NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF GEOLOGICAL, MINING AND METALLURGICAL ENGINEERING

METALLURGICAL ENGINEERING PROGRAM

ME423 METALLURGICAL ENGINEERING

I. GENERAL INFORMATION

CODE	**:**	ME423 Metallurgical Engineering
SEMESTER	**:**	7
CREDITS	**:**	3
HOURS PER WEEK	**:**	5 (Theory, Practice, Laboratory)
PREREQUISITES	**:**	ME320 Metallurgical Basics I ME321 Minerals and Materials Processing I
CONDITION	**:**	Compulsory
DEPARTMENT	**:**	Metallurgical Engineering

II. LEARNING UNITS

1. FLUID-SOLID SYSTEMS

Introduction. Fluids properties. Viscosity. Change if viscosity with temperature. Non-Newtonian fluids. Solid properties. Particle size. Particle size distribution functions. Sphericity, specific and volumetric surface. Dimensional analysis and dimensional groups. Fluid flows. Resistance of immersed bodies. Velocity of terminal fall. Obstructing sedimentation.

2. CHANGE IN AGGREGATION STATES

Desintegration. Decreasing mechanisms. Failure theory. Energy-size relations. Decreasing laws. Decreasing steps: trituration and grinding. Trituration and grinding models. Mill design. Interface forces and capillary pressure. Viscous links. Agglomeration tension forces.

3. MATERIALS SEPARATION

Theories. Double electric layer. Electrical-kinetics phenomena. Interaction and stability of double layer. Additives. Magnetic flocculation. Kinetics. Mechanical separation. Solid-solid. Solid-liquid (filtration, sedimentation). Solid-gas.

4. STIRRING AND MIXING

Impeller mixers. Turbulence. Viscous turbulence. Model theory. Characteristic power of impeller mixers. Power, flow and circulation. Suspension solids. Mass transfer. Scaling. Stirring. Solid-liquid. Liquid-liquid. Solid-gas. Fluidization minimum speed. Expansion of fluid-solid bed. Elutriation velocity. Fluid-solid phase diagrams. Bulk lixiviation and percolation. Factors affecting percolation processes.

III. PRACTICE EXPERIENCE

Practice 1. Resistance of immersed bodies
Practice 2. Trituration and grinding
Practice 3. Materials separation
Practice 4. Stirring and mixing