PPE4I104 FUNDAMENTALS OF CHEMICAL ENGINEERING

UNIT I

Fundamentals Of Chemical Engineering And Fluid Flow

Introduction, units, concept of atomic weight, equivalent weight and moles, composition of Solids, liquids and solutions, gas constant, ideal gas law, Fluid Flow: Newtonian and Non-Newtonian fluid- flow characteristics- Bernoulli's theorem-Hagen Poisuille equation, measurement of fluid flow.

UNIT II

Mechanical Operations

Properties of solids - Sieve analysis; Laws of crushing, Crushers and grinders. Principle of separation and selection and details of equipment for screening, sedimentation, cyclones and hydro cyclones.

UNIT III

Heat Transfer

Modes of heat transfer; Heat transfer by conduction - Fourier's law, conduction across composite walls. Film concept and convective heat transfer coefficient. Heat transfer by natural & forced convection. Co current, Counter current, shell & tube heat exchangers.

UNIT I V

Mass Transfer

Principles of diffusion, theory of diffusion, Two film theory and mass transfer coefficients Humidification - operation, humidity chart, equipments - cooling towers and spray chambers Drying - Principles and definitions. Rate of batch drying- Equipments for drying.

UNIT V

Unit Operations

Absorption - Principle and equipment (packed towers and plate columns). Distillation - Vapour liquid equilibria, flash distillation, and Binary distillation. Industrial equipments for distillation Adsorption - Principle and equipment for adsorption. Extraction - Principle and equipment for adsorption. (Basic principles and equipment description only. Mathematical consideration not required for absorption adsorption, extraction)

Text Books:

1. *W.L .Mc Cabe, J.C. Smith, "Unit Operations of Chemical Engineering", McGraw-Hill, 1993.*
2. *W.L.Badger, J.T. Banchero. "Introduction to Chemical Engineering", McGraw-Hill, UK, 1997.*

References:

1. *Richardson and Coulson, "Chemical Engineering", Vol. 1 & Vol. 2, Asian Books Pvt. Ltd., India, 1996.*
2. *Chemical Engineer's handbook - Perry and Chilton.*
3. *Principles of Unit Operations - Foust A.S., Walzel.L.A. , John Wiley*

LAB

Objective:

To practice the students on various techniques for reducing and separating of particles, flow properties of fluids.

List of Experiments

1. *Flow through rough and smooth pipes.*
2. *Centrifugal pump.*
3. *Calibration of orifice meter.*
4. *Air compressor*
5. *Calibration of rotameter*
6. *Pressure drop in packed bed*
7. *Fluidization*
8. *Flow through weirs*
9. *Air-lift pump.*
10. *Open orifice and drainage time*
11. *Thermal conductivity of solids.*
12. *Heat exchanger*
13. *Stefan-Boltzman constant*
14. *Jaw crusher*
15. *Ball Mill*
16. *Screening efficiency.*
17. *Simple distillation*
18. *Steam distillation*
19. *Particle size and Surface area of filler particles*.

(Any nine Experiments)