

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Bachelor of Technology			Branch/Spec.	Petrochemical Engineering				
Semester	IV			Version	1.0.0.0				
Effective from Academic Year	2020-21			Effective for the batch Admitted in	July 2019				
Subject code	2PCE4103		Subject Name	Mechanical Operations					
Teaching scheme				Examination scheme (Marks)					
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total	
	L	TU	P	TW					
Credit	3	1	0	0	4	Theory	40	60	100
Hours	3	1	0	0	4	Practical	0	0	0
Pre-requisites:									
1. Basic concepts of electronics.									
Course Objective									
<ul style="list-style-type: none"> To Understand mechanical unit operations and their role in chemical engineering To know the nature of solids, their characterization, handling, and the processes involving solids To Analyze the performance of size reduction equipment and calculate the power requirements For Design of solid-fluid separation equipment 									
Theory syllabus									
Unit	Content							Hrs	
1	Introduction: Unit operations and their role in chemical industries; Types of mechanical operations;							9	
2	Properties and handling of particulate solids: Characterization of solid particles, Properties of masses of particles, Mixing of solids, Size reduction, Ultrafine grinders.							8	
3	Screening: Screening equipment, Screen capacity effectiveness of screens, sieve analysis, average diameter and specific surface. Size reduction, types of equipments used in the various stages of reductions. Laws of crushing & grinding power requirements.							7	
4	Filtration Filtration theory, equipment for filtration, constant pressure and constant rate filtration, filter calculations, optimum cycle time & filter aids., Filter media, Principles of cake filtration, Washing filter cakes							9	
5	Clarifying filters: Liquid clarification, Gas cleaning, Principles of clarification. Cross flow filtration: Types of membranes, Permeate flux for ultrafiltration, Concentration polarization, Applications of ultrafiltration, Diafiltration, Microfiltration.							5	
6	Sedimentation: Gravity sedimentation processes, Centrifugal sedimentation processes. Agitation and mixing of liquids: Agitated vessels, Blending and mixing, Suspension of solid particles, Dispersion operations, Agitator selection and scaleup, Power Number, Mixing Index.							7	
Practical content									
The Practical/term work shall be based on the topics mentioned above and will be defended by the candidates.									
Text Books									

1	McCabe W. L., Jullian Smith C. and Peter Harriott - Unit operations of Chemical Engineering, 7th Edition, McGraw-Hill international edition, 2005.
2	Coulson J.M., Richardson J.F, Chemical Engineering, Vol. II, 4th Edition, Elsevier India, 2006.
Reference Books	
1	Unit operations for chemical engineers by McCabe W.L. and Smith J.C. Mc Grow Hill International Edition Seventh Edition 2005.
2	Chemical Engineering by Coulson J.N. and Richardson R.F., Elsevir Publication Vol. II Fifth Edition 2002.
3	Transport Processes and Separation Process Principles by Christe John Geankoplis, PHI Learning, Fourth Edition 2003.
ICT/MOOCs references	
1	https://nptel.ac.in/courses/103107123/
2	https://nptel.ac.in/courses/103103155/
3	https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ch05/
Course Outcomes	
	<p>Understand mechanical unit operations and their role in chemical engineering</p> <p>Understand the nature of solids, their characterization, handling, and the processes involving solids</p> <p>Analyze the performance of size reduction equipment and calculate the power requirements</p> <p>Design solid-fluid separation equipment</p>