

Year & Sem: E1S2	Course Code:CH1203	Course Name: Mechanical Unit Operations	No. of Credits: 4	L 2	T&PS 2	P 0
UNIT I: Properties, handling and mixing of particulate solids: Characterization of solid particles, properties of particulate masses, storage and mixing of solids, types of mixers, mixers for cohesive solids, mixers for free flowing solids. Transportation of solid particulate mass, belt, screw, apron conveyers, bucket elevators, pneumatic conveying. UNIT II: Size reduction: Principles of comminution, computer simulation of milling operations, size reduction equipment-crushers, grinders, ultra fine grinders, cutting machines, Equipment operation. Laws of crushing: Kick's law, Bond's law, Rittinger's law Screening, Industrial screening equipments, Effectiveness of the screen, differential & cumulative analysis. UNIT III: Filtration, cake filters, centrifugal filters, cyclone separators, electro-static precipitators. Principles of cake filtration. Clarifying filters, liquid clarification, gas cleaning, principles of clarification. Cross flow filtration, types of membranes, permeate flux for ultra-filtration, Concentration polarization, particle rejection of solutes, micro filtration. UNIT IV: Separations based on motion of particles through fluids, gravity settling processes and centrifugal settling processes, float and sink method, differential settling, coagulation, Flotation-separation of ores, flotation agents Agitation and mixing of liquids: Agitation of liquids, circulation velocities, power consumption in agitated vessels. Blending and mixing of liquids, suspension of solid particles, dispersion operations. UNIT V: Crystallization: crystal geometry, principles of crystallization equilibria and yields, nucleation, crystal growth, ΔL law, crystallization equipment including MSMPR crystallizers. References/Text Books: 1. Unit Operations in Chemical Engineering by W.L. McCabe and J.C. Smith and Peter Harriott, Mc Graw Hill 7th ed. 2001. 2. Chemical engineers hand book, J.H. Perry, 7th ed. Mc Graw Hill 3. Introduction to Chemical Engineering by J.T.Banchero & W.L. Badger., TMH, 1997. Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations. Video Lectures (Web Links): 1. 2. Study Materials (Web Links): 1. 2. Problems & Solutions (Web Links):						