

**M. TECH. –IV (CHEMICAL ENGINEERING) (CBCS – 2015
COURSE) : SUMMER - 2018**

SUBJECT : SELF – STUDY PAPER – II: PHYSICAL CONCEPTS OF UNIT OPERATIONS

Day : **Tuesday**
Date : **19/06/2018**

S-2018-3184

Time : **11.00 AM TO 02.00 PM**
Max. Marks : 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in the **SEPARATE** answer books.

SECTION – I

Q.1 Describe the graphical method used for stage calculation in distillation. **[10]**

OR

Explain the Lewis – Sorrel method for distillation.

Q.2 Compare extraction over distillation in terms of energy, cost, recovery, inventory and give the principle and mechanism for both. **[10]**

OR

Give the material balance equation for 3 stage counter-current extraction operation.

Q.3 Define crystallization. Explain the principle, mechanism and working of any one crystallizer. **[10]**

OR

Derive the material balance equation for batch crystallizer.

SECTION – II

Q.4 Explain break through curve for adsorption in fixed bed. **[10]**

OR

Explain any one adsorption isotherm in detail.

Q.5 Derive the material balance equation for multi-stage counter-current leaching operation. **[10]**

OR

60 tons per day of oil sand 25 mass % oil and 75% mass sand is to be extracted with 40 tons per day of naphtha in a continuous counter current extraction battery. The final extract from the battery is to contain 40 mass % oil and 60 mass % naphtha and the underflow from each unit is expected to consist of 35 mass % solutions and 65 mass % sand if overall efficiency of battery is 50%. How many stages will be required?

Q.6 Classify different dryers and explain any one type in detail. **[10]**

OR

Derive the equation used for time calculation in batch drying.

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