

		<b>The Maharaja Sayajirao University of Baroda</b> Polytechnic Department of Petrochemical Technology Polytechnic, Near Shastri Bridge, Fatehgunj, Vadodara-2 0265-2781983, , www.msubaroda.ac.in		ACADEMIC YEAR 2012-2013	
Diploma : Full Time (Regular)					
YEAR	II	<b>CHL3301 : Chemical Engg-I( Mechanical operations)</b>		IA	20
				UA	80
Semester	I			HOURS	56
<b>COURSE CONTENT / SYLLABUS</b>					
<b>UNIT-I</b>	<b>Introduction</b>				1 hrs
	Definition of unit operation & unit process Difference of unit operation & unit process with examples.				
<b>UNIT-II</b>	<b>Characterisation of solid particles</b>				7 hrs
	a) Particle shape sphericity (shape factor) particle size, calculation of equivalent particle diameter, specific surface area, volume surface mean diameter, mass mean diameter, simple calculation of properties b) Screening_– standard screen series, cumulative analysis, differential analysis, Sieve shaker, Definition of ideal & actual screen capacity and effectiveness of screen. Types of screens- Grizzlies, Trommels, Gyrotory screen, Vibrating screens. Simple calculation on capacity and effectiveness of screen				
<b>UNIT-III</b>	<b>Size reduction (Comminution)</b>				11 hrs
	a) Criteria for size reduction characteristics of comminuted products, particle size distribution, energy and power requirement in crushing, work index, laws of crushing, Rittinger's law, Bond's law, Kick's law, Simple calculation of power for size reduction b) Size reduction equipment - Crushers, Jaw crushers, Roll crushers, Angle of nip, Ribbon factor, capacity of Roll crusher, Gyrotory crusher, Grinder, Hammer Mill, Ball mill, Attrition mill, Critical speed of Ball mill. Ultrafine grinders - Fluid energy mill cutting machines - Knife cutters, Open and close circuit grinding, Introduction to size enlargement.				
<b>UNIT-IV</b>	<b>Agitation and Mixing of liquids</b>				7 hrs
	Definition of agitation & mixing and their Applications. Equipment for agitation, Purposes of agitation, Types of impellers, Propeller, paddle, Turbine Anchor, equation for power consumption in agitation, flow Patterns in agitated tanks, Baffles, Vortex prevention, flow number, Factors affecting agitation. Simple problems on calculation of power in Agitated vessels.				
<b>UNIT-V</b>	<b>Mixing of solids</b>				4 hrs
	Purposes of mixing solids & pastes factors affecting selection of equipment, rate of Mixing, mixing index for pastes & powder Principle construction & working of change Can mixer, Kneaders, ribbon blender, Pug mill, Banbury mixer, Muller mixer, Double Cone mixer.				
<b>UNIT-VI</b>	<b>Filtration</b>				10 hrs
	Definition & application of filtration, factors affecting selection of equipment, Filtration equipment – plate & frame filter press, shell & leaf filter, vacuum filter, rotary drum filter (pre coat), centrifugal Filtration, centrifuge, cartridge filter, filter media & its characteristics, filter aids and methods of application,				

	precoating Principles of cake filtration, constant pressure & constant rate filtration. Filter medium resistance specific cake resistance simple calculation of $\alpha$ and $R_m$ principles, of centrifugal filtration.	
<b>UNIT-VII</b>	<b>Sedimentation</b>	7 hrs
	Definition – Batch sedimentation rate of Sedimentation height of inter phase & time curve. Flocculation Thickeners, Gravity Setting processes. Sink & float method. Differential settling methods, Free & Hindered Settling, definition of Stoke's law, Newton's Law for terminal settling velocity.	
<b>UNIT-VIII</b>	<b>Separation based on property (solid particles)</b>	5 hrs
	Definition & application of solid separation, Factors affecting selection of equipment, Froth Floatation, Jigging, Magnetic separation, Electro static precipitator, Cyclone separator, Hydro cyclone, Centrifugal classifier, Bag filter.	
<b>UNIT-IX</b>	<b>Conveying of solids (Conveyers)</b>	4 hrs
	Vertical & horizontal transport, Belt Chain, screw, pneumatic conveyor Bucket elevator Industrial application of conveying.	
<b>REFERENCES</b>		
1.	Unit Operation of Chemical Engineering by McCabe Smith	
2.	Unit Operation. Vol. I by K.A. Gavhane	