

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Semester: IV

Environmental Science & Technology

Subject Code : 143502

Subject Name : Chemical Engineering Operations

| Sr. No. | Course contents |
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| 01. | Definition of Unit Operations & their Industrial Relevance, size reduction & analysis, solid–solid mixing |
| 02. | Filtration & Centrifugation : theory of filtration, Industrial filters, Theory of Centrifugation, Industrial Centrifuges |
| 03. | Absorption: diffusivity, Henry's law, design of absorbers including falling film absorber, venturing scrubber, spray Columns. |
| 04. | Adsorption: adsorption isotherms, industrial adsorbents with their characteristic break through curve, adsorption Columns, Humidification & dehumidification, cooling towers |
| 05. | Drying: theory, dryers for wet solids, slurries & solutions. |
| 06. | Crystallization: super saturation, industrial strategies for creating super saturation, industrial crystallizers. |
| 07. | Evaporation: Boiling point elevation, single & multiple effect evaporators, Industrial evaporators. |
| 08. | Distillation: vapor – liquid equilibrium, Batch & continuous distillation, separation of azeotropes, steam distillation, equipments |
| 09. | Liquid Extraction : Solvent selection, Batch Extraction |
| 10. | Membrane Processes : MF, UF and RO |

Reference Books:

1. Unit Operations of Chemical Engineering, Warren McCabe, Jubian Smith and Peter Harriot, Mc Graw Hill, 7th Ed., 2004
2. Transport Processes & Unit Operations in Chemical Engineering ,Gean Koplis, Prentice Hall, 2003
3. Coulson and Richardson's Chemical Engineering Volume 1 - Fluid Flow, Heat Transfer and Mass Transfer , Coulson, J.M.; Richardson, J.F.; Backhurst, J.H Harker, Elsevier, 6th Ed., 1999
4. Coulson and Richardson's Chemical Engineering Volume 2 – Particle Technology and Separation Processes,B J Blackhurst & J H Harker, Elsevier, 5th Ed., 2002
5. Coulson and Richardson's Chemical Engineering Volume 3 – Biochemical Reactors & Process Control, B J Blackhurst & J H Harker, Elsevier, 3rd Ed., 1994
6. Coulson and Richardson's Chemical Engineering Volume 4 – Solutions to the Problems in Chemical Engineering from Vol- 1, B J Blackhurst & J H Harker, Elsevier, 2001
7. Coulson and Richardson's Chemical Engineering Volume 5 – Solutions to the Problems in Chemical Engineering from Vol- 2 and Vol-3, B J Blackhurst & J H Harker, Elsevier, 2001
8. Chemical Enginnering Design Volume 6, R K Sinnott, Coulson and Richardson's Chemical Engineering Elseiver, 4th Ed, 2005

**APPROPRIATE NUMBER OF PRACTICALS WILL BE CONDUCTED AS
PER THE THEORY SYLLABUS**