, assume whatever seems necessary. “A 3 phase Horizontal separator + A Pumping system + A compressor system + A distillation column system”</p>	10	CO4

Q 5	<p>Explain the working of the control loop</p> 	10	CO5
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Section C

Q 1	<p>Take the calculated flow rates from question no 3 of section B and calculate the suction line size. Kindly pay attention to the highlighted assumptions. Assume the flowing as below:</p> <ol style="list-style-type: none"> 1. Consider air viscosity and density at the suction ignoring composition, temperature and pressure effect. 2. Consider industrially acceptable criteria for line size calculation 3. Use carbon steel for suction line with 50 m length 4. Use Iron Pipe Size (IPS data) with “STD” schedule 5. Assume logical data if needed additionally. 6. Use Swamee-Jain equation (given below) for friction factor calculation $f = \frac{1.325}{\left[\ln \left(\frac{\varepsilon}{3.7D} + \frac{5.74}{Re^{0.9}} \right) \right]^2}$	20	CO5
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