GANPAT UNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Petrochemical Technology / Chemical Engineering		
Semester	III	Version	1.0.0.0
Effective from Academic Year	2026-27	Effective for the batch Admitted in	JULY 2025
Course code	1PCT3104	Course Name	Particulate Technology

I.TEACHING-LEARNING AND ASSESSMENT SCHEME

Course Type	Course Code	Learning Scheme						Assessment Scheme										
		Actual Contact Hrs./Week			SLH	NLH	Credits	Theory				Practical				Based on SL		Total Marks
		CL	TL	LL				FA-TH	SA-TH	TOTAL		FA-PR	SA-PR	TOTAL		SLA		
								MAX	MAX	MAX	MIN	MAX	MAX	MAX	MIN	MAX	MIN	
SEC	1PCT3104	3	-	0	3	6	3	40	60	100	40	-	-	-	-	20	8	120

Abbreviation:			
	CL- Classroom Learning	**TL** - Tutorial Learning	**LL** - Laboratory Learning
	SLH - Self Learning Hours	**NLH** - Notional Learning Hours	**SLA** - Self Learning Assessment
	FA - Formative Assessment (Term work +Mid Sem Exam +Attendance)		**SA** - Summative Assessment

II. PRE-REQUISITES

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III. INDUSTRY /EMPLOYER EXPECTED OUTCOMES

The outcome expected from this course is to help the chemical and petrochemical engineering students to attain the industry/employer identified competency about size reduction operations, handling of material and separation of gas-solid, solid-solid, liquid-solid mixtures with minimum energy utilisation through various teaching learning experiences.

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to achieve the following course learning outcomes:

CO1: To understand the properties of solids.

CO2: To know the types of size reduction equipment with their application in different industries.

CO3: To understand the basics of size separation equipment for solid-solid and solid-gas systems.

CO4: To understand the application of solid mixers for cohesive and non-cohesive solids.

CO5: To learn about various conveyors for solids.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's) & CO's	Marks	Hours
Unit 1 Properties of Particulate Solids	**TLO1.1** Comparison between unit operations and unit process **TLO1.2** Various specific properties of solids **TLO1.3** Detail understanding about Particle density and Bulk density **TLO1.4** To know the terms: Diameter, sphericity, equivalent diameter **TLO1.5** To understand meaning of Specific surface area, volume surface mean diameter, mass mean diameter.	**1.1** Differentiate Unit operation and Unit process **1.2** Specific properties of solids **1.3** Particle density and Bulk density **1.4** Diameter, sphericity, equivalent diameter **1.5** Specific surface area, volume surface mean diameter, mass mean diameter.	**10**	**08**
Unit 2 Size Reduction	**TLO2.1** Students will learn about the basics of size reduction.	**2.1** Definition and need of size reduction **2.2** Principles of size reduction	**14**	**12**

	TLO2.2 To know the ways of size reduction equipments **TLO2.3** Understanding of Jaw crusher working and its applications. **TLO2.4** Understanding of Roll crusher working and its applications. **TLO2.5** Understanding of Ball mill working and its applications.	**2.3** Operation and application of size reduction equipments: Jaw crusher **2.4** Operation and application of size reduction equipments: Roll crusher **2.5** Operation and application of size reduction equipments: Ball mill		
Unit 3 Size Separation	**TLO3.1** Importance of size reduction **TLO3.2** Understanding of screening **TLO3.3** Settling chamber operation and uses **TLO3.4** Bag filter operation and uses **TLO3.5** Electrostatic precipitator operation and uses **TLO3.6** Cyclone separator operation and uses	**3.1** Objectives of size separation **3.2** Screening **3.3** Operation and application of solid-gas separation equipment: Settling chamber **3.4** Operation and application of solid-gas separation equipment: Bag filter **3.5** Operation and application of solid-gas separation equipment: Electrostatic precipitator **3.6** Operation and application of solid-gas separation equipment: Cyclone separator.	**14**	**09**
Unit 4 Mixing of Solids	**TLO4.1** Significance of mixing of solids **TLO4.2** Operation and application of Ribbon blender **TLO4.3** Operation and application of Tumbler mixer **TLO4.4** Operation and application of Kneader **TLO4.5** Operation and application of Banbury mixer **TLO4.6** Operation and application of Muller mixer.	**4.1** Importance of mixing of solids **4.2** Operation and application of solid mixers: Ribbon blender **4.3** Operation and application of solid mixers: Tumbler mixer **4.4** Operation and application of solid mixers: Kneaders **4.5** Operation and application of solid mixers: Banbury mixer **4.6** Operation and application of solid mixers: Muller mixer.	**12**	**8**
Unit 5 Conveying of Solids	**TLO5.1** Purpose of conveyors and its types **TLO5.2** Principle, Operation and application of Belt conveyor **TLO5.3** Principle, Operation and application of Screw conveyor **TLO5.4** Principle, Operation and application of Bucket elevator **TLO5.5** Principle, Operation and application of Pneumatic conveyor	**5.1** Types of conveyors **5.2** Principle, Operation and application of conveyors: Belt conveyor **5.3** Principle, Operation and application of Screw conveyor **5.4** Principle, Operation and application of Bucket elevator **5.5** Principle, Operation and application of Pneumatic conveyor	**10**	**8**

VI. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

MICRO PROJECTS

- Write a brief report on important particulate properties and their importance along with their applications in chemical and petrochemical industries.
- Prepare a project report on screening and its importance in chemical/petrochemical industries
- Prepare a project report on any one of the size reduction equipments used in chemical/petrochemical industries
- Prepare a project report on any one of the size separation equipments used in chemical/petrochemical industries.
- Prepare a project report on any one of the mixing equipments used in chemical/petrochemical industries.
- Prepare a project report on any one of the conveying equipments used in chemical/petrochemical industries.

VII. LIST OF REFERENCE BOOKS

Sr. No.	Title	Author	Publication
1	Unit Operations of Chemical	Unit Operations of Chemical	Unit Operations of Chemical
2	Unit Operation –I	K. A. Gavhane	Nirali Prakashan
3	Introduction to Chemical Engineering	W.L. Badger, J.T. Banchero	Tata McGraw Hill
4	Outlines of Chemical Technology	C.E. Dryden	East-West Press

VIII. LINK OF LEARNING WEB RESOURCE

1	https://www.youtube.com/watch?v=Y1_mr09prfY
2	https://www.youtube.com/watch?v=ldhRvlU1G70&t=21s
3	https://www.youtube.com/watch?v=-BHmsjvnm_4
4	https://www.youtube.com/watch?v=EfTcfQY4kEY
5	https://www.youtube.com/watch?v=fHj8djUc3og
6	https://www.youtube.com/watch?v=E2Ln8KgrhpA
7	https://www.youtube.com/watch?v=N2f5X1wkbvQ
8	https://www.youtube.com/watch?v=e0i3mxc79yI
9	https://nptel.ac.in/courses/103107123

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Properties of Particulate Solids	CO1	08	3	5	2	10
2	Size Reduction	CO2	12	4	6	4	14
3	Size Separation	CO3	09	3	6	5	14
4	Mixing of Solids	CO4	08	3	5	4	12
5	Conveying of Solids	CO5	08	2	6	2	10
		Grand Total	45	15	28	17	60

X. COs AND POs AND PSOs MAPPING										
Course outcome (Cos)	**Programme Outcomes (POs)**							**Programme Specific Outcomes (PSOs)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	1	1	2	1	2
CO2	2	3	2	2	1	1	1	3	2	1
CO3	2	3	2	3	2	1	1	3	1	2
CO4	3	2	3	2	1	1	1	3	2	1
CO5	2	3	3	2	2	1	1	3	2	1
Legends: - *3- High* *2-Moderate/Medium* *1-Slight/Low* *0-None*										