

SARDAR PATEL UNIVERSITY
Programme: MSC (Pharmaceutical Chemistry)
Semester: III
Syllabus with effect from: June 2010

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| Paper Code: PS03EPCH02 | Total Credits: 4 |
| Title Of Paper: Mechanical Operations | |

| Unit | Description in detail | Weightage (%) |
|----------|---|---------------|
| 1 | <p>Size Reductions & Separation: Size reductions. Type of Crushers, Grinder and disintegrators for coarse, intermediate and fine grinding, Power requirements, close and open circuit grindings, Laws of Crushing, Introduction to size enlargement and agglomeration.</p> <p>Size separation: Particle size analysis, Screening, Industrial screening, Equipments, Elutriation. Settling, Classification, Floatation, Electrostatic and Magnetic separation, Centrifugal separation.</p> | 25 % |
| 2 | <p>Mixing, Agitation and Conveying: Mixing and Agitation: Fundamentals of Mixing, Characteristics of Mixing equipments, Power consumption and equipments.</p> <p>Conveying: Introduction, Type, Mechanical and pneumatic conveying, elevators, storage of solids.</p> | 25 % |
| 3 | <p>Settling and Fluidization:</p> <p>Settling and sedimentation: Free and hindered settling, Type of thickness – Batch and Continuous, Settling Chambers, Cyclones and their design, ducts and fumes, flow of solids through fluids, settling velocities, stoke's law, terminal velocity</p> <p>Fluidization: Aggregate and particulate fluidization, incipient fluidization velocity, expansion of fluidized beds.</p> | 25 % |
| 4 | <p>Drying and Evaporation:</p> <p>Drying: Introduction, Objective of Drying, Definitions, Equilibrium moisture content, Type of Moisture, Mechanism of drying, rate of drying, drying curves, Driers, Type of driers, Tray drier, Truck drier, Tunnel drier, Rotary drier, Spray drier, Freeze drier, Radiation drying – Microwave drier, driers for solutions and suspensions – drum drier.</p> <p>Evaporation: Introduction, General principles of Evaporation, factors effecting evaporation - time, temperature, moisture, type of product and concentration. Evaporators, Type of Evaporators – Pan Evaporators, Evaporating stills, short tube evaporators, forced circulation evaporators, film evaporators, long tube/ climbing film evaporators, falling film evaporator, wiped film evaporators, multiple effect evaporator, evaporation under reduced pressure.</p> | 25 % |

Basic Text & Reference Books:

- **Unit Operations in Chemical Engineering**, 3rd edition, McGraw Hill and Kogakusha (1976), by W. L. McCabe and J. C. Smith.
- **Pharmaceutical Engineering**, New Age International, by K. Sambamurthy.
- **Cooper and Gunn's Tutorial Pharmacy**, Kothari Book Depot, by S. J. Carter
- **Chemical Engineering, Vol – I and II**, 2nd Edition, Asian Books Pvt. Ltd., by J. M. Caoulson and J. F. Richardson.
- **Chemical Engineer's Handbook**, McGraw Hill, by Perry and Chilton.

