ADVANCE SEPARATION PROCESS

Paper Code: ETEN-415	**L**	**T/P**	**C**
Paper: Advance Separation Process	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To understand the governing mechanisms and driving forces of various advanced separation processes such as reverse osmosis, Nano filtration, ultra filtration, ionic separation etc. and to perform process and design calculations for these processes.

UNIT I

Introduction: Review of conventional processes, Recent advances in separation techniques based on size, surface properties, ionic properties and other special characteristics of substances, Process concept, Theory and equipment used in cross flow filtration, cross flow electro filtration, dual functional filter, Surface based solid - liquid separations involving a second liquid, Sirofloc filter.

[T1, T2][No. of Hours: 11]

UNIT II

Membrane Separation: Types and choice of membranes, Plate and frame, tubular, spiral wound and hollow fiber membrane reactors and their relative merits, Commercial, pilot plant and laboratory membranes permeators involving dialysis, reverse osmosis, Nanofiltration, Ultrafiltration, Microfiltration and Donnan dialysis, Economics of membrane operations, Ceramic membranes.

[T1, T2][No. of Hours: 11]

UNIT III

Separation By Adsorption Techniques: Choice of adsorbents, Normal adsorption techniques, Types of equipment and commercial processes, Recent advances and process economics, Gas Separation techniques for recovery and reuse, Case Studies.

[T1, T2][No. of Hours: 11]

UNIT IV

Ionic Separations: Controlling factors, Applications, Types of equipment employed for electrophoresis, Di-electrophoresis, Electro dialysis, Commercial Processes. Separations involving Iyophilisation, Prevaporation and permeation techniques for solids, liquids and gases. Industrial viability and examples, Zone melting, Adductive crystallization, other separation process, Supercritical fluid extraction.

[T1, T2][No. of Hours: 12]

Text Books:

[T1] King, C.J. " Separation Processes ", Tata McGraw - Hill Publishing Co., Ltd, New Delhi.

[T2] Ronald W. Roussel – "Handbook of Separation Process Technology ", John Wiley, New York.

Reference Books :

[R1] Lacey, R.E. and Loaeb S. - "Industrial Processing with Membranes ", Wiley–Inter Science, New York.

[R2] Schoew, H.M. "New Chemical Engineering Separation Techniques ", Interscience Publishers.

[R3] Kestory, R.E. "Synthetic Polymeric Membrances", Wiley, New York.