MECHANICAL OPERATIONS

PROF. SHABINA KHANAM
Department of Chemical Engineering
IIT Roorkee

TYPE OF COURSE: Rerun | Core | UG
COURSE DURATION: 4 weeks (20 Jul’ 20 - 14 Aug’ 20)
EXAM DATE: 27 Sep 2020

PRE-REQUISITES: Nil

INTENDED AUDIENCE: college degree or with substantial industrial experience, working in the production, handling, processing, modification or characterization of particular solids (powders and bulk solids).

INDUSTRIES APPLICABLE TO: Any chemical industry which deals with particulate matter

COURSE OUTLINE:
Around 75% of chemical manufacturing processes involve small solid particles at some point. Proper design and handling of these fine particles often makes the difference between success and failure of the product. Many products such as catalysts, pigments, fertilizers, cements, ceramics and pharmaceuticals are currently manufactured in particulate forms. Mechanical Operations deal with Science and Technology of particulate matter, which is a multidisciplinary field including Materials Science, Environmental, Biomedical, Aerospace, Agricultural, Chemistry, Microbiology and Cell Science, Pharmacy and Medicine. The primary objective of this course is to
• identify the important physical mechanisms occurring in processes involving particles
• Discuss unit operation and its role in Chemical industries, characteristics of particulate solids, Principles of size reduction, particle dynamics and separation of particles
• formulate and solve mathematical descriptions of such processes

ABOUT INSTRUCTOR:
Prof. Shabina Khanam is working as Associate Professor in Chemical Engineering Department of IIT Roorkee. She has completed B.Tech degree from AMU Aligarh, Aligarh in 2000 and M.Tech and Ph.D. degree from IIT Roorkee in 2002 and 2007, respectively.

COURSE PLAN:
Week 1: Introduction Characterization of a single particle Characterization of collection of particles-1
Characterization of collection of particles-2

Week 2: Fine grain size distribution Effectiveness of screen Industrial screening equipment Size reduction

Week 3: Laws of comminution Size reduction equipment-1 Size reduction equipment-2

Week 4: Particle dynamics-settling velocity Effect of shape and wall, Hindered settling velocity Classification and Jigging