

Vidyasagar University

Curriculum for Industrial Chemistry (Major) [Choice Based Credit System]

Semester-II

| Course | Course Code | Name of the Subjects | Course Type/ Nature | Teaching Scheme in hour per week | | | Credit | Marks |
|-----------------------|-------------|---|------------------------|----------------------------------|---|---|-----------|------------|
| | | | | L | T | P | | |
| CC3 | | C3T: Material and Energy Balance | Core Course-3 | 5 | 1 | 0 | 6 | 75 |
| CC4 | | C4T: Industrial aspects of Physical Chemistry | Core Course-4 | 5 | 1 | 0 | 6 | 75 |
| GE2 | | TBD | Generic Elective-2 | | | | 4/5 | 75 |
| | | | | | | | 2/1 | |
| AECC | | ENVS | AECC (Elective) | | | | 4 | 100 |
| Semester Total | | | | | | | 22 | 325 |

L=Lecture, T=Tutorial, P=Practical, CC- Core Course, TBD - To be decided, AECC- Ability Enhancement Compulsory Course

Generic Elective (GE) (Interdisciplinary) from other Department [Paper will be of 6 credits]. Papers are to be taken from following discipline: **Computer Science/Mathematics/Physics/Chemistry/Economics**

Modalities of selection of Generic Electives (GE): A student shall have to choose **04** Generic Elective (**GE1 to GE4**) strictly from **02** subjects / disciplines of choice taking exactly **02** courses from each subjects of disciplines. Such a student shall have to study the curriculum of Generic Elective (GE) of a subject or discipline specified for the relevant semester.

Semester –II
Core Course (CC)

CC-3: Material and Energy Balance

Credits 06

C3T: Material and Energy Balance

Course Contents:

Unit I: Dimensions and units:

Basic Chemical Calculations –Atomic weight, Molecular weight, Equivalent weight, Mole, composition of - (i) Liquid mixtures and (ii) Gaseous mixtures, Ideal gas law, Vapour pressure, Humidity and Saturation.

Unit II: Material Balance without Chemical Reactions

Flow diagram for material balance, simple material balance with or without recycle or by-pass for chemical engineering operations such as distillation, absorption, crystallization, evaporation, extraction, etc.

Unit III: Material Balance involving Chemical Reactions

Concept of limiting reactant, conversion, yield, Liquid Phase reaction, Gas Phase reaction with or without recycle or bypass.

Unit III: Energy Balance

Heat capacity of pure gases and gaseous mixtures at constant pressure, sensible heat changes in Liquids, Enthalpy changes.

CC-4: Industrial aspects of Physical Chemistry

Credits 06

C4T: Industrial aspects of Physical Chemistry

Course Contents

Unit I: Surface Chemistry and Interfacial phenomenon:

Absorption isotherm, sols, Gels, Emulsions, Micro emulsion, Micelles, Aerosols, Effects of surfactants, hydrotropes.

Unit II: Catalysis

Introduction Types – Homogeneous and Heterogeneous. Basic principles, mechanism, Factors affecting the performance, Introduction to phase. Transfer catalysis. Enzyme catalyzed reactions rate model, industrially important reactions.

Unit III: Kinetics

Order, Molecularity, Rate equation for 1st & 2nd order reaction. Effect of temperature on rate constant, energy of activation, Chain reaction.

Unit IV: Thermodynamics

Gibbs Free energy, van't Hoff equation and its application in industry.

Gibbs Phase rule. Simple systems equation. Phase equilibrium of H₂O and sulphur. Thermal analysis.