# 16CH101 BASICS OF CHEMICAL ENGINEERING

Hours Per Week :

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | - | 4 |

Total Hours :

| L | T | P |
|---|---|---|
| 45 | 15 | - |

| WA/RA | SSH/HSH | CS | SA | S | BS |
|---|---|---|---|---|---|
| 7 | 45 | 3 | 10 | - | - |

## Course Description and Objectives:

This course deals with the fundamentals of chemical engineering and methods to solve practical problems. The objective of the course is to make the students learn about various unit operations in chemical process industries.

## Course Outcomes:

The student will be able to:

- have an insight into the fundamentals of Momentum transfer, Heat transfer, Mass transfer etc.
- familiarize with the typical chemical engineering terminology that they will come across in their future courses.

**SKILLS:**

- ü *Choose a type of extraction for given chemical process.*
- ü *Differentiate various heat exchangers.*

**UNIT - I** **L-9**

**INTRODUCTION :** Introduction, Unit operations, Unit processes, Basic laws, Useful mathematical methods, Units and dimensions, Conversion factors, Dimensional analysis.

**UNIT - II** **L-9**

**PHYSICO-CHEMICAL CALCULATIONS :** Energy, Equivalent mass (weight), Electrochemical processes, Hardness of water, Humidity and saturation.

**MATERIAL AND ENERGY BALANCES :** Material balance, Energy balance.

**UNIT - III** **L-9**

**FLOW OF FLUIDS :** Introduction, Nature of a fluid, Viscosity, Flow field, Flow of a fluid past a solid surface, Conservation of mass, Conservation of energy, Friction losses in laminar flow through a circular tube, Friction losses in turbulent flow, Pressure drop in flow through porous media, Fluidization, Cavitation, Water hammer, Pumping of fluids.

**UNIT - IV** **L-9**

**HEAT TRANSFER :** Conduction, Convection, Radiation, Flow arrangements in heat exchangers, Variation of fluid temperatures in heat exchangers, Heat transfer equipment, Evaporation.

**CHEMICAL KINETICS :** Introduction, Thermodynamics review, Determination of rate equation, Effect of temperature on reaction rate, Catalysis, Reactors.

**UNIT - V** **L-9**

**MASS TRANSFER :** Diffusion, Interphase mass transfer, Absorption, Vapor-liquid equilibrium, Relative volatility, Distillation, Reflux, Calculation of number of theoretical stages by McCabe-Thiele method. Liquid liquid extraction, Single stage equilibrium extraction, Multistage extraction process, Drying, Adsorption.

**TEXT BOOK:**

1. Salil K Ghosal, Shyamal K Sanyal and Siddhartha Datta, “Introduction to Chemical Engineering”, Tata McGraw- Hill, 2001.

**REFERENCE BOOK:**

1. Mc. Cabe W. L, Smith. J. C and Harriot. P, “Unit Operations in Chemical Engineering”, 7$^{Th}$ edition, McGraw-Hill, 2005.

**ACTIVITIES:**

- *Identification of various mass transfer equipment.*
- *Identification of various heat transfer equipment.*