

Name:	 UPES UNIVERSITY WITH A PURPOSE
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, July 2020

Course: Process Design and Flowsheeting

Semester: II Sem

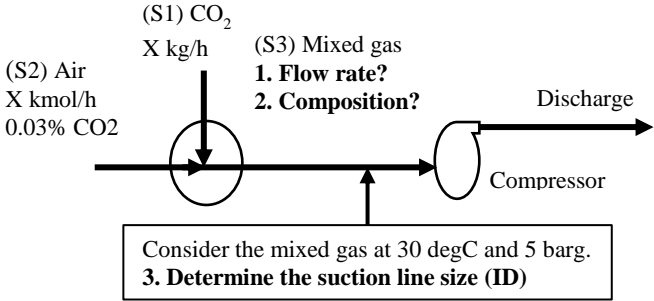
Program: M.Tech CE+PD

Time 03 hrs.

Course Code: CHPD 7008

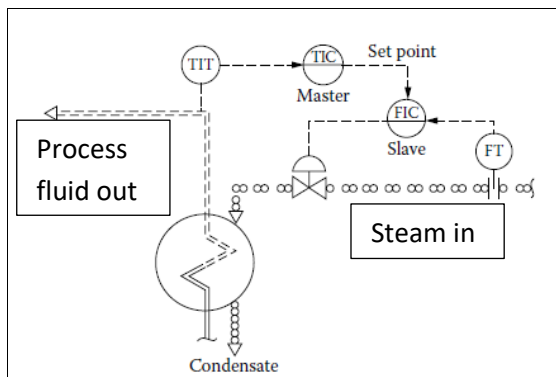
Max. Marks: 100

Instructions: Assignment Based Questions

S. No.	Question	Marks	CO
Q 1	<p>Explain the following, which needs due consideration while establishing a new plant.</p> <ol style="list-style-type: none"> 1) Environmental factors 2) Health and Safety factors 3) Plant location factors 	7+7+6 = 20	CO1
Q 2	<p>Describe the numbering philosophy for the following with example</p> <ol style="list-style-type: none"> 1. Line number 2. Equipment number 3. Instrument number 4. P&ID number 5. Valve number 	20	CO2
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).</p> <p>X = last two digits of respective students’ sap ID.</p> <div style="text-align: center;">  </div> <p>1. Flow rate? 2. Composition?</p> <p>3. Determine the suction line size (ID)</p> <p>Assume the flowing as below:</p> <ol style="list-style-type: none"> 1. Consider air viscosity and density at the suction ignoring composition effect 2. Consider mixed gas (with composition) molecular weight for calculation 3. Consider industrially acceptable criteria for line size calculation 4. Use carbon steel for suction line with 50 m length 5. Use Iron Pipe Size (IPS data) with “STD” schedule 6. Assume logical data if needed additionally. 7. Use Swamee-Jain equation (given below) for friction factor calculation 	5+15= 20	CO3

$$f = \frac{1.325}{\left[\ln \left(\frac{\varepsilon}{3.7D} + \frac{5.74}{Re^{0.9}} \right) \right]^2}$$

Q 4 (i) Explain the working of the control loop



(ii) Describe the working principle of two (2) different types of flow measuring instruments that are used in chemical industry.

10 +
10 =
20

CO4

Q 5 Draw a P&ID for the following. Use proper symbol for equipment, valves. Provide line number, equipment number. Also, assume whatever seems necessary.

P&ID to be created	Assigned to student with Roll No as below
A 3 phase Horizontal separator	Roll no R670219001
4x100% pumping system	Roll no R670219002
A distillation column system	Roll no R670219004
A Tank system	Roll no R670219005
A compressor system	Roll no R670219008
A stabilizer column system	Roll no R670219009
A shell & tube heat exchanger with temp control	Roll no R670219010

20

CO5