

## UCH401 FLUID AND PARTICLE MECHANICS

<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
<b>3</b>	<b>1</b>	<b>2</b>	<b>4.5</b>

**Prerequisite(s):** None

Determination of mean particle size, particle shape, and particle size distribution.

**Screening:** Types of screens. Screen effectiveness and efficiency. Particle size analysis using screens.

**Size Reduction:** Principles of crushing and grinding. Laws of size reduction. Industrial size reduction equipment. Closed and open circuit grinding.

**Fluid-Solid Separations:** Stoke's law. Free and hindered settling. Clarifiers and thickeners. Settling chambers. Elutriation. Zigs. Bag filters. Electrostatic precipitators. Froth-flotation. Magnetic separators. Centrifugal separators.

**Flow past immersed bodies:** Friction in flow through beds of solids. Motion of particles through fluids.

**Fluidization:** Mechanism of fluidization. Determination of minimum fluidization velocity. Determination of velocity range for the operation of a fluidized bed. Types of fluidization. Applications of fluidization.

**Filtration:** Theory of filtration and filtration equipment.

**Handling of Solids:** Storage of solids, sizing of hoppers and bins. Mechanical, pneumatic and hydraulic conveying systems. Mixing of solids and power index.

### **Laboratory work**

Screen analysis, power requirement in mixing, plate and frame filter press, leaf filter, elutriation, pressure drop in fluidized bed & packed bed, sedimentation, froth floatation, Experiments on ball mill etc.

### **Text Books**

1. McCabe, W.L., Smith, J.C., and Harriot, P., *Unit Operations of Chemical Engineering*. McGraw-Hill (2005) 7<sup>th</sup> ed.

### **Reference Books**

1. Richardson, J.F., Harker, J.H. and Backhurst, J.R., *Coulson and Richardsons Chemical Engineering, Vol. 2*, Butterworth-Heinemann (2007) 5<sup>th</sup> ed.
2. Foust, A.S, Wenzel, L.A, Clump, C.W., Maus, L. and Anderson, L.B., *Principles of Unit Operations*, John Wiley (2008) 2<sup>nd</sup> ed.
3. Perry, R.H, and Green, D.W., *Perry's Chemical Engineers' Handbook*, McGraw Hill (2007) 8<sup>th</sup> ed.
4. Narayanan, C.M. and Bhattacharya, B.C., *Mechanical Operations for Chemical Engineers Incorporating Computer Aided Analysis*, Khanna Publishers (2005).