



**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
<b>Q.1</b> (a) Define: (a) Osmotic Pressure (b) Permeability (c) Membrane flux	<b>03</b>
(b) Explain equipments used in storage of solids.	<b>04</b>
(c) Classify Dryers used in Industries and explain any one with neat and clean diagram.	<b>07</b>
 <b>Q.2</b> (a) What are the different flow modes involved in Hopper?	<b>03</b>
(b) Give the advantages and disadvantages of Fluidization as a unit operation.	<b>04</b>
(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 <sub>2</sub> O/ 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	<b>07</b>
<b>OR</b>	
(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 <sup>2</sup> 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 <sup>3</sup> . Determine the time required for drying. The falling rate period may be assumed linear.	<b>07</b>
 <b>Q.3</b> (a) What are the methods of palletizing of solids?	<b>03</b>
(b) Define: (a) Bound Moisture (b) Equilibrium moisture content (c) Relative Humidity	<b>04</b>
(c) Discuss various types of problems involved in Hopper designing.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) Discuss about Geldart's Powder Classification.	<b>03</b>
(b) Explain Drying curve with suitable diagram.	<b>04</b>
(c) Enlist different types of conveyors used in industry and explain Pneumatic Conveying System with suitable diagram.	<b>07</b>
 <b>Q.4</b> (a) Explain working of Electrostatic Precipitator.	<b>03</b>
(b) What are the conveyors and what are the benefits involved in using them?	<b>04</b>
(c) Discuss Phenomena of concentration Polarization Reverse Osmosis in detail.	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) Discuss principal and working of Clarifocculator.	<b>03</b>



- b) Discuss working of Belt Conveyor. 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<sub>2</sub>O 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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