

Branch  $\rightarrow$  Refinery and Petrochemicals Engg. (1)

Sub  $\rightarrow$  Reaction Engineering  
Total marks  $\rightarrow$  100  $\xrightarrow{\times}$   $\xrightarrow{\times}$   $\xrightarrow{\times}$  Total Teaching hr - 105

CO1  $\rightarrow$  To understanding the basic concept of chemical reaction engineering and their applications in Refinery and Petrochemical Engineering.

LO1 To know rate of reaction, rate constant and classification of reaction.

Content  $\rightarrow$  Chemical kinetics, classification of reaction variables affecting the rate of reaction, Definition of reaction rate, Rate constant (K). Elementary and Non-elementary reaction.

Method of Assessment  $\rightarrow$  Internal, Pen Paper 2 Test, Surprise Test, Assignment, Quiz.

Teaching hr  $\rightarrow$  10

Marks  $\rightarrow$  10

LO2  $\rightarrow$  To calculate the reaction rate constant and reaction of temperature.

Content  $\rightarrow$

concentration dependent term of a rate equation, order of reaction, effect of temperature on reaction rate, Arrhenius theory, activation energy and temperature dependency. Collision theory, transition state, thermodynamic method of Assessment  $\rightarrow$  External, End Semester theory exam.

Teach hr  $\rightarrow$  10

Marks - 10

CO2 → To understanding the interpretation of Batch Reactor data and order of reaction.

LO3 → To derive the reaction rate mechanism for Half life time, zero, first, and Nth order of reaction.

content → <sup>Reaction rate mechanism,</sup> order of reaction, zero order reaction

First order reaction, Second and Nth order reaction, Half time, Autocatalytic reaction.

Method of Assessment → External, End semester theory exam.

Teaching hr → 10 marks → 10

LO4 → To Determination rate constant (k), ~~and~~ reaction rate for zero, <sup>first</sup> second order and Half life time reaction.

content → order of reaction, zero, first, second and Half time, life

Method of Assessment → External, End semester theory exam, surprise test.

Teach hr → 10 marks → 10

CO3 → To understanding the basic concept of Batch reactor data, interpretation data, and thermal characteristics of reactor.

LO5 →



(3)

LO5 → To explain the differential and integral method analysis data for Batch reactor.

Content → Interpretation of Batch reactor data, Variable volume, constant volume batch reactor, differential and integral method of analysis data, Total pressure method of analysis of reactor data.

Method of Assessment → External, End semester theory exam, surprise test,

Teach hr → 12

marks → 10

LO6 → To know Basic concepts of thermal characteristics of reactors.

Content → Batch, (CSTR) Continuous stirred tank reactor, PFR, Isothermal condition of reactor, Adiabatic and Non-adiabatic operation,

Method of Assessment → Internal, Pen Paper test, surprise test, Assignment, Quiz

Teaching hr → 09

marks → 10

LO4 → To derive the design equation for Batch reactor, continuous stirred tank reactor [CSTR], and plug flow reactor [PFR]

LO7 → To explain the design equation for Batch reactor and continuous stirred tank reactor (C.S.T.R).

content → ideal reactor, concept of identity, Types of chemical reactor, configuration of reactor and design consideration, Comparison of Batch and continuous operation, Batch & continuous stirred tank reactor (C.S.T.R) performance equation, space time, space volume.

Method of Assessment → External, End semester theory exam, surprise test,

Teaching hr → 12

Marks → 10

LO 8 → To know the basic concept of CSTR and PFR for first order reaction, and calculate the reaction rate and rate constant.

content → plug flow reactor (PFR), performance equation for plug flow reactor, combined reactor system, comparison of combined reactor system, application and limitation of reactor system. Comparing CSTR & PFR, First order reaction in CSTR series, PFR in series, CSTR & PFR in series and CSTR and PFR in parallel

Method of Assessment → External, End semester theory exam, surprise test

Teaching hr. → 12

Marks → 10

LO 5 → To understanding the basic concept of Heterogeneous process reactors in reaction engineering and their application in refinery industry



Lo9 → To explain ~~the types of~~ Heterogeneous reaction and Nature of catalytic reactions.

Content → Heterogeneous Processes, types of Heterogeneous reactions, Catalysis, Nature of catalytic reaction, mechanism of catalytic reactions, Solid Catalyst, properties of solid catalyst, Surface area, Void volume, Density, pore volume Distribution.

Method of Assessment → Internal, pen paper test, surprise test, Assignment, quiz.

Teaching hr → 10

Marks → 10

Lo10 → To explain the catalyst preparation, catalyst deactivation and poisoning of catalyst.

Content → Catalyst preparation, catalyst promoter and inhibitor, catalyst deactivation and poisoning.

Method of Assessment → External, End semester theory exam, surprise test

Teaching hr → 10

Marks → 10

