Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2163506 **Date:28/04/2018**

Subject Name:Unit Operations-II

Time:10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Define: (a) Osmotic Pressure (b) Permeability (c) Membrane flux	**03**
	(b)	Explain equipments used in storage of solids.	**04**
	(c)	Classify Dryers used in Industries and explain any one with neat and clean diagram.	**07**
Q.2	**(a)**	What are the different flow modes involved in Hopper?	**03**
	(b)	Give the advantages and disadvantages of Fluidization as a unit operation.	**04**
	(c)	A Rotary counter current dryer is fed with ammonium nitrate containing 6% moisture at the rate of 100 kg/min and discharge the ammonium nitrate with 0.2% moisture. The air enters at 135°C and leaves at 80 °C. The humidity of entering air being 0.007 kg H_2O/ kg of dry air. The ammonium nitrate enters at 21 °C and leaves at 65°C. Neglecting radiation losses calculate the kg of dry air passing through the dryer and the humidity of the air leaving the dryer. Specific heat of ammonium nitrate = 0.45 Specific heat of dry Air = 0.238 Specific heat of water vapor = 0.48	**07**
		OR	
	(c)	It is desired to dry a certain type of fiber board in sheets 0.131m X 0.162m X 0.071m from 58% to 5 % moisture content (wet basis). Initially from laboratory test data with this fiber board, the rate of drying at constant rate period was found to be 8.9 kg/ m^2 hours. The critical moisture content was 24.9% and the equilibrium moisture content was 1%. The fiber board is to be dried from one side only and has a bone dry density of 210 kg/m^3. Determine the time required for drying. The falling rate period may be assumed linear.	**07**
Q.3	**(a)**	What are the methods of palletizing of solids?	**03**
	(b)	Define: (a) Bound Moisture (b) Equilibrium moisture content (c) Relative Humidity	**04**
	(c)	Discuss various types of problems involved in Hopper designing.	**07**
		OR	
Q.3	**(a)**	Discuss about Geldart's Powder Classification.	**03**
	(b)	Explain Drying curve with suitable diagram.	**04**
	(c)	Enlist different types of conveyors used in industry and explain Pneumatic Conveying System with suitable diagram.	**07**
Q.4	**(a)**	Explain working of Electrostatic Precipitator.	**03**
	(b)	What are the conveyors and what are the benefits involved in using them?	**04**
	(c)	Discuss Phenomena of concentration Polarization Reverse Osmosis in detail.	**07**
		OR	
Q.4	**(a)**	Discuss principal and working of Clarifocculator.	**03**

	(b)	Discuss working of Belt Conveyer.	**04**
	(c)	Explain the concept of Microfiltration and its industrial application in brief.	**07**
Q.5	**(a)**	What is the principle behind Drying? Discuss transport mechanism involved in drying.	**03**
	(b)	Calculate the osmotic pressure of a solution containing 0.10 g NaCl/ 1000 g H_2O at 25 °C	**04**
	(c)	Explain Fluidization Process with suitable diagram of pressure drop and bed height vs. Superficial velocity for a bed of solids.	**07**

OR

Q.5	**(a)**	Give brief on Sand Filter.	**03**
	(b)	Enlist various membrane modules available and explain modules used in Reverse Osmosis.	**04**
	(c)	Discuss the methods of Granulation in brief.	**07**

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